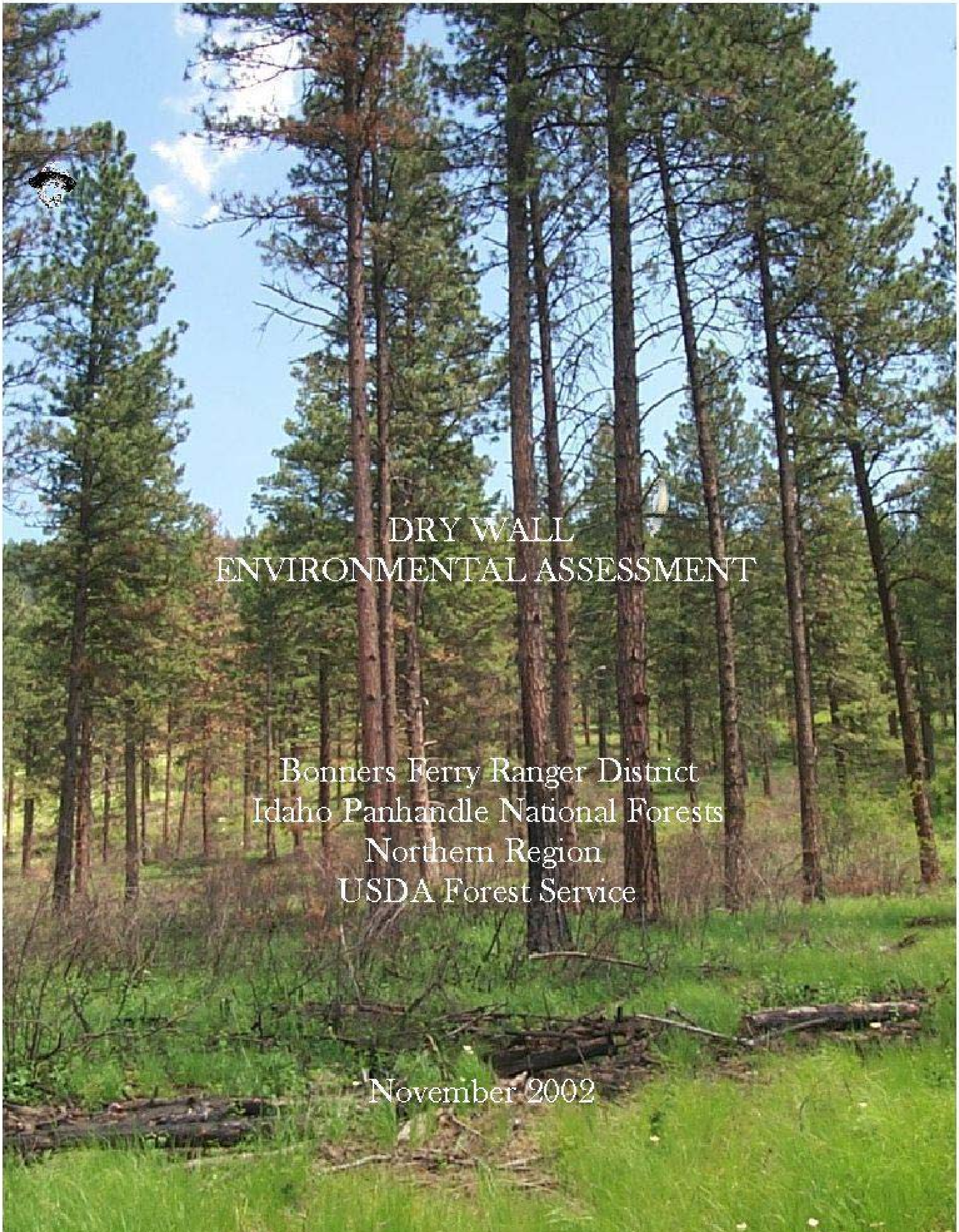


DRY WALL
ENVIRONMENTAL ASSESSMENT

Bonners Ferry Ranger District
Idaho Panhandle National Forests
Northern Region
USDA Forest Service

November 2002

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Chapter 1 - Purpose and Need

1.1 Project Area and Location

The Dry Wall project area is located on public lands administered by the Bonners Ferry Ranger District. The project area is located approximately ten air miles west of Bonners Ferry, Idaho, in the southern end of the Purcell Mountains. The project area is bounded by Meadow Creek to the south, and on the east by the Moyie River. Wall Mountain lies roughly 2.5 miles northwest of the project area. Major drainages within the project area include Wall Creek and Meadow Creek. The assessment area encompasses about 4,500 acres, of which approximately 3,700 acres are National Forest lands on the Bonners Ferry Ranger District, and 800 acres of private land (Figure 1-1), within all or portions of T63N, R2E, sections 8, 9, 10, 11, 14, 15, 16, and 17, Boise Meridian.

1.2 Purpose and Need

The purpose and need for the Dry Wall 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 Wall Creek and Meadow Creek drainages. Based on this information the purpose and need, or objectives, for entering the Dry Wall project area are to:

- Improve ecosystem composition, structure, and diversity of the landscape by providing for tree species and stocking levels similar to historic levels that better resist insects, diseases, and wildfire, and that wildlife are adapted to. 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.
    - Improve wildlife habitat within the project area for species that use these dry forest types (e.g., flammulated owl)
    - Reestablish western white pine as a significant component of its historic range

- The 1897 Organic Act states, "No national forest shall be established, except to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States." Therefore, one of the objectives for entering the Dry Wall assessment area will be to contribute to the short-term supply of timber to help meet the national demand for wood products and employment opportunities. The amount of timber harvested will be a by-product of meeting the ecosystem composition and structure 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 Dry Wall Project Area are briefly described below.

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 Dry Wall 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 Dry Wall project is located in the Kootenai River subbasin, one of 164 subbasins in the Columbia River Basin.

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).

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 Meadow Creek and Wall Creek watersheds. The North Zone Geographic Assessment (NZGA) defines forests in the Dry Wall project area as "Low Integrity/High Risk Landscapes." Some of the specific findings that relate to the Dry Wall 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 Dry Wall 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.

D. Dry Wall 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 Dry Wall 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 Dry Wall area provides the restoration opportunities described above.

1.4 Proposed Action

The proposed action includes vegetation treatments on approximately 750 acres. Proposed silvicultural treatments would include thinning, regeneration, sanitation, and salvage harvests. Logging systems would include tractor, skyline and helicopter. Fuels would be treated using prescribed fire and mechanical piling. Approximately 1.5-2.0 miles of existing roads would be reconstructed. No new road construction is proposed. 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. In fact, in some cases there would be no removal of forest products.

1.5 Scope of the Analysis

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

1.6 Policy Direction and Legal Guidance

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) 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

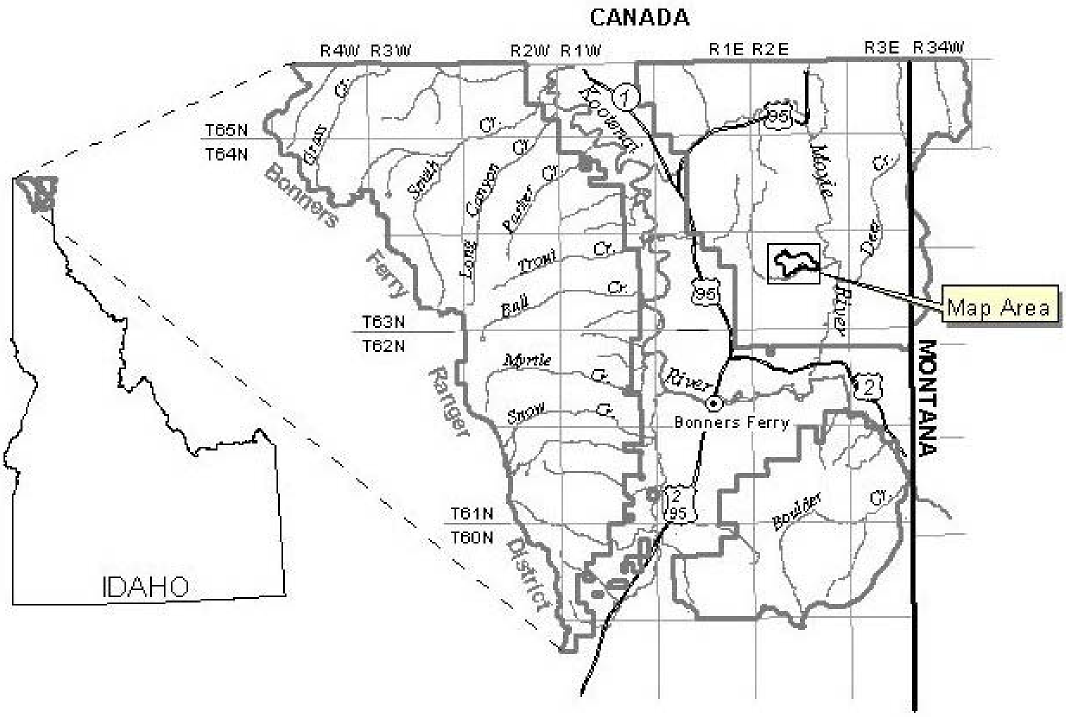
2) Executive Orders

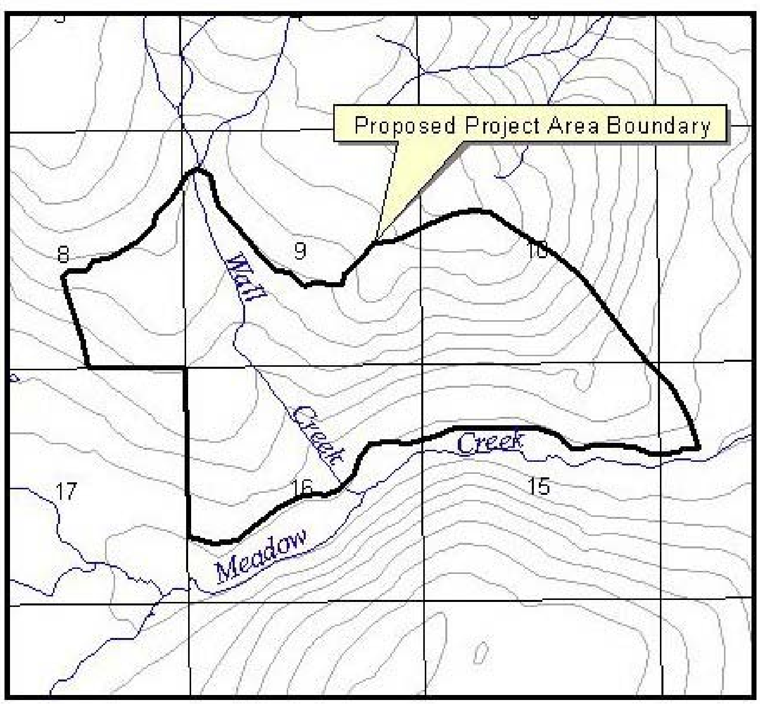
- Executive Order 11593 (protection and enhancement of the cultural environment)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)

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.

Figure 1-1. Proposed Project Area Boundary





This proposal and the additional action alternatives are consistent with the Agenda. Watershed health and restoration would be addressed through road maintenance. 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 or putting into storage roads intended for potential future management. Recreation would be addressed by managing existing recreation opportunities in a way that protects the natural resources in the Dry Wall project area.

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."

The Dry Wall project is consistent with the National Fire Plan 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.

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 that none of the proposed activities would change current access, a roads analysis was not completed for this project.

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 Dry Wall 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** (69% of area) consists of lands designated for timber production.

- **Management Area 9** (31% 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.

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 (Bonners Ferry District Ranger) 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

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

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 Dry Wall 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 Dry Wall 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). Based on field reconnaissance the fire average fire return interval for the Dry Wall project area was estimated at 44 years, with a range of 37 to 60 years (Behrens 2002). 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.
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.
Risk of Root Diseases in Dry Forest Types	Given the dominance of species (Douglas-fir and grand fir) on the landscape that are susceptible to root diseases changes in root disease is an important indicator of ecosystem health. The SIMPPLLE model will be used to estimate changes in risk relative to no action.
Air Quality	Emissions from prescribed burning and burning activity fuels (i.e., burning piles of logging slash) related to vegetation management will create different levels of emissions. FOFEM (First Order Fire Effects Model) will be used to estimate differences in emissions between alternatives.
Coarse Woody Debris (CWD)	CWD is critical for maintaining functioning ecosystems in Rocky Mountain forests (Graham et al 1994). Changes in CWD will be estimated based on the method of fuels treatment. FOFEM will also be used to estimate differences in residual CWD between alternatives.
Restoration Costs	Restoring forested ecosystems carries with it some inherent costs. Some of these costs can be mitigated through revenues, i.e., from the sale of wood products harvested in order to meet desired ecosystem objectives. These costs and revenues will be compared for each alternative.

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, endangered, Forest Service sensitive 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 Dry Wall project, based on known species distribution and habitat availability. Table 2-2 lists species (or habitats) required level of analysis. Species (or their habitats) that are considered present and possibly affected in a measurable way by the proposed actions will be carried forward into Chapter 4. Species (and their habitats) absent from the project area, or not measurably affected by the proposed actions (i.e., either no effect or impacts would be at a level that would not influence species use or occurrence), are discussed in Appendix A.

Table 2-2. Wildlife Presence and Level of Analysis

Species: Common Name	Species: Scientific Name	Species or Habitat Present on District?	Species or Habitat Present in Project Area?	Species or Habitat Measurably Affected?	Species Further Analyzed?
Threatened and Endangered					
Northern gray wolf	*Canis lupus*	Yes	No	No	No
Woodland caribou	*Rangifer tarandus caribou*	Yes	No	No	No
Threatened					
Bald eagle	*Haliaeetus leucocephalus*	Yes	No	No	No
Grizzly bear	*Ursus arctos horribilis*	Yes	No	No	No
Canada lynx	*Lynx canadensis*	Yes	Not within harvest units	No	No
Sensitive					
Common loon	*Gavia immer*	Yes	No	No	No
Harlequin duck	*Histrionicus histrionicus*	Yes	No	No	No
Northern goshawk	*Accipiter gentilis*	Yes	Yes	Yes	Yes
Peregrine falcon	*Falco peregrinus anatum*	Possible	No	No	No
Flammulated owl	*Otus flammeolus*	Yes	Yes	Yes	Yes
Black-backed woodpecker	*Picoides arcticus*	Yes	Yes	Yes	Yes
White-headed woodpecker	*Picoides albolarvatus*	Yes	Yes	Yes	Yes, as a guild with flammulated owl
Fisher	*Martes pennanti*	Yes	Yes	No	No
Wolverine	*Gulo gulo*	Yes	Not within harvest units	No	No
Northern bog lemming	*Synaptomys borealis*	Yes	Not within harvest units	No	No
Townsend's big-eared bat	*Plecotus townsendi*	Yes	No	No	No
Coeur d'Alene salamander	*Plethodon vandykei idahoensis*	Yes	No	No	No
Northern leopard frog	*Rana pipiens*	Possible	Yes	No	No
Boreal toad	*Bufo boreas*	Yes	Yes	No	No
Management Indicators Species					
Pileated woodpecker	*Dryocopus pileatus*	Yes	Yes	Yes	Yes
White-tailed deer	*Odocoileus virginianus*	Yes	No suitable wintering habitat	No	No
American Marten	*Martes americana*	Yes	Yes	No	No
Other Species and Habitats					
Rocky Mountain elk	*Cervus elaphus*	Yes	Yes	Yes	Yes
Forest land birds	N/A	Yes	Yes	Yes	Yes
Snag habitat	N/A	Yes	Yes	Yes	Yes

From the list in Table 2-2 the following species (or their habitats) are considered present and possibly affected in a measurable way by the proposed actions and will be carried forward into Chapter 4:

- Snags
- Northern goshawk
- Flammulated owl (includes white-headed woodpecker as a guild)
- Black-backed woodpecker
- Pileated woodpecker
- Forest land birds

C. Watershed and Fisheries

The current water quality standards do not include specific designated uses for Wall Creek (IDEQ 2002a). Prior to designation, undesignated surface waters are protected for all recreational uses and fish, shellfish, and wildlife, wherever attainable. Attainable beneficial uses for Wall Creek are cold-water biota, salmonid spawning, and secondary contact recreation. However, all but the lower reaches of Wall Creek have a very steep gradient and this stream has only minimal potential as a fishery (Parametrix 2002). Meadow Creek has designated uses for cold-water communities, salmonid spawning, and primary contact recreation. Meadow Creek is also listed as a designated small public water supply for the Bee Line Water Association (IDEQ 2002a).

Table 2-3 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 2-3. Principle Issues and Indicators: Watershed and Fisheries

Principle Issue	Principle Issue Indicators
Hydrologic Function	Road density in miles per square mile.
Riparian Function	Equivalent clearcut area (ECA; i.e., hydrologic openings) within RHCAs, riparian road density in miles per square mile.
Soil Erosion And Mass Wasting	Percent of ground with detrimentally impacted soils, WEPP model erosion and sediment delivery estimates in tons per acre, road density on sensitive landtypes in miles per square mile
Stream Crossings	Number of stream crossings
Water Yield	Increase in equivalent clearcut acres (ECAs)
Cumulative Hydrologic Effects	Proper Functioning Condition (PFC) analysis and trend
Salmonid Populations (westslope cutthroat trout)	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
      (c) Plants
   3) Sensitive Species
      (a) Wildlife
      (b) 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) Harvest Related Increases in Landslide Potential
      (g) Changes in Stream Dynamic Equilibrium
      (h) Stream Survey Data
      (i) Increases in Water Yield
      (j) Increased rain-on-snow risk

2.4 Alternatives Considered But Eliminated From Further Study

A. Maximum Timber

The Maximum Timber alternative was based on the IPNF's Forest Plan (1987) timber management goals, which provided for an annual allowable sale quantity (ASQ) of 280 million board feet (MMBF). The primary goals on over 1.5 million acres of the IPNF at that time called for the long-term growth and cost-effective production of commercially valuable wood products. This type of management was based mostly on even-aged silviculture (clearcut, seed tree and shelterwood) and capital investments in transportation systems needed to access timber stands. Such an alternative in the Dry Wall project area would treat over 600 acres, mostly with even-aged regeneration harvests, produce about 8 MMBF, and require about three miles of new road construction. Since the Forest Plan was implemented in 1987, significant changes in management philosophy have occurred and the IPNF now sells about 60 MMBF annually, or about 80% less than the ASQ. From an overall multiple resource perspective, given the changes in management philosophy, this did not appear to be a reasonable alternative. For this reason this alternative was eliminated from detailed 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 three "action" alternatives. These alternatives were developed to address the significant issues that were outlined previously in this chapter.

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, 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.

B. Alternative 2 - Proposed Action

Under Alternative 2 the restoration of forest composition and structure would be met through a combination of silvicultural treatments and prescribed burning. Group selection prescriptions (uneven-aged management) in units 1, 5, 6, and 7 (324 acres) would be designed to create a mosaic of forested openings and thinned areas. The openings would promote ponderosa pine and larch regeneration and the thinned areas would favor the retention of the largest existing ponderosa pine and larch.

A combination of commercial thinning and sanitation-salvage cutting would be conducted in units 2, 3, 4, 8, and 9 (134 acres). Treatments would be designed to improve the health and vigor of the residual stands by favoring the development of the biggest and best quality trees. Once again, ponderosa pine, western larch and white pine would be the favored species. Sanitation-salvage would occur in areas where small pockets (generally less than ¼ acre) of insect and disease occur. Examples would be areas where the risk of mountain pine beetle infestation in lodgepole pine is high, or root disease areas in Douglas-fir and grand fir.

Units 10 and 11 (251 acres) would be group selection units designed to create forested openings large enough to regenerate larch and western white pine. The size of openings would range from 1-3 acres and approximately 10% of the area (25 acres) would be regenerated. Creating forest openings of well-spaced, genetically improved western white pine would reduce hazardous fuel ladders that have built up in these forest types. In addition, western larch, which is highly resistant to fire and insects and disease, would also be a featured species in these openings. In between the forested openings commercial thinning would also occur. The treatments would focus on removing the smaller trees from lower crown classes while leaving the larger and more dominant trees. A mix of species would be retained, but ponderosa pine, western larch, and white pine would be preferred.

No timber harvest would occur in unit 12 (24 acres), but this unit would be treated with prescribed fire in conjunction with surrounding units (6 and 7). Only small changes in stand structure are expected to occur as fire would only kill the smaller Douglas-fir.

The timber sale contract would include a road maintenance package and the replacement of one undersized culvert on FS 2542. The replacement of this culvert constitutes the only road reconstruction included under Alternative 2. In addition, no new road construction would occur under Alternative 2. The treatments for Alternative 2 are summarized in Table 2-4.

Table 2-4. Alternative 2 Treatment Summary

Unit	Acres	Rx	Logging System	Fuels Treatment	PCC Before Treatment	PCC After Treatment
1	42	GS	G	GP	70	35-50
2	23	CT	G	GP	65	50-55
3	11	CT/SS	G	GP	65	45-50
4	9	CT/SS	G	GP	65	45-50
5	24	GS	ST	GP	70	35-50
6	115	GS	H	UB	70	35-50
7	143	GS	H	UB	70	35-50
8	45	CT	G	GP	65	50-55
9	46	CT/SS	H	GP	80	45-50
10	108	GS/CT	G	GP	60	35-60
11	143	GS/CT	ST	GP	60	10-60
12	24	Burn	NA	UB	55	50-55
TOTAL	733					

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

C. Alternative 3

The objectives of Alternative 3 would be the same as Alternative 2, i.e., restoration of forest composition and structure, but the methods used to meet these objectives would be different. Under Alternative 3 commercial timber harvest would not be used. Instead, only pre-treatment of forest fuels (i.e., slashing of the smaller understory) and prescribed fire would be used. The BEHAVE model was used to determined the type of fire behavior required to create enough mortality in the understory to meet desired restoration objectives.

In units 2, 3, 4, 8, 9, and 12 (158 acres) prescribed fire only would be used to thin stands. In units 1, 5, 6, 7, 10, and 11 (575 acres) some slashing of understory fuels would be required prior to burning in order to generate the type of fire behavior needed to meet restoration objectives.

No new road construction or road reconstruction (culvert replacement on FS 2504) would occur under Alternative 3. The treatments for Alternative 3 are summarized in Table 2-5

The proposed treatment areas for both Alternative 2 and 3 are displayed in Figure 2-1. Table 2-6 provides a "Summary Comparison of Alternatives," Table 2-7 provides a "Detailed Comparison of Alternatives," and Table 2-8 provides a "Comparison of Issues and Alternatives."

Table 2-5. Alternative 3 Treatment Summary

Unit	Acres	Rx	Logging System	Fuels Treatment	PCC Before Treatment	PCC After Treatment
1	42	Underburn	NA	SUB	70	30-40
2	23	Underburn	NA	UB	65	55-60
3	11	Underburn	NA	UB	65	55-60
4	9	Underburn	NA	UB	65	55-60
5	24	Underburn	NA	SUB	70	30-40
6	115	Underburn	NA	SUB	70	30-40
7	143	Underburn	NA	SUB	70	30-40
8	45	Underburn	NA	UB	65	55-60
9	46	Underburn	NA	UB	80	65-70
10	108	Underburn	NA	SUB	60	10-50
11	143	Underburn	NA	SUB	60	10-50
12	24	Underburn	NA	UB	55	50-55
TOTAL	733					

Rx = Silvicultural prescription
PCC = Percent canopy closure
SUB = Slash and Underburn

Table 2-6. Summary Comparison of Alternatives

Treatment Type	Alt 1	Alt 2	Alt 3
Regeneration Cuts			
Group Selection (uneven-aged)	0	575	0
TOTAL Regeneration Cuts	0	575	0
Partial Cuts			
Commercial Thin/Sanitation Salvage	0	66	0
Commercial Thin	0	68	0
TOTAL Partial Cuts	0	134	0
Prescribed Burn w/ Slashing (no harvest)	0	24	575
Prescribed Burn Only (no slashing)	0	0	158
Total Acres Harvested	0	709	0
Logging System			
Ground-based	0	238	0
Skyline	0	167	0
Helicopter	0	304	0
Fuels Treatment			
Underburn	0	282	733
Grapple Pile	0	451	0
Total Miles or Improvements	0	733	733
Transportation Miles			
New Construction – Temporary Road	0	0	0
Reconstruction	0	1 culvert	0

Figure 2-1. Proposed Treatment Areas

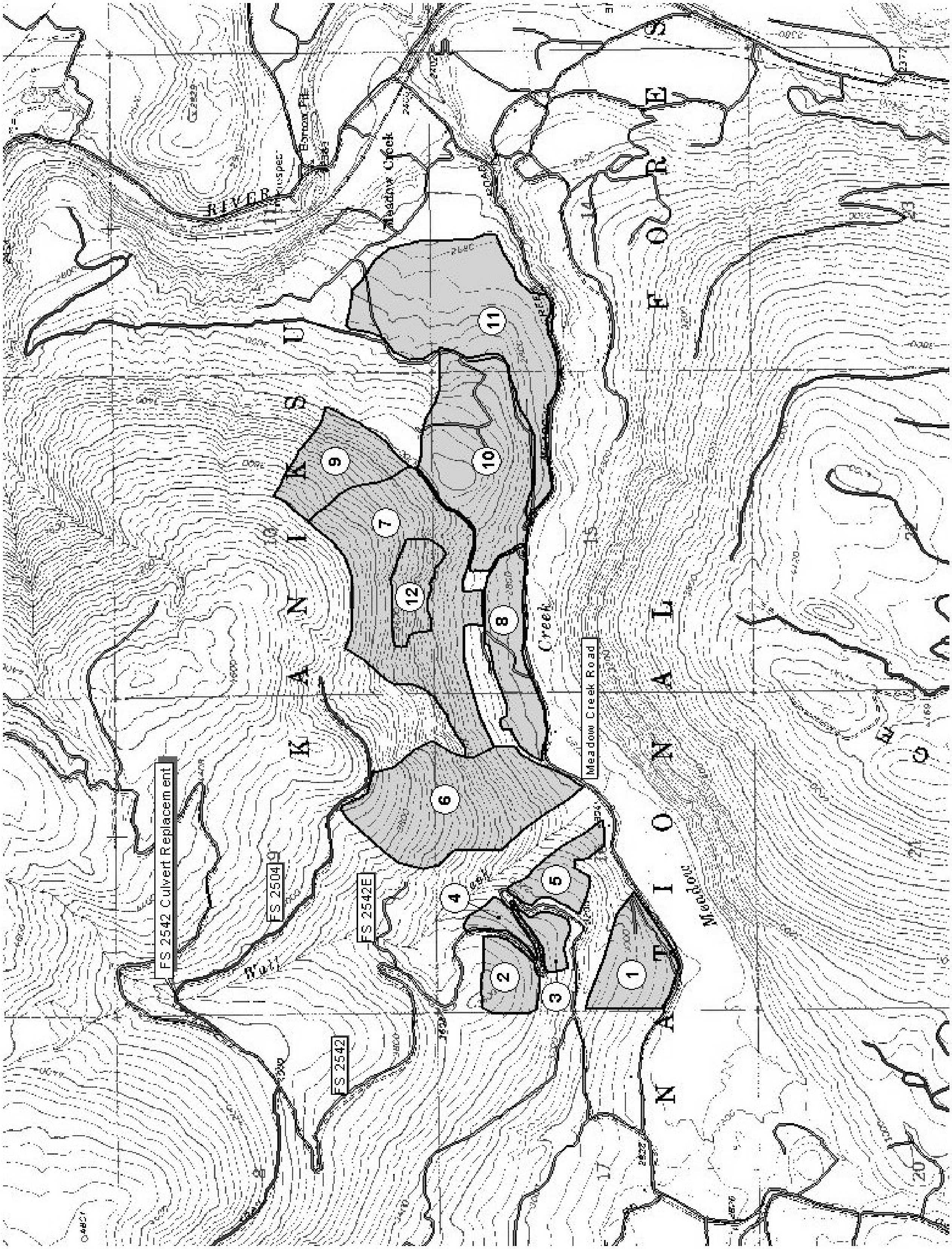


Table 2-7. Detailed Comparison of Treatment Alternatives

Unit(s)	Acres	General Stand Conditions	Description of Treatment	
			Alternative 2	Alternative 3
2, 3, 4, 9	89	Generally healthy, 80-90 year-old dry forest stands, dominated by Douglas-fir. These stands are overstocked and ponderosa pine and larch are being crowded out. In addition, these stands (Units 2, 3, 4 and 9) contain varying amounts of insect and disease problems, i.e., mountain pine beetle, root diseases, mistletoe, etc.	Commercial Thin (CT) - A combination of commercial thinning sanitation/salvage would be prescribed to maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. In particular, the best quality ponderosa pine and western larch would be retained in order to diversify species composition. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown, or trees with insect and disease problems. Examples would include lodgepole pine with mountain pine beetle, or high-risk of attack, Douglas-fir and grand fir with root disease, western larch with mistletoe, and grand fir with scolytus beetles.	Underburn (UB) - Prescribed fire only would be used to thin selected stands. Mortality would primarily be a function of the condition and arrangement of existing fuels. However, most of the mortality would be expected in the smaller diameter trees, but some unwanted mortality in the desirable species (i.e., ponderosa pine, western larch, and white pine) would be expected.
8	45	Generally healthy, 80-90 year-old moist forest stands, dominated by western larch. These stands are overstocked the residual trees are beginning to lose their vigor.	Commercial Thin (CT) - Same as units 2, 3, 4, and 9 except western larch and white pine would be the primary featured species.	Underburn (UB) - Same as units 2, 3, 4, and 9
1, 5	66	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	Group Selection (GS) - The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir. Removing the small diameter firs would create openings up to three acres in size. These openings would be regenerated with ponderosa pine and larch. Portions of these stands that contain smaller-diameter, dense pine and larch would be thinned to improve their health and vigor..	Slash - Underburn (SUB) - Prescribed fire would be used to thin selected stands. Some slashing of understory trees on about 50% of the area would be required to generate fire behavior needed to kill overstory trees and meet restoration objectives. Mortality would primarily be a function of the condition and arrangement of existing fuels. However, most of the mortality would be expected in the smaller diameter trees, but some unwanted mortality in the desirable species (i.e., ponderosa pine, western larch, and white pine) would be expected

Unit(s)	Acres	General Stand Conditions	Description of Treatment	
			Alternative 2	Alternative 3
*6 ,*7	258	These units include dry forest recruitment old growth that historically was characterized by open-grown large-diameter ponderosa pine and western larch. The age of the trees in these stands range from 80-350 years. The older age classes are dominated by ponderosa pine and western larch that were able to survive frequent low-intensity fires. The youngest 80-year old age classes are dominated by Douglas-fir and grand fir that have taken over due to fire suppression.	Group Selection (GS) - Same as units 1 and 5 except these stands have more old growth characteristics.	Slash - Underburn (SUB) - Same as units 1 and 5
10, 11	251	These stands contain moist forest types, that transition into dry forest types on the slopes above. These stands provide the opportunity for restoration of white pine and western larch, which are being replaced by Douglas-fir and grand fir. Ponderosa pine represents a minor component of these stands. These stands also contain varying amounts of insect and problems, i.e., mountain pine beetle, root diseases, mistletoe, etc. Approximately 30 acres of these stands were regenerated in 1994 using a group selection prescription.	Group Selection (GS) - A group selection would be prescribed to regenerate white pine and western larch in openings of one to three acres. In unit 10, canopy cover would be no less than 35% in the dry forest types. This would be a continuation of a previous prescription, which called for 10% of the acres in these stands to be regenerated every 10 years. An estimated 25 acres would be regenerated with this entry. In addition, commercial thinning would be implemented between the groups to maintain the health and vigor of these portions of the stands. In particular, the best quality white pine, western larch, and ponderosa pine would be retained in order to diversify species composition. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown.	Slash - Underburn (SUB) - Prescribed fire would be used to thin selected stands. Slashing would occur prior to burning on about 10% of the area in 1-3 acre groups (no less than 35% canopy cover in unit 10 dry forest types). This would create openings needed for white pine and larch regeneration. Only prescribed fire, with no slashing, would be conducted in the remainder of these stands. In these areas mortality would primarily be a function of the condition and arrangement of existing fuels. However, most of the mortality would be expected in the smaller diameter trees, but some unwanted mortality in the desirable species (i.e., ponderosa pine, western larch, and white pine) would be expected
12	24	Conditions are the same as described for units 6 and 7, except this stand is not suitable for timber harvest.	Underburn (UB) - No timber harvest will be conducted in this stand. Prescribed fire will be used to thin the understory, which is composed mostly of small-diameter Douglas-fir. This unit will be burned in conjunction with units 6 and 7.	Underburn (UB) - Same as Alternative 2

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

Table 2-8. 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 reduction in risk of stand-replacing fire on dry forests No reduction in risk of root-disease on dry forests CWD would exceed recommended levels on dry forest types Total emissions from burning (0) Restoration benefit/cost ($M) Restoration benefits (0) Restoration costs (0) Net Value (0)	Acres reforested with PP (110), WL (25), and WP (25) Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine (110) Risk of stand-replacing fire on dry forests reduced by 90% Risk of root disease on dry forests reduced by 65% Would meet recommended CWD levels on all forest types. Total emissions from burning (198) Restoration benefit/cost ($M) Benefit ($786 to $1,386) Costs ($302) Net Value (+$484 to $1,084)	Acres reforested with PP (110), WL (25), and WP (25) Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine (306) Risk of stand-replacing fire on dry forests reduced by 70% Risk of root disease on dry forests reduced by 22% CWD would exceed recommended levels on dry forest types that are slashed and underburned (units 1, 5, 6, 7) Total emissions from burning (768) Restoration benefit/cost ($M) Benefit ($0) Costs (-$1,116 to 1,566) Net Value (-$1,116 to 1,566)
Wildlife	Snags - trend toward increased dominance of shade-tolerant species (Douglas-fir and grand fir); decline in abundance of large, long-standing snags (i.e., western larch and ponderosa pine) Northern goshawk – Long-term trend toward decreased suitable habitat. Flammulated owl - Long-term trend toward decreased suitable habitat. Black-backed woodpecker – decrease in large snags; overall increase in snag abundance, and nesting and foraging	Snags – trend toward increased abundance of long-standing, large snags (i.e., ponderosa pine and western larch) Northern goshawk – Long-term trend toward increased suitable habitat. Flammulated owl – Long-term trend toward increased suitable habitat. Black-backed woodpecker - increase in large snags; harvested areas remain as relatively poor habitat	Snags – trend toward increased abundance of long-standing, large snags (i.e., ponderosa pine and western larch), but some losses with prescribed fire Northern goshawk – Short-term reduction in capable nesting habitat following fire; long-term trend toward increased suitable habitat. Flammulated owl - Short-term reduction in capable habitat following fire; long-term trend toward increased suitable habitat Black-backed woodpecker –influx of burned trees and temporary flush of high-quality

Issue	Alternative 1	Alternative 2	Alternative 3
	habitat Pileated woodpecker – Long-term trend toward decreased habitat quality Forest land birds - Long-term trend toward decreased habitat quality for dry-forest species	Pileated woodpecker – Short-term decline in habitat quality; long-term trend toward increased habitat quality Forest land birds - Long-term trend toward increased habitat quality for dry-forest species	black-backed woodpecker habitat Pileated woodpecker - Short-term increase in foraging habitat; long-term trend toward increased habitat quality Forest land birds - Long-term trend toward increased habitat quality for dry-forest species
Watershed and Aquatics Habitat	Riparian Function – No direct short-term change; long-term increased risk of loss of function due to severe fire Soil Erosion-Mass wasting – no direct change in detrimentally impacted soils; increased long-term risk due to severe fire Stream Crossings – high-risk culvert at FS 2504 not replaced Water Yield – no short-term changes in water yield; long-term increased risk of increased peak flows due to severe fire. Salmonid Populations – no short-term risk of loss; long-term risk of loss due to of severe fire.	Riparian Function - No direct short-term change; long-term decreased risk of loss of function due to severe fire Soil Erosion-Mass wasting – increase in detrimentally impacted soils of 1.6%, but less than 15% of activity area; decreased long-term risk due to severe fire Stream Crossings – high-risk culvert at FS 2504 replaced Water Yield - no short-term changes in water yield; long-term reduced risk of increased peak flows due to severe fire Salmonid Populations – no short-term risk of loss; long-term reduced risk of loss due to of severe fire.	Riparian Function - No direct short-term change, unless prescribed fire escapes; long-term decreased risk of loss of function due to severe fire Soil Erosion-Mass wasting – increase in detrimentally impacted soils of 0 to 2% of most treatment units, 6% in unit 11; decreased long-term risk due to severe fire Stream Crossings – high-risk culvert at FS 2504 not replaced Water Yield - no short-term changes in water yield; long-term reduced risk of increased peak flows due to severe fire Salmonid Populations –short-term risk of loss if prescribed fire gets out of control; long-term reduced risk of loss due 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.

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.

B. 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.

C. Noxious Weeds

1) Noxious weed treatment would be conducted according to guidelines and priorities established in the Bonners Ferry Noxious Weed Control Project FEIS (USDA 1995). Methods of control may include biological, chemical, mechanical and cultural. Herbicide treatment would not exceed the maximum treatable acres established under the Bonners Ferry Noxious Weed Control Project FEIS adaptive strategy.

2) Gravel or borrow pits to be used during road maintenance 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 landings and other areas of new disturbance (including maintenance on existing roads) 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.

D. Public Health and Safety

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

2) 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.

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

4) 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.

E. Road Reconstruction and Maintenance

1) 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.

F. Soils

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

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

3) In units 1, 8, 10, and 11 only existing skid trails would be used or the units would be winter logged to prevent new soil compaction above existing levels.

4) 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.

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

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

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

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

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

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

11) Broadcast burning would be conducted when soil moistures exceed 25%.

G. 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).

H. 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) During project implementation, activities would be modified to protect any identified sensitive plant populations.

I. Watershed and Fisheries

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

J. Wildlife

1) A snag analysis for the Dry Wall area was conducted and it was determined that as a whole the area exceeds standards in the "Regional Snag Management Protocol" (January 2000) for snags. The District would maintain snag densities by following the guidelines listed Table 2-9. The Dry Wall 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.

Table 2-9. Snag Management Guidelines (from R1 Protocols)

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

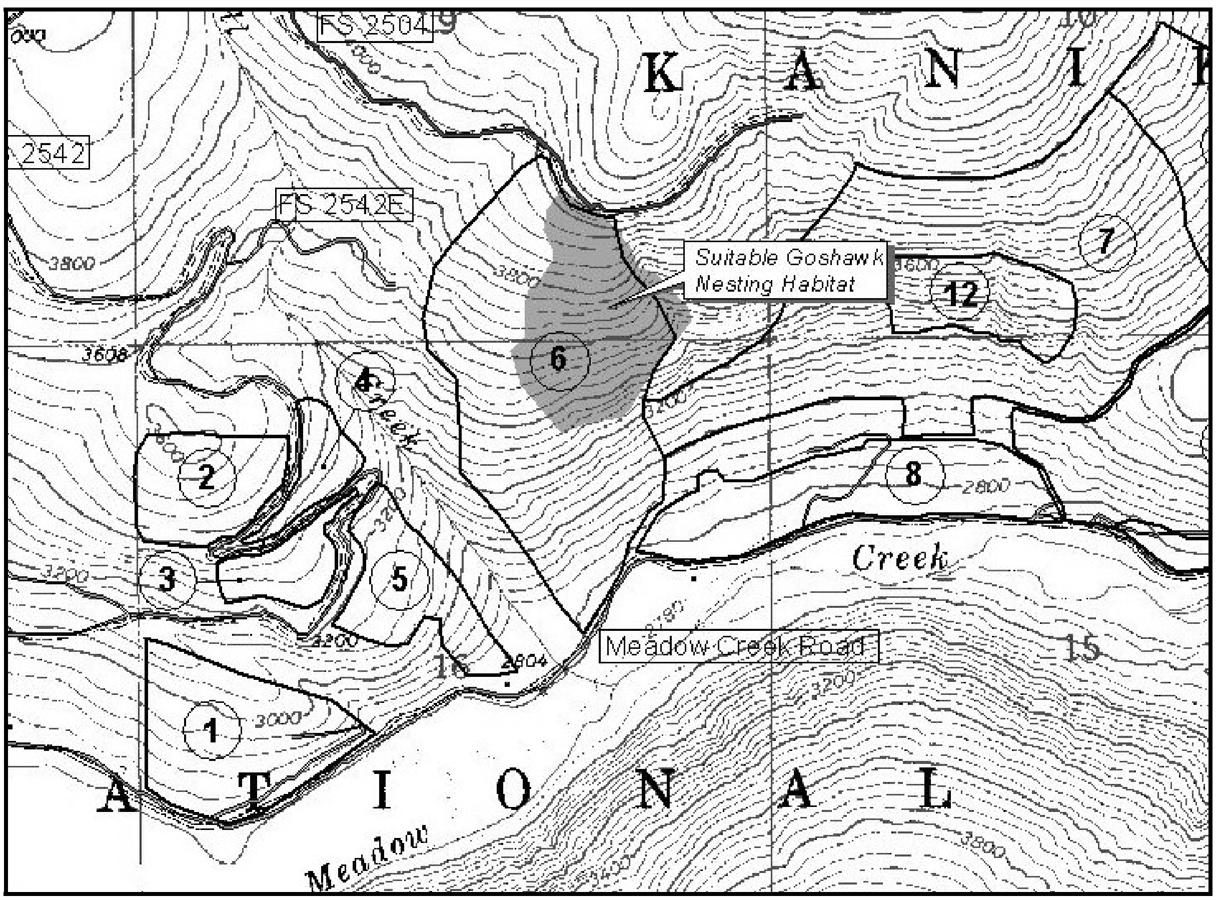
2) Threatened, endangered, and sensitive wildlife species management – if any threatened, endangered, or sensitive species are located during project layout or implementation, modify management activities, as necessary, so that proper protection measures are taken. Clause B(T)6.25,

Protection of Threatened, Endangered, and Sensitive Species, should be included in the timber sale contract.

3) Action alternatives (implemented as planned) are consistent with the Forest Plan, Endangered Species Act, and other regulations. The following conservation measures contribute to maintaining and promoting habitat for dry-forest associated wildlife (units 1, 2, 3, 5, 6, 7, 9, 10, and 12).

a). Retain all merchantable snags greater than 14 inches in diameter, to the maximum extent possible. Retain smaller snags if they do not contribute to excessive understory congestion, and retention is consistent with unit management objectives. Large snags that are felled for safety reasons should remain on site to provide for wildlife habitat and long-term site productivity.
b). Retain large ponderosa pine and western larch to the maximum extent practicable.
c). Retain a minimum 35 percent canopy cover for areas within capable flammulated owl habitat and retain a minimum 50 percent canopy cover for the area within suitable goshawk habitat (unit 6 – see Figure 2-2)

Figure 2-2. Suitable Goshawk Nesting Habitat



A. Threatened, Endangered, and Sensitive Plants

1) No Threatened, Endangered or sensitive plant species are known to occur in the project area. Highly suitable wetland and riparian habitat in the area would be buffered from harvest or project related activities.

2) Any changes to the selected alternative that may occur during layout would be reviewed, and TES plant surveys conducted as necessary prior to project implementation. If any sensitive plants are identified during surveys or during project implementation, Timber Sale Contract provisions B(T)6.25#, Protection of Endangered Species, and C(T)9.51, Settlement for Environmental Cancellation would be implemented as needed.

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).

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 Dry Wall 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 are modified to attain this objective. Sensitive plants are protected according to site-specific management plans developed by the Forest 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.

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:

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

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; also, walk through surveys are normally conducted after the work is completed.

D. Effectiveness Monitoring

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

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

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

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

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

Chapter 3 - Affected Environment

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

3.1 Forest Vegetation

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.

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 Dry Wall 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).

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). The last significant fire in the Dry Wall area occurred in 1926. Prior to 1926 roughly 1,300 acres burned every decade in the Dry Wall area (Figure 3-1). Over the last seventy years there have been dozens of fire starts in the project area, but the largest fire grew to only 5 acres. The majority of fires during this period were less than one acre.

According to the District's historical records some timber harvesting occurred in the project area as far back as 1909, but most of the early logging in the Wall Creek area occurred in 1920's. During this time a system of logging chutes were in place that extended from the lower reaches of Wall Creek for about two miles upstream. The harvesting during this era was primarily an economic selection of the most valuable species, including western larch, ponderosa pine, and western red cedar. The extent of the harvested area was about 1,300 acres, although not all of the area was intensively harvested. The majority of regulated timber harvest began in the early 1960's and continued through the 1990's. Figure 3-1 summarizes harvest activity shows and timber management trends in Wall Creek over the past 40 years. Even-aged regeneration cutting (i.e., clearcut, seed tree, and shelterwood) accounted for over 85% of the timber harvest activity from the 1960's through the 1980's. During the 1990's this trend changed and intermediate harvesting (i.e., thinning, sanitation, salvage, etc.) accounted for over 70% of the timber management activity. Table 3-1 summarizes the timber sales that were sold and harvested from the early 1960's to present. Roughly 1400 acres of land in the southwest corner of the project area are privately owned. Over the course of the past century most of these private lands have been harvested. The harvest systems on these private lands have varied from even-aged regeneration cutting to economic selection cutting, depending on land owner objectives.

Figure 3-1. Dry Wall Timber Management History

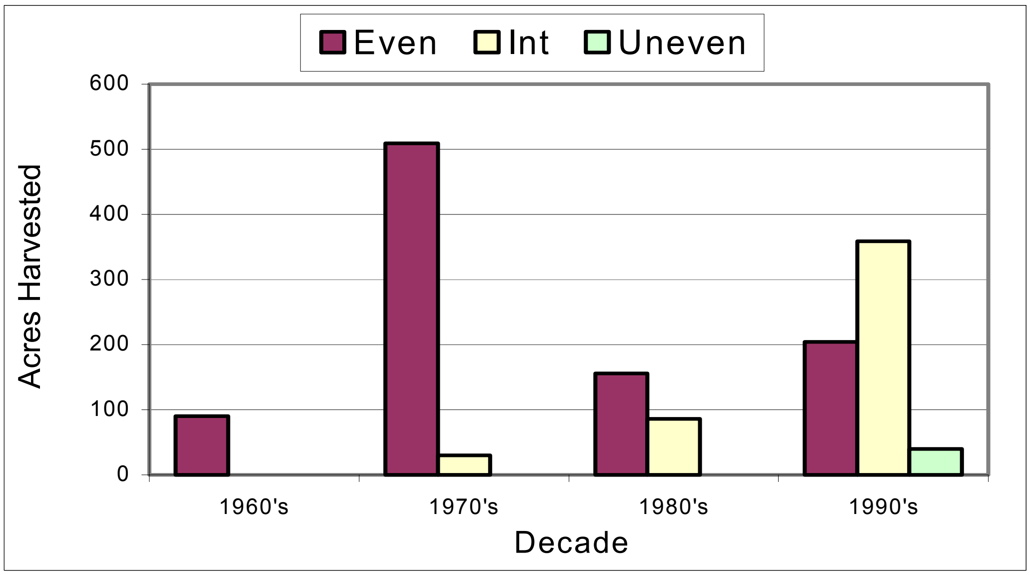


Table 3-1. Timber Sales within the Dry Wall Project Area (Harvest Acres)

Sale Name	Year	Even-Aged	Intermediate	Uneven-Aged	TOTALS
Unknown	1962	62	0	0	62
Meadow Ck Cutoff	1965	28	0	0	28
Wall Mt	1972	369	0	0	369
Fern Ck	1976	140	30	0	170
Queen Mt	1983	22	0	0	22
Moonshine	1984	17	0	0	17
Daylight	1984	23	58	0	81
Freeze Out	1985	48	28	0	76
Camp Nine	1986	46	0	0	46
Wall Face	1990	96	0	0	96
Queen Bussard	1994	0	0	10	10
Moyie Face	1994	0	0	30	30
Meadow Muffern	1996	18	105	0	123
Wall Meadow	1997	90	254	0	344
TOTALS		**959**	**475**		**1**

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.

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).

1) Dry Forests

These forest types consist primarily of Douglas fir, ponderosa pine, western larch and grand fir and represent 25% of the project area. Prior to the 20th century, many stands in the dry 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). Based on field reconnaissance the fire average fire return interval for the Dry Wall project area was estimated at 44 years, with a range of 37 to 60 years (Behrens 2002).

2) 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 68% of the forests in the project area. These are the most common forest types on mid-elevation sites in the mountains of the northern Idaho panhandle. Prior to the introduction of blister rust, when white pine was a dominant species, this was known as the "white pine type." Currently, less than 1% of the project area is composed of stands where white pine is the dominant overstory tree.

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

3) Other Types

Other miscellaneous habitat types are found within the project area, but represent a minor component of the all the forested communities. Cool-moist forests are dominated primarily by subalpine fir and Engelmann spruce and represent 2% 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.

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 4% of the Dry Wall landscape.

C. Forest Composition

The composition of a forest changes over time. Historically, fire was the primary ecological process that determined forest composition. The last major fire in the Dry Wall area was in 1910. Since fire has in effect been removed from the ecosystem for over 90 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 Dry Wall area as displayed in Figure 3-2. Figure 3-2 demonstrates that the composition of ponderosa pine, white pine, and western larch are well below estimated historic levels in the Dry Wall area. Historically, it is estimated that ponderosa pine was the major species on about 18% of the area, or about 600 acres. Currently, ponderosa pine is the primary species on less than 2% (55 acres) of the forested acres in the Dry Wall area. Prior to the introduction of blister rust white pine was a major species on an estimated 25% of the forests in the area. Today white pine is a major species on less than 1% (24 acres) of the forests in the Dry Wall area. Historically, western larch was the major forest species on an estimated 23% (850 acres) of the forested landscape. Western larch is now the major species on about 7% (265 acres) of the forests in the project area. 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. These changes are even more dramatic in the dry forest types as shown in Figure 3-3. As shown in Figure 3-3 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 5% of these forests. On the other hand Douglas-fir is the dominant species on 94% 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. The following is a summary of the changes in forest composition in the Dry Wall area:

On Dry Forest Types:

- Ponderosa pine has ***decreased*** from an estimated 70% to 5%
- Western larch has ***decreased*** from an estimated 10% to less than1%
- Douglas-fir has ***increased*** from an estimated 15% to 93%

On all Forest Types:

- Ponderosa pine has ***decreased*** from an estimated 18% to less than 2%
- Western white pine has ***decreased*** from an estimated 25% to less than1%
- Western larch has ***decreased*** from an estimated 23% to 7%

- Douglas-fir has ***increased*** from an estimated 11% to 51%
- Western hemlock and grand fir have ***increased*** from an estimated 2% to 9%

Figure 3-2. Overall Species Composition: Historic vs. Current

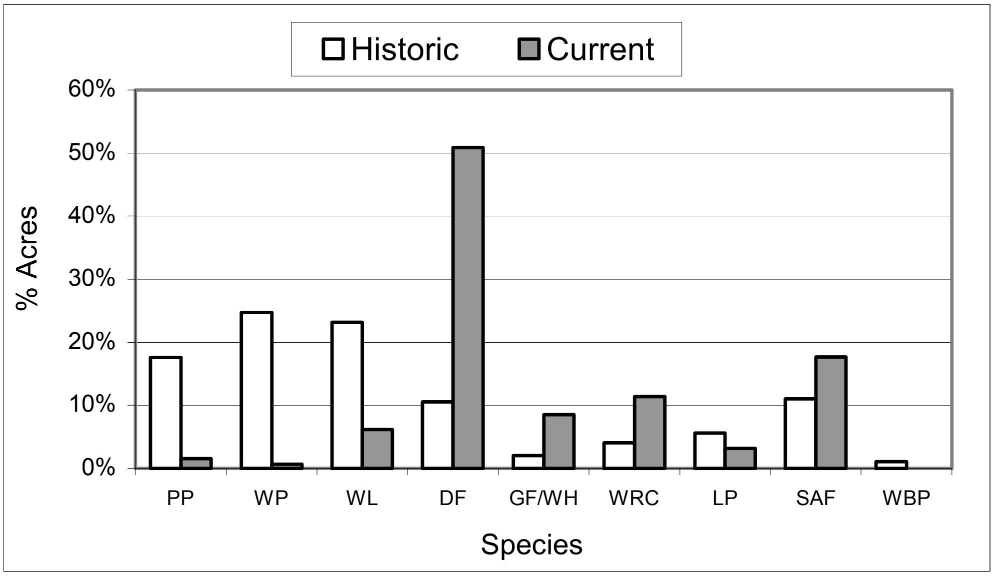
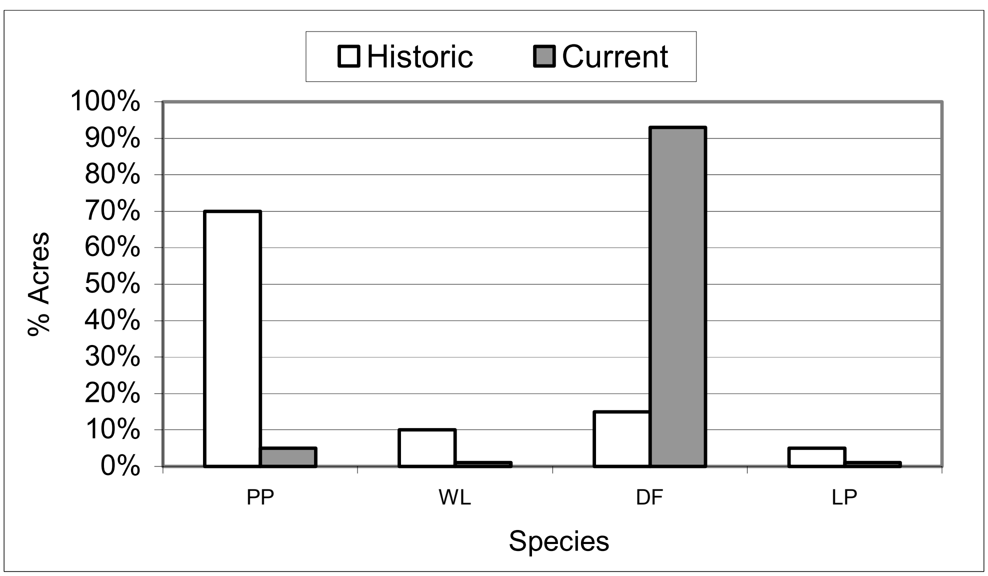


Figure 3-3. Dry Site Species Composition: Historic vs. Current



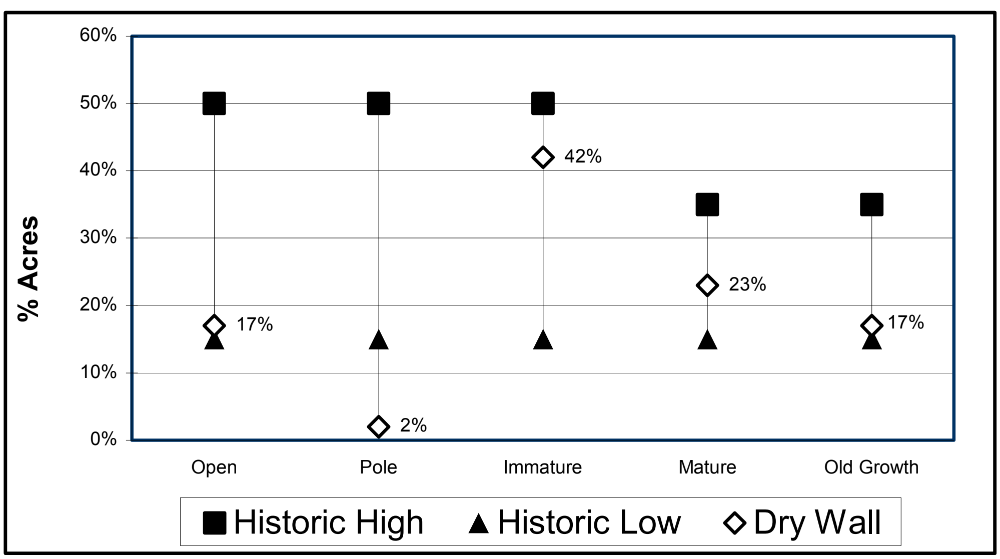
These changes in forest composition have significant implications. Douglas-fir and grand fir, which now dominate the landscape, tend to be much less resistant to fire, insects, and disease than long-live seral species (ponderosa pine and western larch) it has replaced. These species also tend to "hog" nutrients in their foliage, such as potassium, that trees need for disease resistance (Garrison and Moore 1998).

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 over 90 years forest structure has been determined mostly by fire suppression and timber harvest. Figure 3-4 displays current forest structure as compared to the estimated historic ranges (North Zone GA) of each structural class. The following is a summary of the changes in forest structure in the Dry Wall area:

- The current distribution of forested openings (17%) falls ***within*** the historic range (15-50%), but on the lower end of the range
- The current distribution of pole-sized timber stands (2%) falls ***outside*** and slightly ***below*** the historic range (15-50%)
- The current distribution of immature timber stands (42%) falls ***within*** the historic range (15-50%)
- The current distribution of mature timber stands (23%) falls ***within*** historic range (15-35%), but on the lower end of the range
- The current distribution of old growth timber stands (17%) falls ***within*** the historic range (15-35), but on the lower end of the range

Figure 3-4. Dry Wall Forest Structure: Historic vs. Existing



The distribution of old growth forests varies across landscape scales. Historically, an estimated 15-35% of all Idaho Panhandle North Zone forests were composed of old growth. Currently, 14% of the North Zone forests are composed of old growth, slightly below historic levels. In the Kootenai

River sub-basin, old growth forests total 17% of the forested landscape, while old growth accounts for 17% of the Dry Wall forests. Both of these levels fall within the estimated historic range.

E. Conclusions

1) Dry forests have experienced the greatest ecological change

Significant ecological changes in the Dry Wall area have occurred with fire suppression and extensive timber harvest. Given the average fire return interval of 44 years for these forests, the project area could have burned as many as two times since the last major fire in 1910. Additionally, selective logging in the 1920's removed some of the larger diameter ponderosa pine and western larch. An historic study of some of these types in western Montana illustrates some of the changes that have occurred in our dry forests. Prior to 1900 these western Montana sites may have supported an average of 27 trees per acre, with ponderosa pine and western larch dominating. Historically, these thick-barked pine and larch withstood frequent low intensity fires. Total density of trees greater than three inches diameter at breast height (DBH) averaged 43 trees per acre (TPA). In 1984 these sites 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 Dry Wall analysis area average about 300 TPA greater than 3 inches DBH.

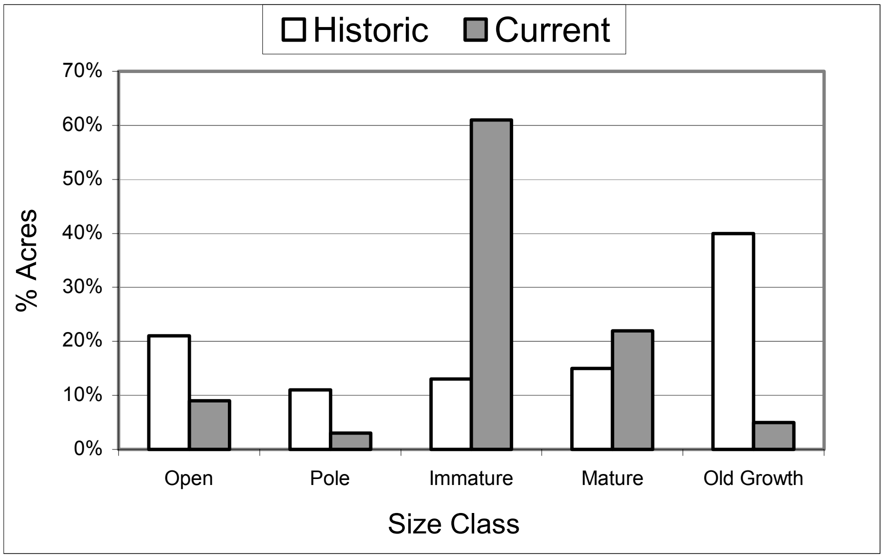
2) Western white pine is missing

Blister rust has taken its toll on western white pine throughout north Idaho. The Dry Wall area is no exception. This species was once a significant component of the moist forest types. Now shade tolerant species such as Douglas-fir, grand fir, western hemlock, and western red cedar dominate areas where western white pine once thrived. These changes in forest composition have some potentially significant effects in today's forests. Conversion of tall, well-spaced white pine to low, densely stocked fir results in hazardous fuel ladders. Thus, significant changes in fire behavior are also characteristic of modern-day, moist interior forests. Such changes in fire behavior threaten future fire control and place neighboring forest ecosystems at risk (Harvey 1994).

3) The amount of old growth in the Dry Wall area falls within the historic range, but the composition, structure, and distribution of old growth has changed

Most of the old growth in the assessment area is located on moist forest types where western red cedar and western hemlock are the dominant species. However, the amount of old growth in dry forest types is significantly lower than estimated historic levels (Figure 3-5). Based on estimates from the North Zone GA, 40% of these forests were in old growth historically, with a range of 25-55%. Currently, about 5% of the dry forest types within the Dry Wall area are classified as old growth, or recruitment old growth, which is well below the estimated historical minimum levels. Not only is there less dry-site old growth in the Dry Wall area, but the composition and structure of this old growth has changed significantly. To meet Forest Plan minimum requirements dry-site old growth stands must be at least 150 years old and contain at least 8 trees per acre (TPA) greater than 21 inches in diameter. The dry-site old growth stands in the project area meet these requirements, but they are also densely stocked with small diameter Douglas-fir and grand fir, which threaten the integrity of these old growth forests

Figure 3-5. Dry Forest Structure: Historic vs. Current



4) The amount of pole-sized and immature timber stands in the Dry Wall area is less than the estimated historic levels.

In particular, these types of forest structure are well below estimated historic levels in the cool-moist and cold-dry forests. Given that the last major fire in the area was over 80 years ago, and extensive timber harvest did not begin until the early 1960's, this may explain the lack of open and pole-sized forests, and the abundance of immature forests in the area.

F. 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 3-6 displays a photograph that represents common stand conditions on dry forest types within the Dry Wall 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 3-7 displays a photograph of another dry forest stand that was harvested and treated with prescribed fire twice in the last 25 years.

Figure 3-6. Altered Stand Conditions in Dry Forest Types - The 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 3-7. Managed Dry Forest Stand - The above stand, about 4.5 miles south of the Dry Wall project area, is located on the same habitat type as the stand in Figure 3-6. 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.

This stand is less than five miles away from the stand in Figure 3-6, but on the same habitat type. These two figures display how contrasting styles in management can drastically change the development of our dry forest stands. However, Figure 3-7 more closely represents a picture of the types of stands that would meet long-term management objectives on dry forest types across the Dry Wall landscape.

1) North Zone Geographic Assessment

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

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 Dry Wall 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

This section describes the existing conditions for Federally listed, Forest Service sensitive, and Forest Service Management Indicator Species (MIS), and other habitats of special interest. Discussion of wildlife species relevancy; project area habitats; and habitat requirements, reference conditions, and existing conditions for listed wildlife and for snag habitat are provided. In addition, rationale for providing no further analysis for particular species is included. Information is based on a 4-day site reconnaissance conducted in early July 2002, habitat data from stand exams, literature review, communications with agencies and other knowledgeable personnel, and professional judgment. As available, habitat capability and habitat suitability models were also used. These models have been developed for the Canada lynx (*Lynx canadensis)*, northern goshawk (*Accipiter gentiles)*, flammulated owl (*Otus flammeolus)*, fisher (*Martes pennanti)*, and white-tailed deer (*Odocoileus virginianus)*. Model assumptions and procedures for each species are provided in the project file. The models provide information on acres of capable and suitable habitat, as defined below:

Capable habitat: refers to the inherent potential of a site to provide essential habitat requirements for a given species. The vegetation on the site may not be currently suitable for a given species because of variable stand attributes (e.g., unsuitable seral stage, cover type, or stand density) but the site has the fixed attributes (e.g., slope, aspect, soil, elevation) that would enable it to provide those variables under appropriate conditions.

Suitable habitat: Refers to the current ability of a site to provide essential habitat requirements for a given species. A site with suitable habitat currently has both fixed and variable stand attributes for a given species' habitat requirements.

A. Wildlife Species Relevancy

A list of threatened, endangered, Forest Service sensitive 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 Dry Wall project, based on known species distribution and habitat availability. Species (or their habitats) that are considered present and possibly affected in a measurable way by the proposed actions were carried forward into Chapter 4, Environmental Consequences. Species (and their habitats) absent from the project area, or not measurably affected by the proposed actions (i.e., either no effect, or impacts would be at a level that would not influence species use or occurrence), are discussed in Appendix A.

B. 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 described in the description of capable habitat above) as well as disturbance (i.e., fire, windthrow, landslide, and insect outbreaks) types and frequencies. In addition to altering habitat due to direct impacts (i.e., 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.

As discussed in the Section 3.1 (Forest Vegetation), fire suppression and timber harvest have been the predominant factors affecting habitats in the vicinity of the proposed treatment units. 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. Past timber harvest near Wall Creek (circa 1920s) has altered the habitat by removing large trees (i.e., ponderosa pine, western white pine [*Pinus monticola*], western redcedar [*Thuja plicata*], and western larch during high-grading operations.

C. Species Analyzed Further

1) Sensitive Species

a. Northern Goshawk

Habitat Requirements - Goshawks are associated with a variety of forest types, including coniferous, mixed hardwood-conifer, and aspen stands (Squires and Reynolds 1997). Availability of nesting habitat, which generally includes mature and old-growth forests with high canopy closure, open understories, and slopes of less than 40 percent, is likely a limiting factor for goshawks (Squires and Reynolds 1997). Nest trees are usually the largest trees in a stand, and forest stands containing nests are often small, approximately 10 to 100 hectares (approximately 25 to 250 acres) (Squires and Reynolds 1997). Foraging habitat includes a wide range of forest age structures that contain relatively open understories. Goshawks are sensitive to disturbance; timber harvest and camping near nests have been shown to cause nest failures (Squires and Reynolds 1997).

Reference and Existing Conditions - In their assessment of the goshawk population in the western U.S., the U.S. Fish and Wildlife Service (USFWS) concluded that despite changes in forest vegetation due to timber harvest, goshawks continue to be well-distributed throughout their historic range (USFWS 1998). The agency also stated that there is no evidence indicating a decline in the goshawk population. Information on goshawk population trends in northern Idaho is not available.

Goshawks are widespread on the Bonners Ferry Ranger District, with 23 documented goshawk nesting territories. No goshawk nests are known within the proposed treatment units for the Dry Wall project, although an inactive nest site occurs within ¼ mile of proposed treatment units. The nest was active in 1993, and no activity was observed at the site in surveys conducted from 1994 through 1997. The goshawk habitat suitability and habitat capability model results indicate that 39 acres of suitable nesting habitat and 535 acres of capable nesting habitat occur within proposed treatment units. Most capable areas are currently unsuitable due to insufficient density of large (greater than 14 inches diameter-at-breast height [dbh]) trees. Over the broader Dry Wall project area, approximately 360 acres of suitable nesting habitat and 3,078 acres of capable goshawk nesting habitat are present.

b. Flammulated Owl

Habitat Requirements - Flammulated owls are neotropical migrants that occur in the western mountains of the U.S. and Canada during the breeding season and over-winter primarily south of the U.S. border (Hayward and Verner 1994). Nesting habitat generally consists of mid-elevation, open, mature and old-growth conifer forests at least partially dominated by yellow pines, especially ponderosa pine (Hayward and Verner 1994; McCallum 1994). In the Forest Service Northern

Region, the species occurs in low-density, mature and old-growth ponderosa pine and Douglas-fir stands with moderately open canopies (i.e., 35 to 65 percent) (USFS 1992). Snags, particularly large snags, are a critical habitat component for flammulated owls; over 80 percent of nests in south-central Idaho were in snags (Powers et al. 1996). Thickets of younger, denser trees appear important for roosting (Hayward and Verner 1994; McCallum 1994). Flammulated owls are secondary cavity nesters, and the availability of nesting cavities is an important habitat requirement for the species (Hayward and Verner 1994). The owls appear to be very tolerant of human presence; however, the effect of more substantial disturbance, such as mechanical operations, is not known (Hayward and Verner 1994; Reynolds and Linkhart 1984).

Reference and Existing Conditions - Clear evidence on the population trends of flammulated owls is not available. However, Hayward and Verner (1994) assert that the species has likely declined in abundance in the past century, due to habitat loss from logging, fire, and stand type conversions. On the Bonners Ferry Ranger District, open-canopied ponderosa pine and ponderosa pine/Douglas-fir stands (habitats that support flammulated owls) are naturally uncommon and fire suppression over the past century has resulted in a large-scale reduction in the acreage of these habitat types. Consequently, flammulated owl abundance on the District has likely declined.

As explained above, similar habitat changes have occurred in the vicinity of the proposed treatment units for the Dry Wall project. The conversion of open-canopied ponderosa pine and ponderosa pine/Douglas-fir forests to dense Douglas-fir stands with remnant large ponderosa pine and Douglas-fir has resulted in a loss of suitable flammulated owl habitat. The flammulated owl habitat suitability and habitat capability models indicate that 43 acres of suitable flammulated owl habitat and 394 acres of capable owl habitat are currently present within the proposed treatment units. Most capable areas are currently unsuitable due to dense canopy cover. Over the broader Dry Wall project area, approximately 64 acres of suitable flammulated owl habitat and 854 acres of capable flammulated owl habitat are present. Flammulated owl surveys were conducted in 1999 along Forest Service Road (FS) 2542 along the western edge of the Dry Wall project area. No owls were detected during the surveys.

c. Black-backed Woodpecker

Habitat Requirements - The black-backed woodpecker (*Picoides arcticus)* occurs in montane and pine forests, where it is confined mostly to burned areas (USFS 1992; Dixon and Saab 2000). Recent burns provide outbreaks of bark beetles, which are the main prey for this woodpecker (Dixon and Saab 2000). In the absence of burns, this woodpecker will forage in areas with diseased trees. Most studies indicate that the species prefers to forage on dead trees rather than live trees (Dixon and Saab 2000). According to a Forest Service report (1992), nesting cavities are excavated in the heartrot of live or dead trees that are generally 8 to 12 inches in diameter and are often near water. However, a recent study in southwest Idaho found that black-backed woodpeckers nested in trees that averaged about 16 inches in diameter (Saab and Dudley 1998). In a study in eastern Oregon, researchers identified black-backed woodpeckers as selecting pine and western larch nest trees that were less than 20 inches in diameter and were recently (< 5 years) dead (Bull et al. 1986). Black-backed woodpeckers have been observed in lightly and moderately harvested ponderosa pine sites, as well as in ponderosa pine sites fragmented by clearcuts and shelterwood cuts (Dixon and Saab 2000). Fire suppression and post-fire logging reduce habitat for black-backed woodpeckers by reducing the availability of burned areas and snags. 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. Habitat capability and suitability models are not available for the black-backed woodpecker.

Reference and Existing Conditions - Black-backed woodpecker population trends in northern Idaho are unavailable. However, suppression of fire and timber harvest has resulted in fewer burned areas and snags across the landscape, and consequently, acres of habitat for the species have likely declined. Six black-backed woodpecker nest sites have been documented on the Bonners Ferry Ranger District.

Historically, low intensity and mixed severity fire occurred relatively frequently in the Dry Wall project vicinity, and crown fires that resulted in large patches of burned overstory trees were rare. Consequently, the area generally did not produce flushes of high-quality black-backed woodpecker habitat. Currently, large patches of burned or diseased trees are not present in the vicinity of the proposed treatment units, and the area does not provide high quality habitat for black-backed woodpeckers. The woodpeckers may occasionally use portions of the proposed treatment areas that have relatively high concentrations of snags, but the project area is not expected to support a resident black-backed woodpecker population. Because the proposed harvest would change the susceptibility of the area to fire and disease and the abundance of snags, further analysis of black-backed woodpeckers is provided in Chapter 4.

d. White-headed Woodpecker

Like the flammulated owl, the white-headed woodpecker (*Picoides albolarvatus)* occurs in drier mature and old-growth forest types at least partially dominated by pine trees. Snags and relatively open-canopied conditions are important habitat components for both species (Idaho Partners in Flight 2000). Because of the habitat similarities between the two species, the white-headed woodpecker is treated as a guild with the flammulated owl, and project effects to this woodpecker are represented by the effects analysis for flammulated owls.

2) Management Indicator Species

a. Pileated Woodpecker

Habitat Requirements - Pileated woodpeckers (*Dryocopus pileatus*) 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 are usually over 25 inches in diameter in stands with at least 60 percent canopy cover (Bull et al. 1990; Bull and Holthausen 1993). 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). Pileated woodpeckers use a wider variety of forest conditions for foraging than for nesting, and the availability of nesting habitat is considered a limiting factor for the species. 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).

3) Forest Land Birds

Habitat Requirements - Forest land birds represent a wide variety of species with varying habitat associations. Some species are associated with older forest while others are associated with younger forests; some species prefer wet forest types while others prefer drier types. Any forest treatment would benefit some species while having a detrimental effect to others. The most prudent way to manage for forest land 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 under-represented and declining, or both.

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 Dry Wall project area contains two of these four priority types, riparian habitat and dry ponderosa pine/Douglas-fir/grand fir forests.

4) Snag Habitat

Snags (i.e., standing dead trees) are vital components of forested ecosystems. In the Interior Columbia River Basin, they provide habitat for more than 80 species of birds, mammals, reptiles, and amphibians and play a critical function in long-term site productivity (Bull et al. 1997). Animals use snags for nesting, foraging, denning, and roosting. Fallen snags (i.e., woody debris) also play important ecological roles including nutrient cycling, nitrogen fixation, and providing foraging, denning, and roosting habitat for various wildlife species.

On the Bonners Ferry Ranger District, snag size and density historically varied across the landscape, with some areas containing high snag densities and others containing low snag densities. Snag density and distribution were determined by forest succession and disturbance events, such as fire, severe windstorms, and insect and disease outbreaks.

Recent influences on snag habitat in the Dry Wall project area include fire suppression and timber harvest. Abundance of ponderosa pine and western larch snags has likely declined since historic times, in accordance with the decreased recruitment of these tree species and the increase in Douglas-fir. Abundance of Douglas-fir snags has likely increased since historic times, although these snags are generally small and degenerate more quickly than snags from longer-lived, healthy trees.

The Forest Plan has adopted guidelines for snag management that include maintaining a minimum of 2.3 snags per acre (snags and snag replacements) of snags greater than 10 inches dbh including 0.14 snags per acre of snags greater than 20 inches dbh (USFS 1985 and 1987). The guidelines are based on the concept that these snag densities will provide 100 percent population levels for cavity-nesting species. The Northern Region recently developed more stringent protocols that provide snag recommendations based on habitat types (USFS 2000). For the habitat types on steep slopes (greater than 30 percent) found within the Dry Wall project area, the Northern Region Protocol recommends 6 to 12 snags per acre of snags greater than 10 inches, with 2 to 4 snags per acre of snags greater than 20 inches dbh; for the habitat types on the more gradual slopes found within the Wall Creek sub-compartment, recommendations are for at least 4 snags per acre of snags greater than 20 inches dbh. The protocol recognizes that healthy snag populations depend on conditions similar to historic times, and that a temporary decline in snag abundance may occur during the process of restoring stands to their historic conditions.

The snag analysis for the Dry Wall project area indicates an average of 9.3 snags per acre of snags greater 10 inches dbh, including 1.0 snags per acre of snags greater than 20 inches dbh. Therefore, existing snag conditions for the project area exceed the Forest Plan guidelines but are below the Northern Region Protocol recommendations.

3.3 Watershed and Fisheries

The Dry Wall project area is located on predominantly south-facing slopes overlooking the lower Meadow Creek valley. Annual precipitation generally ranges from approximately 25 inches at the lower elevations to around 40 inches at the upper elevations (Deiter 1996). The rain-on-snow zone is estimated to lie between 3,000 and 4,500 feet elevations in the Idaho Panhandle National Forests (IPNF), and more than half of the Dry Wall project area is within this zone. The remainder of the project area is within the transitory snow zone that may contribute to rain-on-snow flood events.

Wall Creek flows through the project area and enters Meadow Creek less than three miles from its mouth. Two small unmapped tributary streams flow seasonally from their origin near the middle of the project area to Meadow Creek. These are the only surface waters in the project area. Downstream from the project area Meadow Creek enters the Moyie River approximately nine river miles upstream from its confluence with the Kootenai River.

A. Existing Watershed Conditions

1) Moyie River

A major Kootenai River tributary in Idaho is the Moyie River, a subbasin (fourth level Hydrologic Unit Code [HUC]) that originates in British Columbia. The entire Moyie subbasin 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 since 1930 indicate that spring snowmelt rather than rain-on-snow flood events are the dominant factor influencing channel formation and maintenance (Deiter 1996). Bankfull 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, above and 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 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, woody debris of sufficient size to protect riverbanks and provide fish habitat is lacking. 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 bedrock-controlled.

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 2002a). 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 Bonners Ferry also uses the Moyie River for hydropower generation. The State of Idaho (IDEQ 2002a) has designated no streams in the project area as Outstanding Resource Waters.

The Clean Water Act requires that each State adopt an antidegradation policy as a section 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 2002a). 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.

The 1996 303(d) list for the State of Idaho identifies the 1.64-mile segment of the Moyie River from Moyie Falls Dam to the river mouth as impaired by sediment (IDEQ 2002b). 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). The State is currently scheduled to begin establishment of a total maximum daily load (TMDL) for sediment in the Moyie River in 2005 (IDEQ 2002c). The TMDL process will provide a quantitative assessment of the sediment problem and contributing sources, and specify the reduction in sedimentation from these sources that will be required to attain water quality standards (IDEQ 2002d). Until the TMDL process is completed, the goal is to reduce those pollutants that impair beneficial uses.

2) Meadow Creek

Meadow Creek is one of the largest Moyie River tributaries in the U.S. with a watershed (5th level HUC) area of 15,548 acres, and approximately 82 percent of the watershed managed by the U.S. Forest Service (USFS) (Table 3-2). Stream density in this watershed is 1.4 miles per square mile. Approximately 61 percent of the watershed lies within the rain-on-snow zone.

Table 3-2. Summary of Meadow Creek and Wall Creek Landscape and Geography.

Landscape/Geographical Characteristic	Meadow Creek	Wall Creek
Watershed Area (acres)	15,548	1,777
Watershed Area (mi^2)	24.3	2.8
Federal Ownership (%)	82.1	99.8
Stream Density (mi/mi^2)	1.4	2.1
Rain-on-Snow Zone (acres)	9,417	858
Rain-on-Snow Zone (%)	61	33
Total Road Distance (miles)	84.5	10.1
Road Density ($miles/mi^2$)	3.5	3.6
RHCA[1] Roads (miles)	20.1	1.1
Road Stream Crossings	6	4

[1] RHCA = Riparian Habitat Conservation Area

Meadow Creek has designated uses for cold-water communities, salmonid spawning, and primary contact recreation. Meadow Creek is also listed as a designated small public water supply for the Bee Line Water Association (IDEQ 2002a). The Forest Plan designates Meadow Creek in the project area as part of Management Area 16 (MA 16) (USFS 1987). 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). 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.

Channel conditions in Meadow Creek were previously characterized for the Wall Meadow Timber Sale Environmental Assessment (EA) (USFS 1992). Existing channel bed stability was estimated using the Riffle Armor Stability Index (RASI) (Kappesser 1992). A qualitative stream reach inventory and channel stability evaluation was performed using the USFS Region 1 methods (Pfankuch 1978). Peakflow as a result of rain-on-snow flooding was estimated using the Procedure for Evaluating Risk of Increasing Peak Flows from Rain on Snow Events by Creating Openings in the Forest Canopy (Kappesser 1991). Based on coefficients developed for the IPNF, the R-1 Watershed and Sediments Yields (WATSED) model was also used to estimate natural and existing sediment yield and peak stream flows in Meadow Creek (USFS 1992). Natural peak runoff in Meadow Creek was estimated at 56 cfs and natural sediment yield for the Meadow Creek watershed was estimated to be 725 tons/per year.

Meadow Creek channel conditions and habitat are described in detail in the Dry Wall Timber Sale Environmental Assessment Fisheries Specialist Report (Parametrix 2002). This description was based on stream habitat surveys conducted during the Wall Meadow Timber Sale EA and less intensive surveys in 2002. Much of the lower Meadow Creek watershed and most of the riparian habitat is in mixed private ownership, with channel conditions influenced by different land use activities. Cattle grazing in the riparian habitat contribute to continued instability of the stream. More than one mile of Meadow Creek was diverted from a meandering channel to a straight, constructed channel. Other factors influencing channel stability of Meadow Creek include sediment delivery from road erosion, mass slope failures, historic logging activities, and increased water yield (Shanahan 1992). Logging activities in the Meadow Creek watershed date back approximately 100 years (USFS 1992).

Natural landform processes since the retreat of the most recent continental glaciation; land use activities related to timber harvest, roads, and grazing; and direct channel alterations have resulted in the variety of channel conditions now observed in the lower reaches of Meadow Creek. The first reach drops steeply through an incised gorge from a large culvert under the railroad to the confluence with the Moyie River. Efforts in the early 1990s to construct fish passage improvements in the cascade below the culvert have failed to withstand high flows. Upstream in the second reach, construction of the large culvert decreased the stream gradient locally resulting in a massive deposit of bedload and sediment. The third reach up to the confluence with Wall Creek has a history of beaver activity that has contributed to braiding and the formation of sand and gravel bars. Upstream from the Wall Creek confluence in the fourth reach, Meadow Creek was relocated from a meandering stream course to a straight channel on the south side of the valley. As a result of the channel relocation and cattle damage, severe downcutting and stream bank failures are characteristic of this unstable reach.

3) Wall Creek

As a small tributary of Meadow Creek, limited information is available to describe the existing conditions of Wall Creek. The Wall Creek sub-watershed (6^{th} level HUC) has an area of 1,777 acres, nearly all under Forest Service management, and a stream density of 2.1 miles per square mile. Approximately 33 percent of the sub-watershed is in the rain-on-snow zone.

The current water quality standards do not include specific designated uses for Wall Creek (IDEQ 2002a). Prior to designation, undesignated surface waters are protected for all recreational uses and fish, shellfish, and wildlife, wherever attainable. Attainable beneficial uses for Wall Creek are cold-water biota, salmonid spawning, and secondary contact recreation. However, all but the lower reaches of Wall Creek have a very steep gradient and this stream has only minimal potential as a fishery (Parametrix 2002).

The Wall Creek sub-watershed has experienced extensive logging beginning in the 1920s, with a log chute constructed in or along most of its length (USFS 1992). In general, this early logging was fairly extensive in the Dry Wall area, but not very intensive. Much of the area was logged but the volume of timber removed per acre was highly variable, depending on where the high-value species were located. Approximately 25 percent of the upper Wall Creek drainage was regeneration harvested in the 1970s and 1980s (USFS 1992). Several roads were constructed that crossed the upper tributaries of Wall Creek, and these roads were identified as contributing to sediment yield in 1980 and 1981. The effects of historical management activities on channel conditions in Wall Creek can still be seen today.

Wall Creek channel conditions and habitat are described in detail in the Dry Wall Timber Sale Environmental Assessment Fisheries Specialist Report (Parametrix 2002). This description was based on stream habitat surveys conducted during the Wall Meadow Timber Sale EA (USFS 1992) and less intensive surveys in 2002. The lower reaches of Wall Creek show evidence of historical, but recovering, channel instability. An alluvial fan of cobbles, small boulders, and debris where Wall Creek enters the Meadow Creek valley is evidence of past mass wasting episodes. Clearing of riparian vegetation and woody debris, construction of roads adjacent to the stream and log chute, horses skidding logs across the channel, and operations and occasional failures of the log chute likely all contributed to historical damage to the stream. Wall Meadow EA analyses and field observations indicated that the trend of channel conditions in lower Wall Creek was toward recovery (USFS 1992).

Impacts from high sediment delivery below roads Forest Service roads (FS) 2542 and FS 2504 were noted as high priorities for protecting water quality and channel stability (USFS 1992). The culvert crossing under FS 2504 is undersized and currently causing road erosion problems. Within a short distance downstream of the crossing, fine sediment deposits in the stream are evident, and likely originate from the road crossing. Proceeding further downstream and extending approximately three-quarters of the way to FS 2542E, the Wall Creek channel is highly unstable and characterized by massive quantities of woody debris that is currently trapping large amounts of sediment coming from the unstable stream banks.

B. Affected Fisheries

1) Westslope Cutthroat Trout

Westslope cutthroat trout were petitioned for listing as a threatened species under the ESA (Federal Register Vol. 63, No. 111), but the USFWS determined in 2000 that listing was not warranted (Federal Register, Vol. 65, No. 73). They have since been re-petitioned for listing as a threatened species based on a court finding that the current listing determination did not reflect a reasoned assessment of the ESA's statutory listing factors on the basis of the best available science regarding the threat of hybridization (Federal Register Vol. 67, No. 170). However, they are considered a sensitive species within U.S. Forest Service (USFS) Region 1. Identified risks to westslope cutthroat trout populations include harvest, habitat disruption, and competition and hybridization with introduced species (Quigley and Arbelbide 1997).

Characteristic of many salmonids, westslope cutthroat have two distinct life history strategies. Resident populations spend their entire lives in headwater streams, while migratory populations move into headwater streams to spawn. Juvenile migratory westslope cutthroat rear in headwater streams for several years before migrating downstream to larger river systems (fluvial), lakes (adfluvial), or the ocean (anadromous). 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 be in the Meadow Creek drainage. The East Fork of Meadow Creek (outside of the proposed cumulative effects area) has been identified as containing resident, pure-strain westslope cutthroat trout. Surveys conducted in 1991 confirmed the presence of westslope cutthroat trout in Wall Creek, but electrofishing surveys conducted in 2002 did not find westslope cutthroat trout in either Wall Creek or the portion of Meadow Creek within the Dry Wall cumulative effects area. However, the surveys conducted in 2002 were not exhaustive and both Wall Creek and Meadow Creek within the cumulative effects area potentially support westslope cutthroat trout.

C. Habitat Conditions

1) Meadow Creek

Much of the lower Meadow Creek watershed and most of the riparian habitat is in mixed private ownership, with channel conditions influenced by different land use activities. Most sediment carried by Meadow Creek appears to get trapped behind the Spokane International Railroad culvert just upstream of the mouth. This culvert is a complete barrier to fish migration and has locally decreased upstream channel gradient. Virtually all bedload material is deposited upstream of the culvert forming a huge sediment wedge that extends a considerable distance upstream and is most likely actively enlarging.

In general, large woody debris (LWD) abundance, substrate sizes, and fish species diversity decrease as channel gradient and confinement decreases moving upstream from the mouth of Meadow Creek. Meadow Creek up to the mouth of Wall Creek is generally stable and there is little off-channel habitat in the form of side-channels or adjacent habitat units. Upstream of the mouth of Wall Creek, Meadow Creek consists of extensive networks of beaver dams and ponds with no distinct channel. Cattle grazing in the riparian habitat contribute to continued instability. In addition, more than one mile of Meadow Creek, adjacent to and upstream of the beaver dam complexes, was diverted from a meandering channel to a straight, constructed channel. Other factors influencing the channel stability of Meadow Creek include sediment delivery from road erosion, mass slope failures, historic logging activities, and increased water yield.

2) Wall Creek

Channel stability for Wall Creek is good above Forest Service Road (FS) 2542. The culvert at FS 2542 is steep and impassable. Downstream from FS 2542, evidence of channel instability (channel braiding, incised channels, sediment deposition) increases and there is a large deposit of sediment and channel braiding immediately upstream of the FS 2504 culvert, likely due to the culvert being undersized. The FS 2504 culvert outfall has a drop of approximately 1-ft into a large pool. Thought the outfall pool provides adequate depth for fish to potentially enter the perched culvert, the culvert itself is likely a gradient and velocity barrier to fish passage.

Within a short distance downstream of the FS 2504 road crossing, fine sediment deposits in the stream are evident, which likely originate from the road crossing. Controlling sediment sources from FS 2504 should be a high priority to protect water quality and channel stability. Proceeding further downstream and extending to approximately three-quarters of the distance between FS 2504 and FS 2542E, the channel is highly unstable and characterized by massive quantities of woody debris that is currently functioning to trap large amounts of sediment, which originate from highly unstable banks. Channel braiding is common in the areas of sediment deposition. The steepest reaches were relatively stable, characterized by cascades formed by very large boulders and extensive woody debris and channel stability immediately upstream and downstream of FS 2542E was good. The culvert at FS 2542 had an outfall drop of 20 inches with no pool that would allow fish passage. Continuing downstream of FS 2542E, the channel is steep, cascading, and fairly stable.

Logging occurred in the Wall Creek drainage beginning in the 1920's. During that time a log flume was constructed in or along the entire length of Wall Creek. Construction included travel in and along the channel, and clearing of woody debris from the stream. Sections of road were also built adjacent to Wall Creek for horses to skid logs along the lower-gradient sections of the flume/stream. Wood and debris from this historic log flume structure still line portions of the lower reaches of Wall Creek.

There appears to have been a relatively recent flood event and debris-flow that mobilized large amounts of woody debris and substrate. The lower reaches of Wall Creek within approximately 300 yards of the confluence with Meadow Creek and upstream of the Meadow Creek Road (FS 229) consisted of multiple channels and extensive deposition resulting from an obviously recent high flow event. It was essentially a huge alluvial fan deposited across the forest floor. At one point, deposition has accumulated above a large rootwad creating a drop of approximately 8 ft. This drop is a barrier to fish migration. Downstream of FS 229, the channel is deeply incised, almost to the confluence with Meadow Creek. A man-made weir located on private land immediately upstream of the confluence is a fish migration barrier.

Channel conditions and habitats of Meadow Creek and Wall Creek are described in detail in the Dry Wall Timber Sale Environmental Assessment Fisheries Specialist Report (Parametrix 2002a).

D. Critical Management Issues

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

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 hillslopes. 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).

Hydrologic function would not be affected under any of the project alternatives. No new roads would be constructed and road density in the project area would remain unchanged. There are currently 10.1 road miles (3.6 miles per square mile) in the Wall Creek sub-watershed and 32.1 road miles (4.6 per square mile) in the Dry Wall CEA. Because hydrologic function is not expected to change under any of the alternatives, this factor was not analyzed further as a management issue.

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 protect cold-water fisheries. Timber harvest, 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 hillslopes away from stream channels usually do not deliver sediment to streams. The risk of sedimentation impacting aquatic habitat from road washouts or other road-related mass slope failures is also far greater where these incidents occur near streams.

There are currently 9 acres of ECA within RHCAs in the Wall Creek sub-watershed, and 379 acres of ECAs within RHCAs in the Dry Wall CEA. Most of the ECAs within the Dry Wall CEA are found along Meadow Creek where the stream flows through open pasture. Riparian function would not change directly under any of the project alternatives. However, differences in fuels and fire management distinguish the project alternatives and indirectly affect the risk of wildfires creating ECAs within riparian areas.

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 running 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 re-growth of vegetation covers the surface with protective plant litter. When the year following disturbance has above-average precipitation, significant 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 re-growth.

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 on 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 that relate to Dry Wall project alternatives. Existing sediment delivery from Dry Wall management units was estimated as less than two tons per year using the twenty year-old forest scenarios in WEPP. WEPP was also used to estimate erosion and sediment yield from FS 2504, a road that was originally proposed for reconstruction improvements to support timber harvest operations. Under existing conditions, average annual sediment delivery from FS 2504 was estimated to be an additional 13 tons. Actual erosion rates are highly variable based on 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 Dry Wall project site, but should not be considered predictions of absolute sediment quantities.

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 large woody debris.

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. Where roads are located on sensitive landtypes, the probability of mass wasting increases beyond normal frequencies. Because no new roads are proposed under any Dry Wall alternative, road miles were not used in Chapter 4 as an indicator to contrast alternatives.

Issue indicators: percent of ground with detrimentally impacted soils, WEPP model erosion and sediment delivery estimates in tons per acre.

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 insloped 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. There are currently six stream crossings in the Dry Wall CEA.

In addition to sediment delivered from surface erosion, undersized and poorly maintained culverts, or both, are vulnerable to catastrophic failures when they cannot accommodate stream flows, bedload movement, and debris transported during flood events. Water backed up above the 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.

The number of stream crossings will not change under any of the project alternatives. However, the risk of a culvert failure at the FS 2504 crossing could differ between alternatives and is further discussed in Chapter 4.

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. In the Dry Wall project area, the relatively dry site conditions reduce the potential for peak flow impacts. Most of the annual precipitation occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge. Heavy rainfall is very unusual on the dry slopes below 4,000 ft elevation that comprise the project area.

An indicator of the overall relative risk of impacts to the hydrologic functions of a forested watershed may be calculated as the equivalent clearcut area (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. An ECA over 30 percent is used as a "red flag" indicator that more intensive field surveys are warranted to determine if a watershed is at a threshold for hydrologic impacts. The current ECA for the Dry Wall CEA is 17 percent, well below the 30 percent red flag level.

Issue indicator: ECA in acres.

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 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 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.

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 extremely long recovery periods, or both. Additionally, these watersheds 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, which 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. Currently Wall Creek is listed as functioning at risk due to moderate watershed disturbance, and Meadow Creek is listed as functioning at risk due to moderate riparian disturbance and watershed disturbance (USFS 2000). Because none of the Dry Wall project alternatives would altern the PFC analysis and trend, this issue was not used to contrast alternatives in Chapter 4.

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.

4.1 Forest Vegetation

A. Forest Composition

1) Alternative 1

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

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

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. The indirect and cumulative effects of Alternative 1 would be potential losses in productivity. 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 (Harvey et al 1994).

2) Alternative 2

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 Dry Wall landscape. A primary goal of restoration treatments in ponderosa pine and fir forests is to create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, disease, and severe fire. An additional goal is to manipulate existing species composition and site conditions to favor regeneration of ponderosa pine and other seral species. 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 particular, planting of blister rust resistant stock is needed to obtain substantial white pine regeneration, which was dominant in many stands prior to the advent of white pine blister rust (Byler et al, 1994). 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 Dry Wall 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.

Alternative 2 would increase the acres in the Dry Wall project area where ponderosa pine is the dominant species by an estimated 180% (55 acres to 155 acres), white pine by 100% (25 acres to 50 acres), and larch by 9% (265 acres to 290 acres). The direct, indirect, and cumulative effects of Alternative 2 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.

3) Alternative 3

This objective of this alternative would be to restore ponderosa pine, western larch, and white pine with the use of prescribed fire only. No commercial timber harvest would be used to meet restoration objectives. In order to meet these objectives understory trees, primarily Douglas-fir, would have to be killed with fire. Furthermore, large enough openings would need to be created in the forest canopy to allow for regeneration of ponderosa pine, western larch, and white pine. Even beneath a light overstory stand casting 47% shade, ponderosa pine saplings grew only about half as rapidly as their associates, i.e., Douglas-fir (Oliver and Ryker 1990). Western white pine becomes free to grow in stands between 30 and 50 square feet of basal area (Jain and Graham 2001). This equates to approximately 15-25 trees per acre averaging 20 inches in diameter. Larch is the most shade intolerant conifer in the Northern Rockies, prescribed burning or scarification needed to regenerate larch are very difficult in partial cuttings (Schmidt and Shearer 1990). The BEHAVE model was used to determined the type of fire behavior required to create enough mortality in the understory fir to create these conditions. Two methods could be used to achieve these objectives. The first option would involve slashing a certain amount of the smaller understory firs prior to underburning in order to create a fuel bed that would carry the fire. This option would likely require a spring burn. The second option would involve prescribed burning with no pre-treatment of fuels. This option would require a prescribed burn under relatively dry summer conditions. Under both options, in order to create enough heat to kill understory fir, the intensity of the prescribed fire would make fireline control difficult. In addition, fire behavior under both options would induce spotting of up to one-quarter mile from the prescribed fire. In practice, the option with the combination of slashing and prescribed fire would be more feasible given the expected spotting distances. Neither scenario is particularly favorable, but excessive spotting under summer dry conditions could lead to more fires in areas where they were unintended.

The BEHAVE model predicts that enough mortality could be induced in the understory to create openings in the forested canopy to allow for regeneration of ponderosa pine, western larch, and white pine. The amount of openings created would be similar to Alternative 2, although the extent and location openings would be difficult to determine. Furthermore, the fire behavior required to kill the understory fir would also be hot enough to kill a certain percentage of larger diameter pine and larch, eliminating a valuable seed from these stands.

The direct, indirect, and cumulative effects of Alternative 3 would be similar to Alternative 2, i.e., to increase the percentage of long-lived seral species (ponderosa pine by 180%, white pine by 100%, and larch by 9%) across the landscape and decrease the percentage of short-lived species like Douglas-fir and grand fir. However, with prescribed fire only, it is almost certain that a percentage of quality ponderosa pine and larch seed trees would be killed in the burn. This would require artificial reforestation (i.e., planting) in areas where desirable seed sources are lost. With silvicultural practices there would be much greater control over size and species selected for harvest, i.e., the root-disease susceptible species would be removed, or greatly reduced, and the desirable seed sources would be retained. Consequently, Alternative 3 is expected to be less effective than Alternative 2 in restoring long-lived seral species and reducing the percentage of Douglas-fir and grand fir in treated areas.

B. Forest Structure

1) Alternative 1

Changes in forest structure are subtle until they are looked at over a longer period of time. Currently, immature, multi-storied forests, composed mostly of Douglas-fir, dominate the landscape. Using the SIMPPLLE model changes in forest structure were projected over a 50-year period that include natural disturbances (Figure 4-1). The model was run assuming an attempt to suppress all fires would be continue. However, the model assumes a probability that some suppression efforts would be unsuccessful and certain amount of natural fire would occur. Under Alternative 1, natural succession, along with root disease and fire are projected to be the dominant processes that shape forest structures. The projected extent of root disease is not surprising given the amount of Douglas-fir that currently dominates the landscape. Multi-layered stands of pole-immature sized Douglas-fir are projected to be the dominant forest structure. Ponderosa pine, western larch, and white pine are projected to be insignificant components of the landscape. The model also projects the amount of old growth to drop from the current level of 17% to an estimated 6% at the end of the 50-year scenario. This predicted loss of old growth structure is primarily due to two factors: 1) stand replacing fire and 2) root disease. The predicted changes from fire are more obvious (i.e., the stand burns) than those created by changes from root disease. In the drier forest types, existing old growth ponderosa pine and larch would eventually succumb to competition from excessive Douglas-fir, removing the primary component of dry forest old growth. Given the dominance of Douglas-fir, root diseases would eventually increase over time. Although canopy openings would be created, only Douglas-fir, which is more tolerant of shade, would regenerate. Even if some ponderosa pine and larch survive these species would fail to regenerate given their requirements for open sunlight and exposed mineral soil (Schmidt and Shearer 1990; Oliver and Ryker 1990). Consequently, a cycle of Douglas-fir dominance and root disease would be perpetuated, and stands of open-grown old growth ponderosa pine and larch would be eliminated. Under the no action alternative significant changes in forest structure are projected over time. In some cases the distribution of forest structures would be outside the historic range of variability (Figure 4-1). In particular, the amount of old growth would be reduced from 17% to 6% and mature forests would be reduced from 23% to 4%. The direct effects of Alternative 1 would be to maintain the dominance of multi-storied forest structures across the landscape. The indirect and cumulative effects would be an increased long-term risk of insect and disease occurrences and stand-replacing fire, especially on dry site forest types.

Figure 4-1. Dry Wall Size Class Distribution with Natural Disturbances

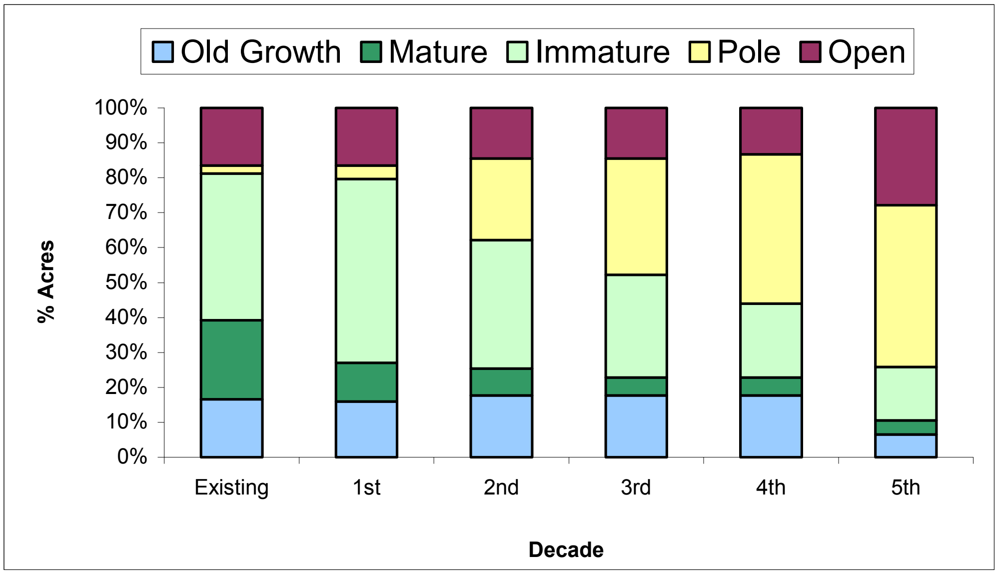
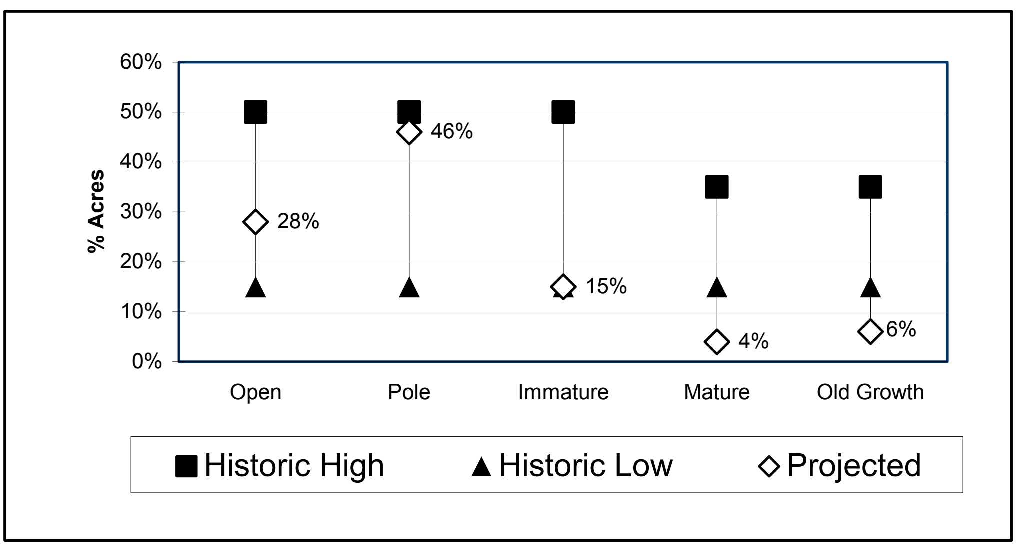


Figure 4-2. Dry Wall Forest Structure: Historic vs. Projected (Alternative 1)



2) Alternative 2

Group selection prescriptions in units 1, 5, 6, and 7 (324 acres) would be designed to create a mosaic of forested openings and thinned areas. The forested openings would be centered round naturally occurring clumps of old growth, mostly ponderosa pine, but some larch and Douglas-fir as well. In these clumps the younger, smaller-diameter, less fire resistant species (e.g., Douglas-fir, grand fir lodgepole pine) would be removed and the old growth trees (generally trees greater than 20 inches diameter) would be retained. In areas where the stand structure is more single, commercial thinning would occur. In these thinned areas a mix of species would be retained, but ponderosa pine and larch would be the preferred species. Harvesting the smaller diameter trees, followed by prescribed burning or mechanical piling, would restore these stands to a more open grown character that existed historically.

A combination of commercial thinning and sanitation-salvage cutting would be conducted in units 2, 3, 4, 8, and 9 (134 acres). The stands included in these treatments are primarily single-storied and the proposed treatments would not significantly alter these conditions. The primary difference will be in the density of the stand. The treatments would focus on removing the smaller trees from lower crown classes while leaving the larger and more dominant trees. A mix of species would be retained, but ponderosa pine, western larch, and white pine would be preferred. Sanitation-salvage would occur in areas where small pockets (generally less than ¼ acre) of insect and disease occur. Examples would be areas where the risk of mountain pine beetle infestation in lodgepole pine is high, or root disease areas in Douglas-fir and grand fir.

Units 10 and 11 (251 acres) would be group selection units designed to create forested openings large enough to regenerate larch and western white pine. The size of openings would range from 1-3 acres and approximately 10% of the area (25 acres) would be regenerated. In dry forest habitats of unit 10, the goal would be to maintain canopy cover in these openings of at least 35%. Creating forest openings of well-spaced, genetically improved western white pine would reduce hazardous fuel ladders that have built up in these forest types. In addition, western larch, which is highly resistant to fire and insects and disease, would also be a featured species in these openings. In between the forested openings commercial thinning would also occur. The treatments would focus on removing the smaller trees from lower crown classes while leaving the larger and more dominant trees. A mix of species would be retained, but ponderosa pine, western larch, and white pine would be preferred.

No timber harvest would occur in unit 12 (24 acres), but this unit would be treated with prescribed fire in conjunction with surrounding units (6 and 7). Only small changes in stand structure are expected to occur as fire would only kill the smaller Douglas-fir.

Alternative 2 includes 54 acres (Units 6 and 7) of harvest in Forest Plan non-allocated recruitment old growth, 38 acres (Unit 6) of harvest in allocated recruitment old growth, and 23 acres of prescribed burning, with no timber harvest (unit 12). Prescribed treatments would actually improve existing stand characteristics by developing stand structures that are more sustainable over time (Morgan et al 1994). In the short-term, the proposed treatments would maintain the IPNF's old growth allocation. In the long-term, proposed treatments in all dry forest stands (not just those that currently meet old growth definitions), coupled with periodic thinning and burning that mimic historic fire intervals, would actually increase the amount of dry forest old growth. Future projections in forest structure for Alternative 2 using the SIMPPLLE model are displayed in Figures 4-3 and 4-4.

The direct effects of Alternative 2 would be to increase the percentage of more open forest structures within the cumulative effects area. Changes in stand structure from prescribed treatments would alter the potential fire behavior in all treated stands from a stand-replacing event to a more low severity fire. In particular, a stand replacing fire in the dry forest types would kill not only the smaller trees, but the old growth pine and larch as well. 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 Alternative 2 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.

Figure 4-3. Dry Wall Size Class Distribution (Alternative 2)

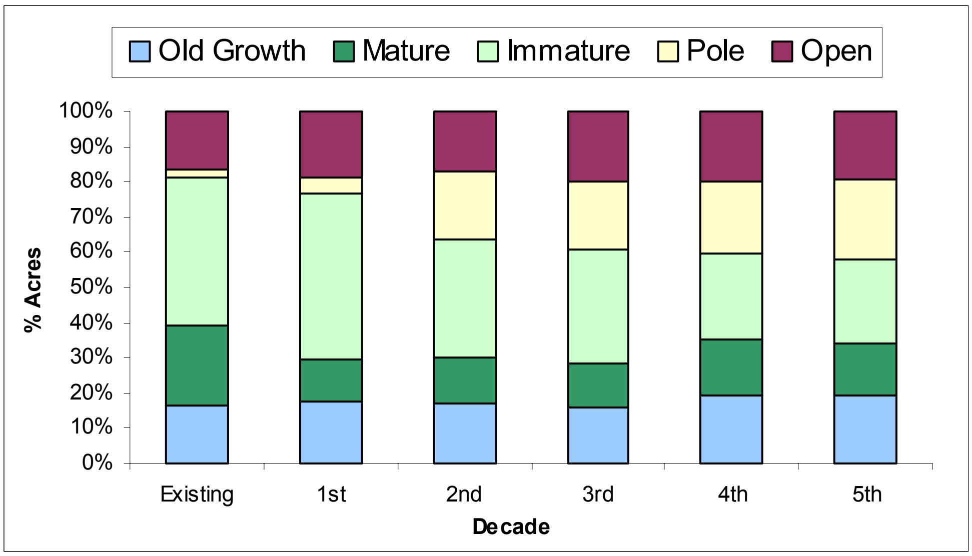
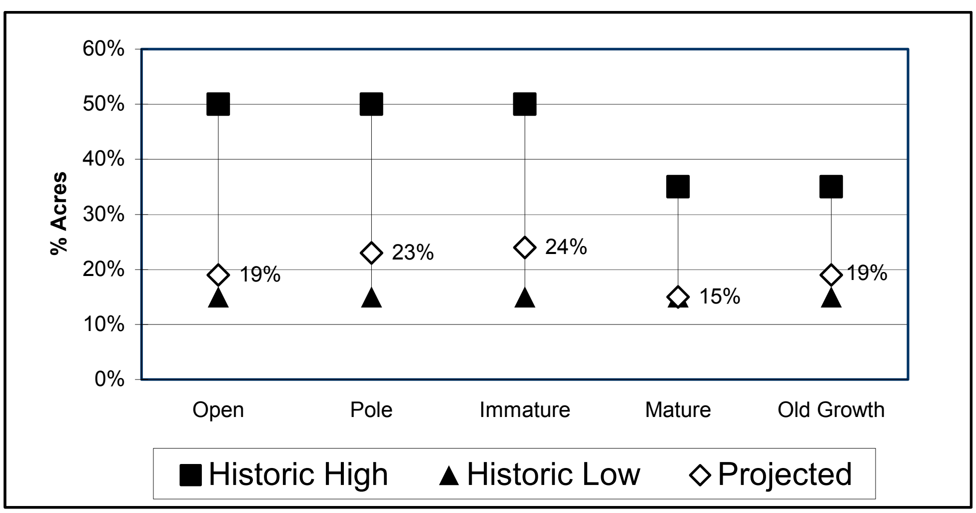


Figure 4-4. Dry Wall Forest Structure: Historic vs. Projected (Alternative 2)



3) Alternative 3

Under this alternative commercial timber harvest would not be used to change forested structures. Instead, only pre-treatment of forest fuels (i.e., slashing of the smaller understory) and prescribed fire would be used. The BEHAVE model was used to determine the type of fire behavior required to create enough mortality in the understory to create desired objectives.

In units 2, 3, 4, 8, 9, and 12 (158 acres) some slight reductions in canopy cover would occur. However, it would be difficult to control the quality of trees "selected," i.e., species, form and vigor, insects and diseases, etc. In other words, mortality would be somewhat random. Consequently, optimum thinning objectives would be more difficult to achieve compared to Alternative 2. In order to achieve a more effective thinning in terms of density reduction a much hotter fire would be needed, where the risk of losing control of the trees selected for removal and the fire itself, would be much greater.

In units 1, 5, 6, and 7 (324 acres) stand structures would be considerably more open than Alternative 2. In order to remove, or in this case kill, the same amount of understory trees that would be removed with a timber harvest, fire intensities would need to be over 500 BTU[1]/foot/second and flame lengths would need to be close to 8 feet. This type of fire would create scorch heights of about 50 feet and spotting distances of up to one-quarter mile away. Fires with these types of intensities would present serious control problems (Roussopoulos and Johnson 1975). Such a fire would kill not only the smaller understory trees, but climb into the crowns of some of the larger ponderosa pine and larch, including old growth trees, and kill them as well.

In Units 10 and 11 (251 acres) in order to create the 1-3 acre openings needed for white pine and larch regeneration the fire intensities needed to kill overstory trees would be around 600 BTU/foot/second and flame lengths would be again over 8 feet. In dry forest habitats of unit 10, the goal would be to maintain canopy cover in these openings of at least 35%. Once again, this would be a very difficult fire to control and some large ponderosa pine, larch and white pine would be killed.

Alternative 3 includes 77 acres (Units 6, 7, and 12) of prescribed burning in Forest Plan non-allocated recruitment old growth and 38 acres (Unit 6) of burning in allocated recruitment old growth. Protecting all of the old growth trees under this alternative would be difficult given there would be no removal of excessive understory trees. A primary advantage of silvicultural cutting is that it allows for controlled removal of specific trees in terms of number, size, species, and location (Fiedler 1996). Consequently, relying solely on prescribed burning improvement and maintenance of old growth structure, would be more difficult as well. In the short-term, this alternative would be expected to maintain the IPNF's current old growth allocation, although some valuable components of the system would be lost, i.e., some old trees would be killed. In the long-term, maintenance of these old growth structures is somewhat doubtful without prior removal of existing and anticipated fuel loads. Future projections in forest structure Alternative 3 using the SIMPPLLE model are displayed in Figures 4-5 and 4-6

---

[1] BTU (British Thermal Unit) – Amount of heat required to raise the temperature of 1 pound of water 1^{o} F

The direct effects of Alternative 3 would be to increase the percentage of more open forest structures within the cumulative effects area. In addition, the number of dead trees would increase from just under 10 trees per acre to an estimated 20-30 trees per acre in the lower intensity burn units (2, 3, 4, 8, 9, and 12) to over 100 trees per acre in the higher intensity burn many units (1, 5, 6, 7, 10, and 11). This would be far in excess of Forest Plan recommendations (100% of cavity nesting potential) of 7 trees per acre (snags and snag replacements) and Northern Region Protocols of 6-12 trees per acre (two trees greater than 20 inches in diameter). In the short-term, changes in stand structure from prescribed treatments would alter the potential fire behavior in all treated stands from a stand-replacing event to a more low severity fire.

Figure 4-5. Dry Wall Size Class Distribution (Alternative 3)

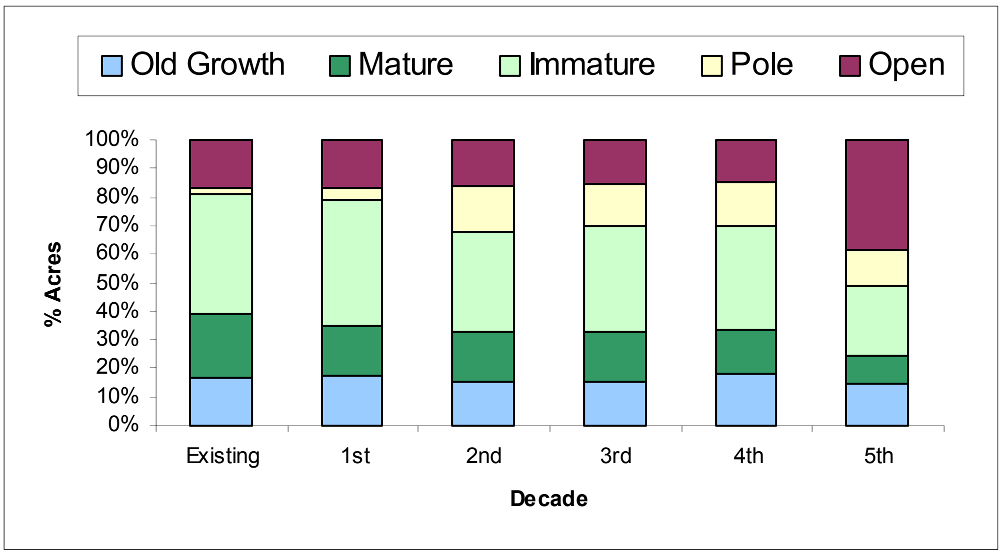
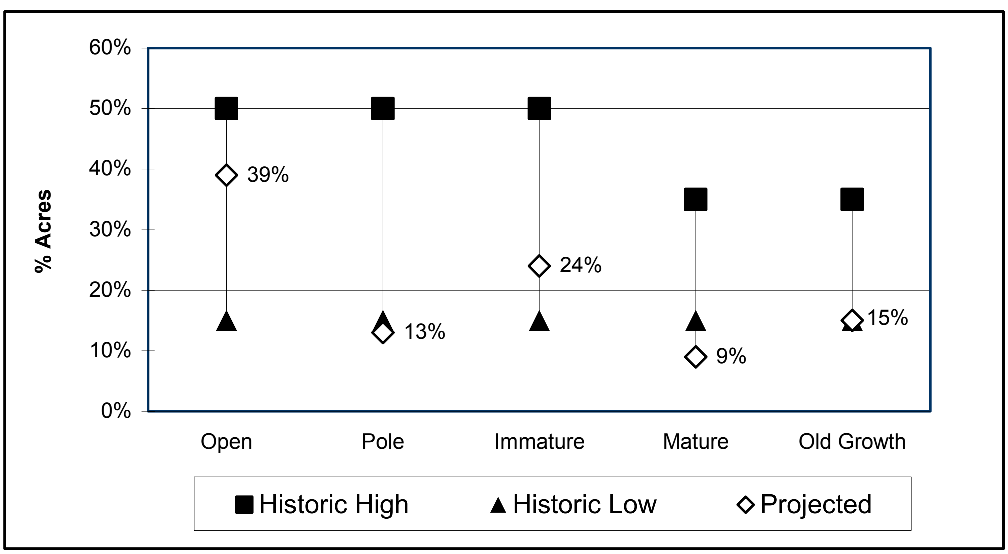


Figure 4-6. Dry Wall Forest Structure: Historic vs. Projected (Alternative 3)



C. Risk of Stand Replacing Fire in Dry Forest Types

The risk of stand-replacing 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 effect an individual stand may effect 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.

1) Alternative 1

The average fire return interval in dry forest types within the project area was estimated at about 45 years. The last fire in these forest types within the cumulative effects area was over 80 years ago. Smith and Fischer (1997) state that as the fire return interval in these forest types increase, the likelihood of a severe stand-replacing event also increases. Currently, there is no "wildland fire used for resource benefits" policy for the Dry Wall 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 Alternative 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.

2) Alternative 2

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 almost 90%. 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, indirect, and cumulative effects of this alternative would be to reduce the risk of stand-replacing fires in dry forest types within the project area.

3) Alternative 3

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 almost 70%. Prescribed fire would change current forest structures and reduce the risk of a stand-replacing event in the short-term. However, in the long-term, as standing dead trees created from prescribed burning accumulate on the forest floor the risk of re-burn and a subsequent severe fire would be high. The direct effects of implementing Alternative 3 would be a short-term reduction in the risk of stand-replacing fire. However, the indirect and cumulative effects of this alternative would be an increased risk of stand-replacing fire in the long-term.

4) All Alternatives

Using the Forest Vegetation Simulator (FVS) a typical dry forest stand was projected 40 years (the estimated fire return interval) into the future for each alternative and simulated fire was run through the stand at the end of 40 years. To provide consistency, the simulated wildfire was run under the same weather (normal summer) and fuel moisture conditions for each alternative. Figure 4-7 provides illustrations and summaries of how a typical dry forest stand could look following such a fire.

D. Risk of Root Disease

1) Alternative 1

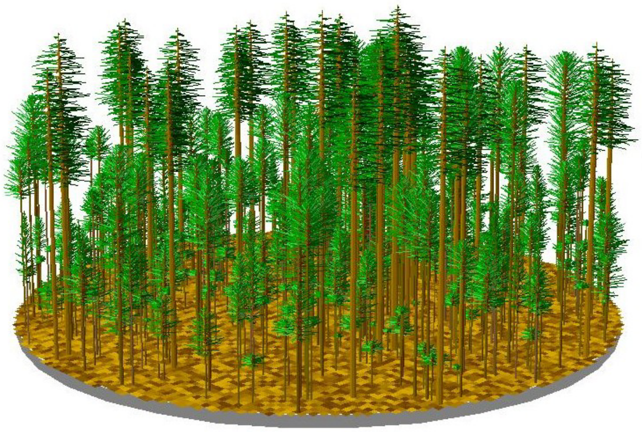
Root disease pockets are currently scattered throughout the proposed treatments units. The direct effects of Alternative 1 would be an increase in the number of acres affected by root diseases. Under Alternative 1 root disease pockets are expected to increase as the species that are most susceptible to root diseases, Douglas-fir and grand fir, continue to dominate the landscape.

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). Consequently, the indirect and cumulative effects of Alternative 1 would be not just 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).

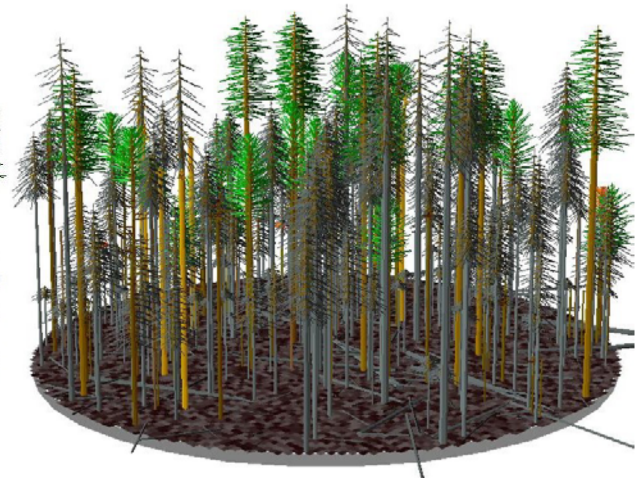
2) Alternative 2

The direct effects of Alternative 2 would be a reduction in the number of acres susceptible to root disease occurrences. Under Alternative 2 about 315 acres would be converted to ponderosa pine, western larch, and white pine, species that are less susceptible to root diseases, such as Douglas-fir and grand fir. These conclusions are also supported by the SIMPPLLE model, which was also 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 65%. This seems reasonable given the reductions of Douglas-fir as the major species in treated stands. In the

Figure 4-7.Dry Forest Stand Conditions Following Wildfire in 40 Years

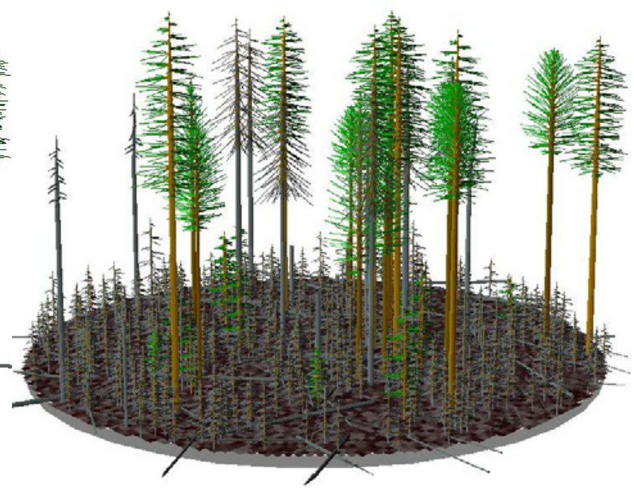


Existing conditions – Illustration of a typical dry forest stand in the Dry Wall project where large-diameter ponderosa pine are being replaced by small-diameter Douglas-fir.



Alternative 1 – A fire would kill almost 95% of the trees in this type of stand and over 70% of the trees greater than 20 inches in diameter.

Alternative 2 – Harvesting the small-diameter Douglas-fir and retaining the larger ponderosa pine would drastically alter potential fire behavior. A fire in the above stand would kill most of the small trees (less than 5” diameter), but less than 10% of the trees over 20".



Alternative 3 – Under this alternative most of the understory trees, but not all, would be killed with prescribed fire. However, these trees would not be removed and would eventually fall to the forest floor, resulting in natural fuel buildups almost triple those recommended by Graham et al (1994). A fire in the above stand would kill most of the small trees (under 5”) and nearly 20% of the trees over 20

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 indirect and cumulative 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.

3) Alternative 3

The direct, indirect, and cumulative effects of Alternative 3 would be a reduction in the number of acres susceptible to root disease occurrences. Alternative 3 would also convert about 315 acres to ponderosa pine, western larch, and white pine. According to the SIMPPLLE model, Alternative 3 would reduce the risk of root diseases in treated stands by an estimated 22%. With prescribed fire it is less certain that ponderosa pine, western larch, and white pine would become established as the dominant species. With silvicultural practices there is control over size and species selected for harvest, i.e., the root-disease susceptible species can be removed, or greatly reduced. Consequently, it is not surprising that Alternative 3 is predicted to reduce the amount of root disease in the treated areas, but not as much as Alternative 2.

E. Air Quality

A "Decision Analysis" matrix (USFS 1998) described in Appendix D is used to stratify burns based on levels of potential emissions. This matrix identifies the appropriate emissions and dispersion analysis to use. Direct and cumulative effects on air quality are based on estimated emissions from prescribed burning and burning of activity fuels (i.e., burning piles of logging slash). Emissions for prescribed burning and activity fuels for Alternatives 2 and 3 were estimated using the FOFEM model. Indirect effects, discussed below, are related to wildfire and more difficult to predict.

1) Effects Common to All Action Alternatives

Indirect effects, i.e., unplanned emissions, would result from subsequent wildfire events. The question is not whether fires will occur in the future, but when they will occur and how large they become. This will be directly related to a number of variables including, but not limited to, the condition of the fuels across the landscape, weather patterns, access, and fire suppression policies at the time. However, some estimates of potential emissions from wildfire can be made. Using the SIMPPLLE model, a conservative estimate is that for every 100 acres of wildfire, total emissions would be about 50 tons of particulate matter. The Environmental Protection Agency (EPA) threshold for any single pollutant is 100 tons. In essence, the particulates from a 200-acre wildfire would exceed EPA standards.

2) Alternative 1

Alternative 1 includes no prescribed burning and no burning of activity fuels, therefore, would have no direct and cumulative effects on air quality.

3) Alternative 2

Emissions from Alternative 2 would be the result of prescribed underburning (Units 5, 6, 7 and 12), pile burning (Units 2, 3, 4, 8, 9, 10, and 11), and burning landing piles (all except Unit 12). The direct effects (estimated emissions) of Alternative 2 are displayed in Table 4-1. Based on estimates from FOFEM only Unit 6 (90.09 tons) and Unit 7 (72.45 tons) approach the threshold of 100 tons of particulate matter for any single pollutant. The combined emissions for all burning activities under Alternative 2 are estimated at almost 200 tons of particulate matter.

4) Alternative 3

Emissions from Alternative 3 would be the result of prescribed underburning only. The direct effects (estimated emissions) of Alternative 3 are displayed in Table 4-2. In theory, based on estimates from FOFEM Unit 6 (139.15 tons), Unit 7 (173.03 tons), and Unit 11 (120.47 tons) would exceed the threshold of 100 tons of particulate matter for any single pollutant. However, in practice it would take at least two days, and maybe three, to complete the burning these units, which means the threshold of 100 tons would not be exceeded. In summary, Alternative 3 would produce total emissions for all burning activities of about 770 tons of particulate matter, almost four times the amount estimated for Alternative 2.

F. Coarse Woody Debris

1) Alternative 1

Graham et al (1994) recommend 7-13 tons of coarse woody debris (CWD) greater than three inches in diameter for the dry forest types and 17-33 tons for moist forest types. Units 1, 2, 3, 4, 5, 6, 7, 9, and 12 are primarily on dry forest types, units 8 and 11 are moist forest sites, and unit 10 is combination of the two. For the most part, natural fuel accumulations in the dry forest type are beginning to exceed the recommended levels, but the levels within moist forest types generally meet the recommendations. With continued fire exclusion, natural fuels would be expected to increase over time from a variety of natural sources, including insects and disease, and blowdown. In the absence of fire the decomposition of these natural fuels is slow, eventually impairing ecosystem development. High fuel accumulations greatly increase the potential for catastrophic stand and soil destructive wildfire. The greater fuel buildup, the more likely the event (Harvey et al, 1993). Consequently, the direct effects of Alternative 1 would be a continued build up of CWD over time. The indirect and cumulative effects would be an increased risk of catastrophic fire and subsequent loss of ecosystem productivity.

2) Alternative 2

Proposed treatments under Alternative 2 would be designed to meet CWD recommendations for all habitat types. Based on fuel consumption and residual CWD estimates from the FOFEM model units 6, 7, and 12, which would be underburned, are expected to meet CWD recommendations. Based on Forest Plan monitoring (1998-2000) only areas with nearly complete cleanup after harvesting generally will not meet recommended levels of CWD. This could be a concern in Units 1, 2, 3, 4, 5, 8, 9, 10, and 11, which would be grapple piled. However, timber sale and brush disposal contracts would be designed to ensure that enough slash would be left, in various sizes, to meet CWD recommendations for each given habitat type.

Table 4-1. Estimated Emissions (Alternative 2)

Unit	Rx	Fuels Treatment	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
1	GS	GP	42	0.56	0.48	1.04
2	CT	GP	23	0.30	0.26	0.56
3	CT/SS	GP	11	0.15	0.12	0.27
4	CT/SS	GP	9	0.12	0.10	0.22
5	GS	GP	24	0.32	0.27	0.59
6	GS	UB	115	39.10	33.35	72.45
7	GS	UB	143	48.62	41.47	90.09
8	CT	GP	45	0.59	0.50	1.10
9	CT/SS	GP	46	0.61	0.52	1.12
10	GS/CT	GP	108	5.28	4.51	9.79
11	GS/CT	GP	143	6.72	5.74	12.46
12	Burn	UB	24	4.32	3.60	7.92
Alternative 2 Totals			733	106.69	91.42	197.61

Table 4-2. Estimated Emissions (Alternative 3)

Unit	Rx	Fuels Treatment	Acres	Total PM_{10}	Total $PM_{2.5}$	Total Emissions
1	Burn	Slash-UB	42	27.3	23.52	50.82
2	Burn	UB	23	9.66	8.05	17.71
3	Burn	UB	11	4.62	3.85	8.47
4	Burn	UB	9	3.78	3.15	6.93
5	Burn	Slash-UB	24	15.6	13.44	29.04
6	Burn	Slash-UB	115	74.75	64.4	139.15
7	Burn	Slash-UB	143	92.95	80.08	173.03
8	Burn	UB	45	18.9	15.75	34.65
9	Burn	UB	46	19.32	16.1	35.42
10	Burn	Slash-UB	108	60.47	51.06	111.53
11	Burn	UB	143	75.79	64.35	140.14
12	Burn	UB	24	11.52	9.84	21.36
Alternative 3 Totals			733	414.66	354.09	768.25

The direct effects of Alternative 2 would be a reduction of CWD on all forest types, but all units are expected to meet the recommendations of Graham et al in the short-term. In the long-term, the cumulative effects of Alternative 2 would be maintenance of soil productivity on all forest types. The indirect effects of meeting CWD recommendations on dry-forest types would be a reduction in the risk of severe fire.

3) Alternative 3

The direct effects of Alternative 3 would be a reduction of CWD on all forest types, but all units are expected to meet the recommendations of Graham et al in the short-term, with the exception of Units 1, 5, 6, 7, and portions of 10. In these units, where slashing would occur prior to underburning, CWD levels higher than those recommended are expected based on estimates from the FOFEM model.

The indirect and cumulative effects of Alternative 3 would be an increased occurrence of insects and diseases, and ultimately, an increase in CWD accumulations. Alternative 3 would not only change the vertical structure of forest stands, but the horizontal structure as well. Initially, the number of dead trees in these stands would be far in excess of those needed to meet IPNF standards and Region 1 Protocols (2000). Over time, the amount of CWD would continue to increase as snags created from the prescribed fire fall to the ground. The additional CWD would likely be more than the amount recommended on all forest sites, including moist forest sites. As CWD accumulates and these forests regenerate, even burned forests are at high risk to reburns during subsequent decades. These hot fires in windblown or previously burned forests are extremely catastrophic because the large accumulation of dry, dead trees on the forest floor fuels very hot fires which damage the soil and kill trees that survived the initial fire or prescribed burn, and regeneration (Oliver et al, 1997). Finally, increased mortality from prescribed fire would likely result in increased Douglas-fir beetle activity. At low or endemic levels, Douglas-fir beetles infest scattered trees, including windfalls and trees injured by fire scorch, defoliation, or root disease. Where such trees are abundant, once they have been infested and killed, beetle populations can build up rapidly and spread to adjacent green, standing trees. Various fungi introduced by the beetles also contribute to mortality of infested trees (Schmitz and Gibson 1996).

G. Restoration Costs

Restoring forested ecosystems carries with it some inherent costs. Some of these costs can be mitigated through revenues, i.e., from the sale of wood products harvested in order to meet desired ecosystem objectives. The costs of the alternatives analyzed in detail are disclosed below.

1) Alternative 1

Alternative 1 includes no prescribed burning or silvicultural treatments. Consequently, no direct costs or revenues would be generated under this alternative.

The indirect and cumulative effects of no action are more subtle. The risksand probabilities of changes in ecosystems are likely to be related to the magnitude and direction of departures from the historical range of variability. Such risks have both ecological (Covington et al 1994) and societal dimensions (McKetta et al 1994). When ecosystems are outside the historical range of variability, changes may occur dramatically and rapidly. An investment of money, energy, or human effort may be required (Morgan et al 1994). Restoring ecosystem composition and structure will require some sort of financial investment. In the Dry Wall project area, as these systems trend further from historic conditions (e.g., loss of old growth ponderosas pine, declines in white pine, etc.) the costs of restoration will increase over time.

2) Alternative 2

The direct costs of restoration treatments under Alternative 2 would be over $300,000 (Table 4-3). However, based on an appraisal of the anticipated timber sale volume removed to achieve restoration objectives, Alternative 2 is expected to generate more revenue than costs. Estimated timber volume removed under Alternative 2 is about 4 million board feet (MMBF). The timber sale appraisal conducted for this volume of timber estimated that the advertised rate for the sale of timber would be about $150 per thousand board feet (MBF). Past history on the Bonners Ferry Ranger District has shown that these types of sales are often bid up to twice their advertised rate, in this case $300/MBF would not be unusual. Consequently, through timber sale receipts, Alternative 2 is expected to generate at least $600,000 in revenue and as much as $1.2 million if the sale is bid up close to historic rates. Additional deposits for brush disposal (BD) are expected to be over $186,000. In summary, the anticipated revenues for Alternative 2 are expected to be far more than the costs.

The indirect and cumulative effects of Alternative 2 are again related to improvements in forest composition and structure. As these systems are restored toward their historic conditions, the future financial costs of maintaining (e.g., silvicultural treatments and prescribed fire) and protecting (e.g., from fire, insects, and disease) these forests would be greatly reduced.

Table 4-3. Restoration Costs for Alternatives 2 and 3

T	Alternative 2	Alternative 3
Value of Timber Harvested/Burned	(+) $600-1,200	(-) $450-900
Brush Disposal (BD) Deposits from Timber Sale Receipts	(+) $186	0
Underburning	(-) $172	(-) $497
Fireline Construction	(-)$10	(-) $82
Burn Pile and Landings	(-) $22	0
Grapple Piling (concentrations and landings)	(-) $53	0
Slashing Understory Fuels	0	(-) $59
Limbing and Lopping Sawlogs	(-) $27	0
Reforestation	(-) $18	(-) $26
T	(+) $484 to 1,084	(-) $1,116 to 1,566

(1) *Values are rounded from appraisal estimates*

3) Alternative 3

The direct costs of restoration treatments under Alternative 3 would range from $1.1 million to almost $1.5 million (Table 4-3). The costs of restoration treatments alone would be well over $800,000. The costs of these treatments are higher than Alternative 2 for several reasons. First, prescribed fire would be the primary treatment in all units. This is a costly item at an estimated $678/acre. Next, some pretreatment of fuels (e.g., slashing) would be required to generate the type of fire behavior that would kill enough of the understory to meet restoration objectives. Finally, reforestation costs under Alternative 3 are expected to be double those of Alternative 2 given the anticipated loss of some desirable natural seed sources (e.g., ponderosa pine, western larch, and white pine). Additional costs would be in the form of lost revenues from merchantable timber burned during prescribed fire activities. A conservative estimate is that prescribed burning treatments would kill at least 3 MMBF of timber. Based on the appraised value of at least $150/MBF this would a minimum of $450,000 of lost revenue, or costs, and as much as $900,000 if the bid value were doubled. Even if the value of the timber is not deducted as cost, the projected cost of Alternative 3 would be over $660,000. In summary, the entire cost of restoration under Alternative 3 would be subsidized.

The indirect and cumulative effects of Alternative 3 are again related to improvements in forest composition and structure. Alternative 3 would reduce the risk of stand replacing fire in the short-term, but this risk would increase for a number of years in the long-term due to the potential for a re-burn. Alternative 3 would also reduce the risk of root disease spread compared to Alternative 1, but Alternative 3 would not be as effective as Alternative 2. Consequently, the future financial costs of maintaining and protecting these forests would be reduced under Alternative 3, but the costs would be greater than Alternative 2, especially in the long-term.

H. Reasonably Foreseeable Actions

The Bonners Ferry Ranger District Salvage sales EIS is scheduled for FY 2003. A proposed action has been developed and is scheduled for release in the spring of 2003. Harvest of these trees is proposed to reduce hazardous fuels, to restore productive stand conditions, and ecological function, or any one of these conditions, in areas affected by windstorms, insects, disease and other damaging events. The vegetative objectives of this proposal are consistent with the objectives of the Dry Wall EA. The cumulative effects of this project would contribute toward vegetative restoration in the Dry Wall Project Area.

I. Consistency With Forest Plan

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. Forest Plan direction is to maintain at least 10 percent of the forested portion of the IPNF as old growth. For distribution purposes at least 5% of each old growth management unit must be maintained as old growth. The Dry Wall assessment area is included within old growth management units (OGMU) 30. OGMU 30 is about 15,100 acres and contains 1,260 acres (8%) of old growth. As part of the IPNF Forest Plan strategy, 14% of the total forested area (roughly 51,000 acres) on Bonners Ferry Ranger District was allocated for old growth management, as directed in a letter from the Forest Supervisor on May 7, 1991. Within the Dry Wall assessment about 17% of the forested landscape (593 acres) was allocated as old growth. Another 5% (183 acres) of the landscape meets recruitment old growth standards, but was not allocated as part of the Forest Plan strategy.

a. Alternative 1

This alternative includes no entry into allocated, or non-allocated old growth. Forest Plan standards for old growth maintenance and distribution would be met. However, the long-term integrity of dry forest old growth would be somewhat dubious given the risk that stand-replacing fire would continue to increase over time. Historically, this type of old growth was characterized by open-grown stands of large diameter ponderosa pine and western larch that were maintained through frequent underburning. A fire history data for the Dry Wall project area revealed that the average fire return interval on these sites was about 45 years. Stands where treatments are being proposed last burned over 80 years ago. On an individual stand basis 80 years is within the historical range, however, from a landscape perspective the entire dry forest landscape in the Dry Wall area has had 80 years of fire exclusion. This landscape level of fire exclusion is outside the historic range.

With no treatment these stands would continue to meet the minimum Forest Plan old growth standards for size and age. However, with continued fire suppression and no mechanical treatments to reduce natural fuel loads, the risk of catastrophic fire would increase over time in these old growth forests. Such a fire would not only kill invading grand fir and Douglas-fir, but also the old, large-diameter, ponderosa pine and larch that are providing the old growth structure of these stands. Returning fire into these dense stands, or those with understory (ladder) fuels, could fatally damage already stressed overstory trees. Even without catastrophic fire, competition from Douglas-fir and grand fir, which tend to "hog" water and nutrients on these sites, would eventually kill the older pine and larch. Furthermore, pine and larch would not be able to regenerate under a dense canopy of Douglas-fir and grand fir, even if there were a seed source of ponderosa pine and larch. For these reasons, restoring ponderosa pine forests to more healthy and sustainable conditions will generally require some kind of silvicultural cutting (Hardy and Arno, 1996). These conclusions are consistent with ICBEMP findings (1996) for north Idaho forests where open grown, large-diameter, ponderosa pine and larch forests have been replaced with dense stands of small-diameter Douglas-fir and grand fir. The net result is a decrease in forest diversity throughout dry-site forests in north Idaho.

b. Alternative 2

This alternative includes entry into allocated and non-allocated recruitment dry-forest old growth. Treatments would be designed to restore the historic integrity of this type of old growth. Silvicultural prescriptions would be designed to retain the old growth ponderosa pine, western larch, and even the scattered old growth 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. This alternative would result in no net loss of allocated old growth. Consequently, Forest Plan standards for old growth maintenance and distribution would be met.

c. Alternative 3

Alternative 3 includes use of prescribed burning in the same recruitment old growth stands as Alternative 2. In the short-term, Alternative 3 would be expected to maintain the IPNF's current old growth allocation, although some valuable components of the system would be lost, i.e., some old growth trees, and some of the future recruitment old growth trees, would be killed. Consequently, improvement and maintenance of old growth structure, would be more difficult in the long-term than Alternative 2.

2) 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."

J. Lands Suitable for Timber Production

a. Alternative 2

This alternative include lands that were designated as unsuitable for timber production in the Forest Plan (MA9). The Forest Plan (Timber Standard 3, page II-32) allows for changes in land suitability classification based on recommendations of a certified silviculturist. In accordance with this standard lands within the Units 1, 2, 3, 4, 5, 6, 7, and 9 have been field reviewed and re-classified as suitable for timber production.

4.2 Wildlife

A determination of the cumulative effects analysis area is based on each species' relative home range size in relation to its available habitat, topographic features which relate to how a species moves and uses its home range (e.g., watershed boundaries), and boundaries that represent the point of diminishing potential effects. For the Dry Wall project, the cumulative effects analysis area was determined to be the Dry Wall project area for each species being further analyzed. Note that this area is different from the cumulative effects area analyzed for some of the other resources, such as hydrology and fisheries.

The 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. Cumulative effects analysis considers relevant past, present, ongoing, and foreseeable future actions. Past actions and events have shaped the forest vegetation and provide the baseline habitat conditions for analyzing direct and indirect effects of proposed activities. This is especially true for the habitat suitability models that incorporate changes in vegetation resulting from disturbance and succession into the models.

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 Capital Forest Management (formerly Crown Pacific International) to determine their future plans. Based on the information provided by these entities, there are no foreseeable future activities planned on lands within the cumulative effects analysis area but outside of the National Forest.

To determine any future activities on National Forest lands, the Forest Service's Schedule of Proposed Actions (SOPA) was reviewed. The Forest Service has one planned action, the D7 Small Sales EIS, in the Dry Wall cumulative effects analysis area. The project will allow for removal of snags within 1,200 ft of existing roads. Snags can be removed only from areas where snag densities exceed the Northern Region Snag Management Protocol (USFS 2000) recommendations. As with under current conditions, firewood cutting will continue to be permitted in the cumulative effects analysis area. Most firewood cutting occurs within 200 ft of existing roads.

Because the only present, ongoing, or foreseeable future actions in the cumulative effects analysis area (other than the proposed Dry Wall project) are minor salvage and firewood cutting that will not have a significant effect on tree and snag densities, and because analysis of direct and indirect effects considers past actions, no further discussion of cumulative effects is provided.

A. Analysis Indicators for Selected Species

The indicators used to measure effects for each species are displayed in Table 4-4. Indicators vary among species and are based on those factors that could result in a measurable adverse or beneficial effect. For species in which habitat suitability models are available (i.e., northern goshawk, flammulated owl, and fisher), a quantitative assessment of changes in availability of suitable habitat is provided below.

B. Snag Habitat

Analysis of changes in snag habitat is based on assessment of stand development in the presence and absence of the proposed actions, as well as knowledge of proposed harvest techniques.

1) Alternative 1

In the absence of timber harvest, the project area would continue to trend toward increasing dominance of shade-tolerant species, with a decline in abundance of large, long-standing snags (i.e., western larch and ponderosa pine) and an increase in abundance of small, short-standing snags (i.e. Douglas-fir and grand fir). In addition, the area would become increasingly susceptible to stand-replacing fire. Such a large-scale disturbance would result in a short-term influx of both large and small snags, followed by a longer-term decline in snag abundance during early stages of stand development.

Table 4-4. Issue Indicators by Species/Habitat

Species/Habitat	Indicator
Snag habitat	Trends in snag type and density.
Northern goshawk	Trends in suitable nesting habitat.
Flammulated owl[1]	Trends in suitable habitat.
Black-backed woodpecker	Changes in susceptibility to fire and disease, and distribution and quality of snag habitat.
Fisher[2]	Trends in suitable habitat and changes in road access.
Pileated woodpecker	Trends in large snag habitat. Canopy cover is also considered.
Forest land birds	Trends in priority habitat types (i.e., riparian and dry ponderosa pine/Douglas-fir/grand fir forests).

[1] Treated as a guild with the white-headed woodpecker.
[2] Treated as a guild with the American marten.

2) Alternative 2

Under Alternative 2, all large snags and large trees would be protected from timber harvest, to the maximum extent possible. Large trees would provide future large snag recruitment. Small snags would be harvested, if their presence interfered with harvest of other trees, and Alternative 2 would result in a declining trend in small snag abundance within harvested areas. Because most existing large trees (live and standing dead) would not be harvested and because stand conditions following harvest would encourage growth of species which produce long-standing, large snags (i.e., ponderosa pine and western larch), Alternative 2 would result in increasing abundance of large snags in harvested areas over time.

3) Alternative 3

Under Alternative 3, the killing of trees by prescribed fire would result in a dramatic increase in the number of small and large snags over the short-term. In the treatment units planned for a relatively intense burn, fire is expected to create 50 to 100 snags/acre of snags less than 10 inches dbh, 10 to 20 snags/acre of snags between 10 and 15 inches dbh, and 2 to 4 snags/acre of snags greater than 20 inches dbh, as estimated from the BEHAVE fire model. Over the longer-term, large live trees remaining under Alternative 3 would provide for future recruitment of large snags. However, because more large trees would be killed from fire under Alternative 3 than would be harvested under Alternative 2, Alternative 3 would provide for less long-term recruitment of large snags than Alternative 2. If the prescribed fire under Alternative 3 were to run out of control, a short-term influx of large snags would occur, with a long-term scarcity of large snag recruitment.

4) Consistency with Forest Plan and Other Regulations and Effects Determination

Forest Plan guidelines for snag management (USFS 1985) would be exceeded in the short-term under Alternative 1. However, over time, recruitment of large snags would decline to the level that the alternative might no longer meet Forest Plan guidelines. Under Alternative 2, Forest Plan guidelines would be exceeded in both the short-term and long-term. As with existing conditions, abundance of large snags under Alternative 2 would remain below Northern Region Protocol (USFS 2000) recommendations immediately following timber harvest. However, over time, large snag recruitment is expected to result in achievement of the Northern Region Protocol recommendations for large snag densities under this alternative. Under Alternative 3, large snag densities would exceed both the Forest Plan guidelines and Northern Region Protocol recommendations.

C. Northern Goshawk

Because nesting habitat is considered to be the most limiting factor for goshawks, the effects analysis for the species focuses on trends in suitable nesting habitat. At least three suitable nest areas should be provided per nesting home range (5,000 to 6,000 acres) to maintain nesting goshawk population distribution. In addition, at least three replacement nest areas should be provided per home range area.

1) Alternative 1

Approximately 39 acres of currently suitable goshawk nesting habitat are present within the proposed treatment units. This habitat occurs as a single ponderosa pine/Douglas-fir/western larch stand that is becoming increasingly dominated by young Douglas-fir and grand fir. Under historic conditions, frequent underburning prevented this Douglas-fir and grand fir encroachment and maintained the large trees, large snags, and open-canopied stand conditions. Without natural fire, young Douglas-fir and grand fir trees are expected to develop into an increasingly dense understory that would reduce the ability of the stand to provide goshawk nesting habitat. In addition, the dense stand conditions would increase the risk of catastrophic stand replacing fire that would threaten goshawk nesting habitat.

As mentioned in Chapter 3 most of the capable goshawk habitat within proposed units (535 acres) is currently unsuitable due to insufficient density of large (> 14 inches dbh) trees. These areas are projected to become increasingly dominated by densely stocked young trees and consequently are not trending toward providing suitable goshawk habitat.

2) Alternative 2

Under Alternative 2, timber harvest would be conducted in 39 acres of suitable goshawk nesting habitat. However, at least 50 percent canopy cover would remain following harvest, and large trees and snags would be protected from harvest. Consequently, the area would remain as suitable habitat. Timber harvest would affect 535 of 3,078 acres (17 percent) of capable goshawk nesting habitat in the project area. In harvested areas, canopy cover immediately following harvest would generally range from 35 to 60 percent, and on-going management would maintain canopy cover in the range of 35 to 65 percent. Over time (i.e., several decades) density of large trees would increase and become sufficient to provide suitable goshawk habitat in areas with at least 50 percent canopy cover. Consequently, Alternative 2 would result in a long-term increase in suitable goshawk habitat.

3) Alternative 3

Under Alternative 3, prescribed fire (implemented as planned) would affect the same acreage of suitable and capable goshawk nesting habitat as Alternative 2. In burned areas, canopy cover generally would be inadequate to provide goshawk nesting habitat immediately following fire. However, the prescribed fire would advance the harvested areas toward suitable goshawk nesting habitat by providing large trees and snags and promoting the development of open-understoried forests. Alternative 3 does incur risk of prescribed fire burning out-of-control. Under this scenario, development of suitable goshawk habitat would be delayed, or possibly prevented, depending on stand development following fire.

4) Consistency with Forest Plan and Other Regulations and Effects Determination

Forest Plan guidelines (USFS 1987) state that habitat for sensitive species should be managed to prevent further declines in populations that could lead to Federal listing under the Endangered Species Act. Without management (i.e., Alternative 1), the 39 acres of suitable goshawk habitat within proposed treatment units would decline in quality over time. However, this small acreage of impact under Alternative 1 would not contribute to a trend toward Federal listing or loss of viability to the population or species.

Alternative 2 would improve goshawk nesting habitat by converting capable but currently unsuitable habitat to suitable habitat. Consequently, Alternative 2 would have a beneficial effect on northern goshawks.

Alternative 3 (implemented as planned) would result in a short-term (i.e., approximately 10-year period) loss of 39 acres of suitable goshawk habitat, and a long-term increase in suitable goshawk habitat. Consequently, this alternative would have a beneficial effect on goshawks.

D. Flammulated Owl

The effects analysis for the flammulated owl focuses on trends in suitable habitat.

1) Alternative 1

Approximately 43 acres of currently suitable flammulated owl habitat are present within proposed treatment units. This habitat occurs as a contiguous patch dominated by large ponderosa pine, which is being increasingly encroached upon by young Douglas-fir and grand fir. Under historic conditions, frequent underburning prevented this Douglas-fir and grand fir encroachment and maintained the large trees and snags and open-canopied stand conditions. Without natural fire, young Douglas-fir and grand fir trees are expected to develop into an increasingly dense understory, with virtually no recruitment of large ponderosa pine. Consequently, the ability of the stand to provide flammulated owl habitat would decline over time. As with the goshawk, increasing risk of stand replacing fire would also threaten the long-term viability of existing suitable flammulated owl habitat.

As mentioned in Chapter 3, most of the capable flammulated owl habitat within proposed units (394 acres) is currently not suitable, due to dense canopy cover. Without management, this habitat would trend toward denser cover of young trees and would remain unsuitable for flammulated owls.

2) Alternative 2

Under Alternative 2, timber harvest would occur in 43 acres of suitable flammulated owl habitat. Canopy cover immediately following timber harvest would be at least 35 percent and large trees and snags would remain on site. Consequently, the area would remain as suitable owl habitat. Timber harvest would affect 394 of the 854 acres (46 percent) of capable habitat in the project area. Canopy cover immediately following timber harvest in these areas would range from 35 to 55 percent, and most areas would become suitable flammulated owl habitat. Only those capable areas with relatively low density of existing large trees (approximately 30 acres) would not be immediately converted to suitable habitat following harvest. However, over time, these areas are expected to develop into suitable flammulated owl habitat.

3) Alternative 3

Under Alternative 3, prescribed fire (implemented as planned) would affect the same acreage of suitable and capable flammulated owl habitat as Alternative 2. Currently suitable habitat would receive high-intensity fire, and remaining canopy cover (estimated at 30 to 40 percent) may be inadequate to provide flammulated owl habitat. As with Alternative 2, management on the 351 acres of capable but not suitable habitat would remove young, dense Douglas-fir and grand fir and in most areas would result in the conversion of this capable habitat to suitable habitat. Some large Douglas-fir, ponderosa pine, and western larch would die and become snags, while most would remain as live large trees. Flammulated owls would be expected to use both the large live trees and large snags.

If the prescribed fire under Alternative 3 were to burn out-of-control, development of suitable flammulated owl habitat would be delayed, or possibly prevented, depending on stand development following fire.

4) Consistency with Forest Plan and Other Regulations and Effects Determination

Without management (i.e., Alternative 1), the 43 acres of suitable flammulated owl habitat within proposed treatment units would decline in quality over time. However, this small acreage of impact under Alternative 1 would not contribute to a trend toward Federal listing or loss of viability to the population or species.

Alternative 2 would improve flammulated owl habitat by converting capable but currently unsuitable habitat to suitable habitat. Consequently, Alternative 2 would have a beneficial effect on flammulated owls.

As with Alternative 2, Alternative 3 (implemented as planned) would improve flammulated owl habitat by converting capable but currently unsuitable habitat to suitable habitat. However, the 43 acres of currently suitable owl habitat may become unsuitable following fire, depending under remaining canopy cover. Because Alternative 3 (implemented as planned) would result in an overall increase in suitable owl habitat, the alternative would have a beneficial effect on flammulated owls.

E. Black-backed Woodpecker

The effects analysis for the black-backed woodpecker focuses on changes in susceptibility to fire and disease and changes in the distribution and quality of snag habitat.

1) Alternative 1

In the absence of management, increasing density of young Douglas-fir and grand fir would result in an increase in diseased trees and small snags. Although abundance of large snags would decrease, overall snag abundance is expected to increase, and nesting and foraging habitat for black-backed woodpeckers would be more abundant than under existing conditions. As mentioned previously, dense stand conditions with high fuel loads would result in increasing susceptibility to stand-replacing fire. Such an event would create a temporary flush of high-quality black-backed woodpecker habitat.

2) Alternative 2

Although Alternative 2 would result in an increase in large snags over time, the alternative represents an overall decrease in snags, as timber harvest would remove small snags and subsequent stand conditions would result in low levels of small snag recruitment. In addition, the removal of young Douglas-fir and grand fir under Alternative 2 and the subsequent open stand conditions would result in reduced susceptibility to disease and to stand-replacing fire. Consequently, under Alternative 2, the harvested areas would remain as relatively poor habitat for the black-backed woodpeckers, as under existing and historic conditions.

3) Alternative 3

Alternative 3 would result in an influx of burned trees and consequently would create a temporary flush of high-quality black-backed woodpecker habitat.

4) Consistency with Forest Plan and Other Regulations and Effects Determination

Without management (i.e., Alternative 1), black-backed woodpecker habitat would improve over time, as overall snag abundance, disease, and probability of stand-replacing fire increased. Consequently, Alternative 1 would not contribute to a trend toward Federal listing or loss of viability to the population or species.

Under Alternative 2, habitat quality for black-backed woodpeckers in harvested areas would remain poor, as extensive areas of snags, disease, and fire would not be present. However, Alternative 2 would not contribute to a trend toward Federal listing or loss of viability to the population or species.

Alternative 3 would result in a temporary increase in high-quality black-backed woodpecker habitat and would not contribute to a trend toward Federal listing or loss of viability to the population or species.

F. Pileated Woodpecker

The effects analysis for the pileated woodpecker focuses on trends in the abundance of large snags. Canopy cover is also considered.

1) Alternative 1

As mentioned in Section 4.3.1, the project area would continue to trend toward increasing dominance of shade-tolerant species in the absence of timber harvest, with a decline in abundance of large, long-standing snags (i.e., western larch and ponderosa pine) and an increase in abundance of small, short-standing snags (i.e. Douglas-fir and grand fir). Consequently, the area would decline in habitat quality (especially for nesting) for pileated woodpeckers. As with the goshawk, flammulated owl, and fisher, increasing risk of stand-replacing fire would also threaten the long-term viability of pileated woodpecker habitat, through loss of canopy cover.

2) Alternative 2

Timber harvest would result in the immediate loss of approximately 400 acres of existing pileated woodpecker nesting habitat, due to inadequate remaining canopy cover following harvest. However, in the years following harvest, canopy cover would increase (stands would be managed to provide 35 to 65 percent canopy cover) and in a few areas would become dense enough to provide pileated woodpecker nesting habitat. (As mentioned in the existing conditions section, pileated woodpeckers generally require 60 percent canopy cover for nesting.) In all treatment areas, remaining snags and downed wood would provide on pileated woodpecker foraging habitat. Overall, Alternative 2 would have an impact pileated woodpecker nesting habitat. However, the treatment areas historically contained relatively open canopies and in most areas did not provide nesting habitat for the species.

3) Alternative 3

As with Alternative 2, canopy cover immediately following timber harvest under Alternative 3 (implemented as planned) generally would be inadequate to provide pileated woodpecker nesting habitat. The large number of snags and downed wood following fire under Alternative 3 would provide abundant foraging opportunities. Similar to Alternative 2, in the years following treatment, canopy cover would increase and in some areas would become dense enough to provide pileated woodpecker nesting habitat. Alternative 3 would result in a greater abundance of potential pileated woodpecker nest trees, as abundance of large snags (which provide preferred nest sites for the woodpecker) under this alternative would be greater than Alternative 2.

If the prescribed fire under Alternative 3 were to burn out-of-control, development of suitable pileated woodpecker habitat would be delayed, or possibly prevented, depending on stand development following fire.

4) Consistency with Forest Plan and Other Regulations and Determination of Effect

There are no Forest Plan standards for the pileated woodpecker other than to provide for viable populations, and there are no other laws or regulations applicable to the woodpecker. Alternative 1 would result in a long-term decline in pileated woodpecker habitat through loss of large snags, although the relatively small size of the affected area would prevent impacts to the overall viability of the species. Alternatives 2 and 3 (implemented as planned) would result in a short-term impact to pileated woodpeckers and a long-term increase in habitat for the species. Consequently, these alternatives would not threaten the viability of the species.

G. Forest Land Birds

The effects analysis for forest land birds focuses on trends in priority habitat types (i.e., riparian and dry ponderosa pine/Douglas-fir/grand fir forests) identified by Idaho Partners in Flight (2000).

1) Alternative 1

The Dry Wall project area contains two of four priority habitat types, riparian and dry ponderosa pine/Douglas-fir/grand fir forests. 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 historic, 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. In addition, potential stand-replacing fire, a greater likelihood as stand density and disease increased, would pose the threat of eliminating habitat for several decades.

2) Alternative 2

Implementation of BMPs and the INFISH would protect riparian habitats, and Alternative 2 would have no effect on forest land birds associated with this habitat type. The proposed actions would promote the restoration of dry ponderosa pine/Douglas-fir forests and therefore, over the long term, would improve conditions for forest land birds associated with this habitat type.

3) Alternative 3

Implemented as planned, Alternative 3 would have no effect on riparian habitats, and therefore no effect on forest land birds associated with this habitat type. As with Alternative 2, Alternative 3 would promote the restoration of dry ponderosa pine/Douglas-fir forests, and consequently, the alternative would improve conditions for forest land birds associated with this habitat type.

If the prescribed fire under Alternative 3 were to burn out-of-control, riparian habitat could be affected and forests could be converted to open areas with only standing dead trees remaining. Under these conditions, habitat use by riparian-associated and dry forest-associated birds would be dramatically reduced until suitable vegetation developed.

4) Consistency with Forest Plan and Other Regulations and Determination of Effects

Alternative 1 would result in a long-term decline in one of the four priority habitat types for forest land birds, the dry ponderosa pine/Douglas-fir/grand fir forest habitat. Within the impact area, birds associated with this habitat type would decline over time. Alternative 2 and Alternative 3 (implemented as planned) would result in short-term impacts and long-term improvements to this habitat type. Consequently, although some birds associated with dry forests may temporarily be displaced under Alternative 2 and Alternative 3, over time, the area would be able to support a higher abundance of dry-forest associated birds than under current conditions.

4.3 Watershed and Fisheries

This effects analysis evaluates each project alternative for potential impacts to water resources, including water quality and natural channel processes. Critical management issues for protecting water resources include hydrologic integrity, riparian function, mass slope failures and soil erosion, stream crossings, water yield, and cumulative watershed effects.

This effects analysis evaluates direct, indirect, and cumulative effects of project alternatives, focusing on management issues for protecting water resources, including water quality and natural channel processes.

A. Cumulative Effects

For the purpose of analyzing potential watershed cumulative effects in the project area, the Dry Wall cumulative effects area (CEA) has been assumed to include sections 8, 9, 10, 11, 14, 15, 16, and 17 of Township 63 North, Range 2 East (Figure 2). This CEA encompasses most of the lower Meadow Creek watershed, including the lower portion of the Wall Creek sub-watershed.

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. Timber harvesting, road construction, and other Forest Service management activities in the Dry Wall cumulative effects area (CEA) have occurred at several times during recent decades. Approximately 25 percent of the upper Wall Creek drainage was regeneration harvested in the 1970s and 1980s (USFS 1992). Regeneration harvesting within the Dry Wall CEA in the 1990s was limited to two units in 1990 and three units in 1991. Group-selection timber harvesting (i.e., cutting about 10 percent of the area in 2- to 3-acre patches) in 1995 occurred on an area centered on Unit 10. In addition, timber harvesting has occurred on private lands within the CEA. These activities have influenced the riparian vegetation communities, channel stability, and aquatic habitat of Wall Creek and lower Meadow Creek.

Present and ongoing activities within the Dry Wall CEA include fire suppression, road maintenance, motor vehicle use, and grazing. Fire suppression, as it alters vegetation conditions, will continue to influence water yield, as discussed for Alternative 1. The mainline Meadow Creek Road is a relatively high-traffic forest road on the Bonners Ferry District and its frequent use and maintenance 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. Erosion from off-road vehicle use was not observed in the CEA. Cattle grazing in the privately owned riparian areas of lower Meadow Creek is expected to continue to effect water quality in the stream. The resulting stream bank erosion and reduction in riparian shade have increased fine sediment deposition and stream temperatures in the lower reaches of Meadow Creek.

To determine any forseeable 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 Capital Forest Management (formerly Crown Pacific International) to determine their future plans. Based on the information provided by these entities, there are no foreseeable future activities planned on lands within the cumulative effects analysis area.

To determine any future activities on National Forest lands, the Forest Service's Schedule of Proposed Actions (SOPA) was reviewed. The Forest Service has one planned action, the D7 Small Sales EIS, which could include timber within the Dry Wall cumulative effects analysis area. The EIS will allow for removal of windfall (i.e., trees naturally blown down) within 1,200 ft of existing roads, but does not include any operations within RHCAs or sensitive land types. In addition, firewood cutting and cattle grazing will continue to be permitted in the cumulative effects analysis area. Most firewood cutting occurs within 200 ft of existing roads.

In summary, all past, present, and foreseeable activities have been accounted for. Because the only present, ongoing, or foreseeable future actions in the CEA (other than the proposed Dry Wall project) are road use and maintenance, grazing, and minor salvage and firewood cutting that will not have a measurable effect on hydrology, and because analysis of direct and indirect effects considers past actions, no further discussion of cumulative effects is provided.

B. Direct And Indirect Effects

The direct and indirect effects of project alternatives on hydrology and water quality are described below for the four management issues identified in Chapter 3.

1) Riparian Function

a. Alternative 1

Riparian function would not change directly from road construction under any of the Dry Wall alternatives because no new roads are proposed. However, in the absence of proposed management activities, the risk of high-intensity wildfires in the project area would continue to increase with fuels buildup under Alternative 1. A hot, uncontrolled wildfire could spread to RHCAs, indirectly creating new riparian openings.

b. Alternative 2

Alternative 2 timber harvest unit boundaries have been designed to avoid RHCAs and thus protect riparian areas. Riparian function would not change directly under Alternative 2. Further, fuels reduction would reduce the risk of a stand-replacing fire spreading from Dry Wall treatment units to adjacent riparian areas.

c. Alternative 3

Alternative 3 prescribed burning unit boundaries have been designed to avoid RHCAs and thus protect riparian areas. Riparian function would not change directly under Alternative 3, provided that fires are successfully contained within unit boundaries. Fuels reduction would reduce the risk of a future stand-replacing wildfire spreading from Dry Wall treatment units to adjacent riparian areas.

However, the risk of uncontrolled burning within RHCAs is higher under Alternative 3 than under Alternative 2.

2) Soil Erosion And Mass Wasting

a. Alternative 1

Following IPNF soil guidelines for environmental analysis (Niehoff 1998), existing soil conditions resulting from road construction and timber harvesting were estimated to amount to less than 4 percent of the CEA with detrimentally impacted soils. The area of detrimentally impacted soils would not be directly affected under Alternative 1. Although detrimentally impacted soils would not directly change, there is a higher and increasing risk, under Alternative 1, that extensive areas could have detrimentally impacted soils if fuels buildup leads to a stand-replacing fire.

Based on WEPP model estimates for a twenty-year old forest, sediment delivery from Dry Wall project units averages less than 2 tons per year under Alternative 1 (Table 4-5). Under existing conditions, average annual sediment delivery from FS 2504 is estimated to be an additional 13 tons. 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 21,700 tons per year.

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.

b. Alternative 2

The area of detrimentally impacted soils within the CEA was estimated to directly increase by 1.6 percent (71 acres) under Alternative 2 (Table 4-6). Although detrimentally impacted soils would directly change, there is a lower risk, under Alternative 2, that extensive areas could have detrimentally impacted soils as the result of fuels buildup leading to a stand-replacing fire.

Based on remote sensing information contained in the Forest Service geographic information system (GIS), Table 4-6 indicates that Units 8 and 10 have a high mass failure potential, and these are units with tractor logging proposed under Alternative 2. From field reconnaissance of these units, however, it appeared that the GIS land type designation was inaccurate. Slopes are generally less than 30 percent and there was no evidence of mass failures having occurred in recent decades. Design features to protect soils from tractor logging impacts will include using existing skid trails and minimizing any new skid trails, using slash mats to minimize compaction, and grapple-piling slash to minimize the potential for soil impacts from burning.

Based on WEPP model estimates for areas experiencing a low-severity fire, sediment delivery from Dry Wall project units could total approximately 350 tons per year for the first year or two after Alternative 2 timber harvest and prescribed burning (see Table 4-5). This amount could vary greatly depending on the coincidence of wet or dry weather following the management activity (i.e., heavy rains following ground disturbance could cause more or drought conditions could result in less sediment delivery). WEPP model estimates for a five-year old forest indicate that sediment delivery

Table 4-5. Summary of WEPP Model Sediment Delivery Estimates

Unit Number	Acres	Twenty-year Old Forest[1]			Low-severity Fire[2]			Five-year Old Forest[3]			High-severity Fire[4]		
		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 (%)
1	42	0	0.0	3	0.15	6.3	37	0	0.0	7	11.51	483.4	100
2	23	0	0.0	3	0.12	2.8	37	0	0.0	7	6.33	145.6	100
3	11	0	0.0	3	0.14	1.5	37	0.01	0.1	7	4.59	50.5	100
4	9	0	0.0	3	0.14	1.3	37	0.01	0.1	7	4.41	39.7	100
5	24	0	0.0	3	0.34	8.2	40	0.01	0.2	7	31.15	747.6	100
6	115	0	0.0	3	0.43	49.5	40	0.02	2.3	7	39.84	4,581.6	100
7	167	0.01	1.7	10	0.91	152.0	53	0	0.0	23	45.33	7,570.1	100
8	45	0	0.0	3	0.6	27.0	37	0	0.0	7	2.5	112.5	100
9	46	0	0.0	3	0.45	20.7	37	0.02	0.9	7	36.15	1,662.9	100
10	108	0	0.0	3	0.48	51.8	40	0.02	2.2	7	36.5	3,942.0	100
11	143	0	0.0	3	0.08	11.4	40	0	0.0	7	9.84	1,407.1	100
12	24	0	0.0	3	0.66	15.8	47	0.03	0.7	7	39.86	956.6	47
		TOTAL	1.7		TOTAL	348.3		TOTAL	6.5		TOTAL	21,699.7	

[1] This vegetation treatment simulates expected conditions under the no-action alternative, in the absence of wildfire. This condition applies to any well-established forest and soils completely covered with a forest duff layer.

[2] 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 wild fires could occur in areas of some units under the no-action alternative. These same conditions would occur in prescribed burn areas under Alternatives 2 and 3.

[3] This vegetation treatment simulates where vegetation has become sufficiently established to generate 100% ground cover. This condition could follow timber harvest and prescribed burning, or both, under Alternatives 2 and 3.

[4] 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.

Table 4-6. Soil Resources Evaluation for Proposed Harvest Units

		Sensitive Landtypes (ac)			Sediment Delivery Potential (ac)			Mass Failure Potential (ac)			Alternative 2[1]		
Unit	Area (ac)	Very High	High	Medium	Very High	High	Medium	Very High	High	Medium	Prescription/Logging System/Fuels Treatment	Detrimentally Impacted Ground (%)[2]	Detrimentally Impacted Ground (ac)
1	42	0	0	0	0	0	0	0	0	0	GS-CT / T / GP	13	5.5
2	23	0	0	0	0	0	0	0	0	0	CT / T / GP	13	3.0
3	11	0	0	0	0	0	0	0	0	0	CT-SS / T / GP	13	1.4
4	9	0	0	0	0	0	0	0	0	0	CT-SS / T / GP	13	1.2
5	24	0	2	4	0	2	4	0	0	6	GS / S-T / GP	3	0.7
6	115	0	5	1	0	13	1	0	8	6	GS / H / UB	0	0.0
7	167	0	33	29	0	33	29	0	33	29	GS / H / UB	0	0.0
8	45	8	10	29	0	10	29	0	10	0	CT / T / GP	13	5.9
9	46	0	0	12	0	0	12	0	0	12	CT-SS / H / GP-LS	0	0.0
10	108	0	12	1	0	12	1	0	12	0	GS-CT / T / GP	13	14.0
11	143	0	0	4	0	0	4	0	0	0	GS-CT / S-T / GP	9	12.9
12	24	0	0	18	0	0	18	0	0	18	Burn / NA / UB	0	0.0
Total	**757**	**8**	**62**	**98**	**0**	**70**	**98**	**0**	**63**	**71**	**--**	--	44.5

Silvicultural Prescriptions		Logging Systems		Fuels Treatment	
GS =	Group Selection	T =	Tractor	GP =	Grapple Pile
CT =	Commercial Thin	S =	Skyline	UB =	Underburn
SS =	Sanitation Salvage	H =	Helicopter	LS =	Lop & Scatter
		NA =	Not Applicable		

[1] The other two project alternatives were also examined. Alternative 1 (No Action) includes no active management prescriptions and no direct soil resource effects. Alternative 3 (Prescribed Burns) includes no timber harvest activities. Fuels models indicate 0 to 2% of surface soils impacted in all units except 6% in Unit 11.

[2] Source of detrimentally impacted ground percentages is from soil disturbance model coefficients in Niehoff (2002). Assumes fuels not grapple-piled when soils are dry.

would drop to an average of six or seven tons per year after revegetation has achieved 100 percent ground coverage.

A close inspection of FS 2504 in July 2002 showed that, with the exception of a failing culvert at the Wall Creek crossing, the road is in very good condition and the only reconstruction under Alternative 2 would entail replacement of the failing culvert on FS 2504.

c. Alternative 3

The area of detrimentally impacted soils within the CEA was estimated to marginally increase under Alternative 3, assuming 0 to 2 percent of treatment unit surface soils would be impacted in most units and 6 percent of surface soils would be impacted in Unit 11 (Table 4-6). Although detrimentally impacted soils would marginally increase, the risk that extensive areas could indirectly have detrimentally impacted soil, as the result of fuels buildup leading to a stand-replacing fire, would be less under Alternative 3 than under the no-action alternative. This analysis assumes that prescribed burning is conducted with surface soil moisture greater than 25 percent and hydrophobic surface soil conditions do not result, and fires are contained within unit boundaries. If hydrophobic soil conditions result from hot burning in some areas, or if prescribed fires are not contained, then detrimentally impacted soils could be far more extensive under Alternative 3.

Based on WEPP model estimates for areas experiencing a low-severity fire, sediment delivery from Dry Wall project units could total approximately 350 tons per year for the first year or two after Alternative 3 prescribed burning (Table 4-5). This amount could vary greatly depending on the coincidence of wet or dry weather following the management activity. WEPP model estimates for a five-year old forest indicate that sediment delivery would drop to an average of six or seven tons per year after revegetation has achieved 100 percent ground coverage. Again, this analysis assumes that hydrophobic soil conditions will not develop. Sediment delivery from areas of high-severity fire could range from 2.5 to 45 tons per acre per year in different management units.

3) Stream Crossings

a. Alternative 1 and 3

The number of stream crossings would remain the same under Alternative 1. There are currently six stream crossings in the Dry Wall CEA. Because Wall Creek has a very limited potential fishery, other streams are likely to be higher priorities for funding culvert replacements and other restoration activities. Therefore, funding to replace the FS 2504 culvert is uncertain and the risk may remain high for this culvert to fail under Alternatives 1 or 3.

b. Alternative 2

The failing Wall Creek culvert under FS 2504 would be replaced during management activities proposed under Alternative 2. This replacement, funded by timber sale revenue, would address the one culvert observed to have a high risk of failure.

4) Water Yield

a. Alternative 1

Because no activities are planned in the project area under Alternative 1, no direct changes in water yield would be expected. The current ECA for the Dry Wall CEA is 17 percent, well below the 30 percent "red flag" level. Over time, the risk of a stand-replacing wildfire would increase as fuel loads increased. An extensive fire of this nature could greatly increase the ECA and result in increased peak flows with consequent adverse impacts to water quality, channel stability, and aquatic habitat.

b. Alternative 2

Because activities planned in the project area under Alternative 2 are expected to result in only a minor increase in ECA, no direct changes in water yield would be expected. Alternative 2 would result in an ECA of 22 percent, still below the 30 percent threshold. By reducing current and future fuel loads, Alternative 2 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.

In the Dry Wall project area, the relatively dry site conditions reduce the potential for peak flow impacts. Most of the annual precipitation occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge. Heavy rainfall is very unusual on the dry slopes below 4,000 ft elevation that comprise the project area. The timber harvesting proposed under Alternative 2 will restore the more natural conditions of canopy openings that are characteristic of dry sites. This alternative is not expected to increase the risk of damaging peak flows in Wall Creek or Meadow Creek.

c. Alternative 3

Alternative 3 would result in an ECA of 23 percent, still below the 30 percent threshold. By reducing current and future fuel loads, Alternative 3 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. This analysis assumes that prescribed fires are contained within the management unit boundaries and hydrophobic conditions do not develop. Because relatively hot fires are necessary to accomplish the project objectives under Alternative 3, this alternative has higher risks of uncontrolled wildfires outside the unit boundaries and areas of heavy fuel buildup developing hydrophobic soils. If these unplanned outcomes resulted from Alternative 3, then water yield could be greatly affected.

5) Salmonid populations (westslope cutthroat trout)

a. Alternative 1

Under Alternative 1, no timber would be harvested, so canopy coverage, riparian function, and hydrologic functions (including water yield) would not change. Also, no additional roads or stream crossings would be constructed. Since no ground-disturbing activities would occur, no direct increases in sediment delivery to streams would occur. Under this alternative, there would be no changes in sediment or water yield due to timber management activities. Therefore, there would be no additional risk of direct or indirect effects to the salmonid species, non-salmonid fishes, or aquatic invertebrates.

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. An extensive fire of this nature could result in indirect effects such as increased peak flows and consequent adverse impacts to water quality, channel stability, and aquatic habitat. In addition, without road maintenance improvements, the risk of drainage system failures would gradually increase as culverts on existing roads reach the end of their designed lifespan and become further plugged with sediment and debris.

The Forest Service has one planned action, the D7 Small Sales EIS, in the Dry Wall cumulative effects analysis area. In addition, the Idaho Department of Lands has been contacted to determine all current permits held by small private landowners and Capital Forest Management (formerly Crown Pacific International) was contacted to determine their current and planned actions. In summary, all past, present, and foreseeable activities have been accounted for. Effects from past and current management are generally not anticipated to act cumulatively with the no-action alternative to adversely affect water resources. Therefore, no cumulative effects are anticipated. However, past forest management and fire control practices have led to fuel conditions that could, if continued, lead to an intense stand-replacement fire with the consequences for hydrology and water quality.

b. Alternative 2

Alternative 2 would have no direct or indirect effects on westslope cutthroat trout in Wall Creek or Meadow Creek, and no cumulative effects are anticipated as described for Alternative 1. The standard Riparian Habitat Conservation Area (RHCA) buffers, as described in the Inland Native Fish Strategy (INFISH) (USFS 1995), will be implemented. In more landslide prone areas, extra precautions (i.e., helicopter logging, skyline logging, not allowing harvesting or ground skidding in ephemeral channels) would be employed to comply with INFISH standards.

As specified in the Hydrology Specialist Report (Parametrix 2002b), it is anticipated that water and sediment yields would not be greatly altered by Alternative 2 actions. Ground-disturbing activities within the RHCAs would benefit fish resources and watershed health (e.g. culvert replacement and road decommissioning). Reducing fuel loads through timber harvest would also reduce the risk of high-intensity wildfires and associated indirect impacts to water quality, channel stability, and aquatic habitat.

c. Alternative 3

To kill the same amount of understory fir that would be removed through logging under Alternative 2, prescribed burning would require intense fire conditions. There is an inherent risk with high-intensity prescribed burning that uncontrolled wildfire could occur outside of the intended treatment area and kill vegetation in both upland and riparian areas. This could result in indirect effects of high-intensity wildfire similar to those described for Alternative 1. However, if correctly implemented, prescribed burning would have no direct effects on water and sediment yields, similar to Alternative 2 actions. In addition, no cumulative effects are anticipated as described for Alternative 1.

6) Consistency With Regulations - All Alternatives

Including considerations for potential cumulative effects, Dry Wall project action alternatives, as planned, comply with the Forest Plan, the Clean Water Act, and other regulatory requirements. The Dry Wall project has been designed to minimize the need for mitigation by avoiding effects to water resources. By restoring fire-tolerant tree species to 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 purpose through a combination of timber harvesting and prescribed burning will minimize the reduction of vegetative cover. Using helicopters 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 Dry Wall project.

Under Alternative 2, timber-harvesting revenues would provide for specific mitigation to reduce the hydrologic effects of FS 2504. The undersized culvert at Wall Creek would be replaced to reduce the risk of a road washout at this location.

Endangered Species Act: No ESA-listed species occur within the project area.

Forest Plan: The Forest Plan identifies many of the fundamental requirements to mitigate for the effects of forest management activities on water resources (USFS 1987). Compliance with State water quality standards through the use of Best Management Practices (BMPs), and monitoring to determine the effectiveness of BMPS, are central mitigation requirements in the Forest Plan.

Forest Plan guidelines specify that management of habitat for threatened, endangered, and sensitive species will be given priority in identified fishery habitat. In addition, management activities will not significantly impair the long-term productivity of the water resource and ensure that water quality and the stream channel system will be protected. A key component of the Forest Plan is that fishery and timber management activities are coordinated to maximize the contribution of riparian vegetation to aquatic habitats. The proposed management alternatives are consistent with the Forest Plan because adequate riparian buffer are provided for, and there are no anticipated direct, indirect, or cumulative effects on fish habitat. In addition, no threatened or endangered species occur in the project area.

Inland Native Fish Strategy: The INFISH (see Section 4.2) amendments to the Forest Plan provide more stringent requirements to protect riparian areas (USFS 1995). To comply with INFISH, the Dry Wall project designated RHCAs where no timber harvesting is planned. For Meadow Creek and Wall 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 ft 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 ft slope distance, whichever is greater. For these Category 4 streams in Units 7 and 8, RHCAs will be marked on the ground during the timber sale layout. A hydrologist 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.

INFISH specifies that stream channel integrity, channel processes (e.g. surface erosion, bank erosion, and channel migration), water quality, LWD recruitment, and the sediment regime under which the riparian and aquatic ecosystems developed be maintained. Proposed management alternatives provide for RHCAs that meet INFISH requirements and there are no anticipated effects on existing channel integrity, channel processes, or water quality.

Clean Water Act: Wall Creek and Meadow Creek are not on the State 303(d) list or EPA's April 2000 amendments to the list.

Governor's Bull Trout Conservation Plan: No bull trout occur in the project area. Therefore, the proposed management alternatives are consistent with the Governor's Bull Trout Conservation Plan because there will be no impact on bull trout populations.

7) Conservation Measures

Because the effects of the proposed alternatives on stream habitat and water quality are expected to be minimal, mitigation measures are not warranted. Proposed timber harvest methods would minimize sediment delivery to streams. Plans are already in place to replace the undersized culvert where FS 2504 crosses Wall Creek, which would control sediment input from that source. Adherence to Forest Plan and INFISH strategies would maintain the integrity of aquatic ecosystems, particularly the protection of RHCA's

Chapter 5 - List of Preparers

The following individuals participated in the formulation and analyses of the alternatives and the subsequent preparation of the Dry Wall Environmental Assessment (EA).

Pat Behrens - Silviculturist, Interdisciplinary Team Leader (USFS)

Spike Loros - Document Display Specialist and GIS Analyst (USFS)

Jim Good – Hydrologist (Parametrix)

Chris Savage – Hydrologist (USFS)

Bill LaVoie – Fisheries Biologist (Parametrix)

Chad Baconrind – Fisheries Biologist (USFS)

Julie Grialou - Wildlife Biologist (Parametrix)

David Roberts – Wildlife Biologist (USFS)

Anna E. Hammet - IPNF North Zone Botany Coordinator (USFS)

Maridel Merritt - Writer Editor (USFS)

Tom Sandberg – Archaeologist (USFS)

Barry Wynsma – Visual Analyst (USFS)

Pat Hart – Recreation Technician (USFS)

Chapter 6 - Public Involvement

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

Public scoping for this project was initiated in May 2002 with a proposed action to treat roughly 750 acres in the Meadow Creek drainage. A total of 48 scoping letters were mailed to individuals, environmental groups, or agencies (including the Kootenai Tribe of Idaho) on the IPNF's Quarterly Schedule of Proposed Actions, and adjacent landowners, informing them that an EA to address vegetation management needs in the Dry Wall project area was being prepared. From this scoping, the Idaho State Fish and Game, The Lands Council (Spokane, WA), Kootenai Environmental Alliance (Coeur d'Alene, ID), and two adjacent landowners submitted written comments. One local landowner and The Ecology Center did not submit formal comments, but requested that they continue to be informed throughout the assessment process. The comments received were quite varied ranging from support of the Proposed Action to a request for developing a non-commercial alternative, which spawned the development of Alternative 3. Many of the comments from The Lands Council and the Kootenai Environmental Alliance centered round the nature and level of analyses these groups felt should be conducted for specific environmental issues. At some point the issues raised are addressed in the body of the Dry Wall EA (primarily Chapters 3 and 4), or through specialists reports and other information contained within the Project File.

Chapter 7 - Literature Cited

Aubry, K.B., G.M. Koehler, and J.R. Squires. 1999. **Ecology of Canada lynx in southern boreal forests**. Pages 373-396 *in* L.F. Ruggiero, K.B. Aubrey, S.W. Buskirk, G.M Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires, Ecology and conservation of lynx in the United States. USFS, Rocky Mountain Research Station, RMRS-GTR-30WWW.

Behrens, P. 2002. **Dry Wall Fire History**. August 2002.

Behrens, P. 2002. **Personal communication from Patrick Behrens, Silviculturist, to Jim Good of Parametrix, Inc**. September 5, 2002. U.S. Forest Service, Bonners Ferry Ranger District.

Belt, George H. 1980. **Predicting streamflow changes caused by forest practices using the equivalent clear-cut area model**. University of Idaho. Moscow, Idaho. January 1980.

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

Bjornn, T. C. 1971. **Trout and salmon movements in two Idaho streams as related to temperature, food, stream flow, cover, and population density**. Transactions of the American Fisheries Society 100: 423-438.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. **Resource partitioning among woodpeckers in northeastern Oregon**. U.S. Forest Service, Pacific Northwest Research Station, Research Note, PNW-444. June 1996.

Bull, E.L, R.S. Holthausen, and M.G. Henjum. 1990. **Techniques for monitoring pileated woodpeckers**. U.S. Forest Service, Pacific Northwest Research Station, PNW-GTR-269. September 1990.

Bull, E.L and R.S. Holthausen. 1993. **Habitat use and management of pileated woodpeckers in northeastern Oregon**. Journal of Wildlife Management 57(2):335-345.

Bull, E.L, C.G. Parks, and T.R. Torgersen. 1997. **Trees and logs important to wildlife in the Interior Columbia River Basin**. U.S. Forest Service, Pacific Northwest Research Station, PNW-GTR-391.

Chapman, D. W. 1988. **Critical review of variable used to define effects of fines in redds of large salmonids**. Transactions of the American Fisheries Society 117: 1-21.

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

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

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

Corkran, C.C, and C. Thoms. 1996. **Amphibians of Oregon, Washington, and British Columbia**. Lone Pine Publishing, Vancouver, British Columbia.

Deiter, D. 1996. **Meadow-Dawson watershed report**. Hydrologic analysis of the Meadow-Dawson Timber Sale prepared by Dale Deiter, District Hydrologist. U.S.D.A. Forest Service, Idaho Panhandle National Forests, Bonners Ferry Ranger District. Bonners Ferry, Idaho.

Dixon, R.D., and V.A. Saab. 2000. **Black-backed woodpecker (*Picoides arcticus*)**. *In* The Birds of North America, No. 509 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists's Union, Washington, D.C.

Elliott, W.J., D.E. Hall, and D.L. Scheele. 2000. **Disturbed WEPP (Draft 02/2000): WEPP interface for disturbed forest and range runoff, erosion and sediment delivery: Technical documentation**. U.S.D.A. Forest Service, Rocky Mountain Research Station and San Dimas Technology and Development Center. Moscow, Idaho. http://forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html.

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

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

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.R. Tonn and D.S. Page-Dumroese. 1994. **Managing Coarse Woody Debris in Forests of the Rocky Mountains**. U.S. Dept. Agric. For. Serv. Intermountain Research Station. Research paper INT-RP-477.

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

Harris, Gary D. 2000. **Placer pipeline watershed report**. Prepared by North Zone Hydrologic Technician, U.S.D.A. Forest Service, Idaho Panhandle National Forests, Sandpoint Ranger District. Sandpoint, Idaho.

Harvey, A.E., G.I. McDonald, M.F. Jurgensen and M.J. Larsen. 1993. **Microbes: Driving Forces for Long-term Ecological Processes in the Inland Northwest's Cedar-Hemlock-White Pine Forests.** Symposium Proceedings of Interior Cedar-Hemlock-White Pine Forests: Ecology and Management. March 2-4, 1993, Spokane, WA; Dept of Natural Resource Sciences, Washington State University, Pullman WA.

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

Hayes, G.E., and J.B. Buchanan. 2002. **Washington state status report for the peregrine falcon**. Washington Department of Fish and Wildlife, Olympia, Washington. February 2002.

Hayward, G.D. and J. Verner (eds.). 1994. **Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment**. Fort Collins, Colorado.

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

Hillman, T. W., J. S. Griffith, and W. S. Platts. 1987. **Summer and winter habitat selection by juvenile chinook salmon in a highly sedimented Idaho stream**. Transactions of the American Fisheries Society 116: 185-195.

ICBEMP. 1996. **Status of the Interior Columbia Basin: summary of scientific findings**. U.S.D.A. Forest Service, Pacific Northwest Research Station. PNW-GTR-385. Portland, Oregon.

IDEQ (Idaho Department of Environmental Quality). 1998. **Lower Snake River subbasin, Snake River subbasin, Lower Salmon River subbasin and little Salmon River subbasin bull trout problem assessment**. Prepared for the State of Idaho, Division of Environmental Quality, by the Clearwater Basin Bull Trout Technical Advisory Team, Lewiston, Idaho. 72p.

IDEQ (Idaho Department of Environmental Quality). 2002a. IDAPA 58.01.02 – **Water quality standards and wastewater treatment requirements,** Idaho administrative code, Idaho Department of Environmental Quality. Boise, Idaho. http://www2.state.id.us/adm/adminrules/idapa58/0102.pdf.

IDEQ (Idaho Department of Environmental Quality). 2002b. **Clean Water Act section 303-d list for the State of Idaho**. Idaho Department of Environmental Quality. Boise, Idaho. http://www2.state.id.us/deq/water/1998_303d/303dlist.pdf.

IDEQ (Idaho Department of Environmental Quality). 2002c. Idaho TMDL 8-year schedule. Idaho Department of Environmental Quality. Boise, Idaho. http://www2.state.id.us/deq/water/tmdlschd_97.htm.

IDEQ (Idaho Department of Environmental Quality). 2002d. **Idaho TMDL fact sheet**. Idaho Department of Environmental Quality. Boise, Idaho. http://www2.state.id.us/deq/water/tmdls/Idaho_TMDL_Fact_Sheet.pdf.

Idaho Partners in Flight. 2000. **Idaho bird conservation plan**, version 1.0. January 2000.

Jain T.B. and Graham R.T. 2001. **Silvicultural Options For Increasing And Sustaining Western White Pine As A Dominant Species Within A Wide Range Of Canopy Openings**. In Proceedings: Reforestation Challenges in the 21st Century. Coeur d'Alene, ID, March 13, 2001.

Jageman,H. 1984. **White-tailed deer habitat management guidelines**. University of Idaho, Forest, Wildlife, and Range Experiment Station, Moscow, Idaho.

Johnsgard, P.A. 1990. **Hawks, Eagles, and Falcons of North America: biology and natural history**. Smithsonian Institute Press, Washington.

Johnson, C. A. 2000. **Little Salmon River subbasin biological assessment of ongoing and proposed Bureau of Land Management activities on sockeye salmon, fall chinook salmon, spring/summer chinook salmon, steelhead trout, bull trout, and westslope cutthroat trout**. Bureau of Land Management, Cottonwood Resource Area, Cottonwood, Idaho.

Jones, J.L. 1991. **Habitat use of fisher in northcentral Idaho**. M.S. Thesis, University of Idaho, College of Graduate Studies. May 1991.

Jones, J.A. and G.E. Grant. 1996. **Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon**. Water Resources Research, Vol. 32, No. 4, pp. 959-974. April 1996.

Kappesser, G. 1991. **A procedure for evaluating risk of increasing peak flows from rain on snow events by creating openings in the forest canopy**. U.S.D.A. Forest Service, Idaho Panhandle National Forests, Coeur d'Alene, Idaho.

Kappesser, G. 1992. **Riffle armor stability index, version 3.2**. Prepared by Gary Kappesser, Forest Hydrologist. U.S.D.A. Forest Service, Idaho Panhandle National Forests, Coeur d'Alene, Idaho.

Leonard, W.P., H.A. Brown, L.L.C. Jones, K.R. McAllister, and R.M. Storm. 1993. **Amphibians of Washington and Oregon**. Seattle Audubon Society, Seattle, Washington.

Liknes, G. A., and P. J. Graham. 1988. **Westslope cutthroat trout in Montana: life history, status, and management**, AFS Symposium 4: 53-60.

Loeffler, C. (ed.). 1998. **Conservation plan and agreement for the management and recovery of the southern Rocky Mountain population of the boreal toad (*Bufo boreas*)**. October 1998.

McAllister, K., W.P. Leonard, D. Hays, and R.C. Friesz. 1999. **Washington state status report for the northern leopard frog**. Washington Department of Fish and Wildlife, Olympia, Washington. October 1999.

McCallum, D.A. 1994. **Conservation of Flammulated Owls in the United States**. In: Hayward, G.D. and J. Verner, tech. editors. 1994. Flammulated, boreal, and great gray owls in the United

States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station.

McIntyre, J. D., and B. E. Rieman. 1995. **Westslope cutthroat trout**. In: Young, M.K., tech. ed. Conservation assessment for inland cutthroat trout. General Technical Report RM-256. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

McIntyre, J.W. and J.F. Barr. 1997. **Common loon (*Gavia immer*). *In* The Birds of North America**, No. 313 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists's Union, Washington, D.C.

McKelvey, K.S., K.B. Aubry, and Y.K. Oretega. 1999. **History and distribution of lynx in the contiguous United States**. Pages 207-264 *in* L.F. Ruggiero, K.B. Aubrey, S.W. Buskirk, G.M Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires, Ecology and conservation of lynx in the United States. USFS, Rocky Mountain Research Station, RMRS-GTR-30WWW.

Montana Bald Eagle Working Group. 1991. **Habitat management guide for bald eagles in northwestern Montana**.

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

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

Niehoff, J. 1998. **Internal memorandum to District Rangers regarding updated soil guidelines for NEPA analysis and procedure for using soil monitoring data to determine existing conditions**. Prepared by Jerry Niehoff, Soil Scientist. U.S.D.A. Forest Service, Idaho Panhandle National Forests. Coeur d'Alene, Idaho.

Niehoff, Jerry. 2002. **Fire Effects on Mineral Soil**. IPNF Soil Scientist. Personal Communication

Oliver, C.D., Bonnicksen T., Bowyer J., Cubbage F., Sampson N., Schlaurbaum S., Wahley R., and H. Wiantt. 1997. **Forest Health of the United States' Forests - What are the alternative approaches and policies to Managing our forests?** Section #1, part #4, forest health science panel, April 9, 1997.

Oliver W.W. and Ryker R.A. 1990. In: **Silvics of North America Conifers**. USDA Agriculture Handbook 654, p.418.

Parametrix, Inc. 2002a.   **Dry Wall Timber Sale Environmental Assessment Fisheries Specialist Report**. Prepared by Parametrix, Inc. for the U.S. Forest Service, Bonners Ferry Ranger District. Bonners Ferry, Idaho.

Parametrix, Inc. 2002b. **Dry Wall Timber Sale Environmental Assessment Hydrology Specialist Report**. Prepared by Parametrix, Inc. for the U.S. Forest Service, Bonners Ferry Ranger District. Bonners Ferry, Idaho.

Patton, T., and R. Escano. (Revised by N. Warren). 1990. **Marten habitat relationships. *In* N. Warren (ed.), Old-growth habitat and associated wildlife species in the northern Rocky Mountains**. Northern Region, Wildlife Habitat Relationships Program, R1-90-42.

Pfankuch, D.J. 1978. **Stream reach inventory and channel stability evaluation: A watershed management procedure**. U.S.D.A. Forest Service, Northern Region. Missoula, Montana.

Powell, R.A. 1982. **The fisher: life history, ecology, and behavior**. University of Minnesota Press, Minneapolis.
Powers, L.R., A. Dale, P.A. Graede, C. Rodes, L. Nelson, J.J. Dean, and J.D. May. 1996. **Nesting and food habits of the flammulated owl (*Otus flammeolus*) in southcentral Idaho**. Journal of Raptor Research. 30:15-20.

Quigley, T. M. and S. J. Arbelbide (eds.). 1997. **An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great Basins**. USFS, Pacific Northwest Research Station, PNW-GTR-405.

Reiman, B. E., and K. A. Apperson. 1989. **Status and analysis of salmonid fisheries: Westslope cutthroat trout synopsis and analysis of fishery information**. Job Performance Report, Project F-73-R-11, Subproject No.11, Job No. 1, Idaho Department of Fish and Game, Boise, Idaho.

Reynolds, R.T., and B.D. Linkhart. 1984. Methods and materials for capturing and monitoring flammulated owls. Great Basin Naturalist: Vol 44(1):49-51.

Roussopoulos, P.J. and V.J. Johnson. 1975. **Help in making fuel management decisions**. Research paper NC-1 12. St. Paul, MN: USDA, Forest Service, North Central Experiment Station. 16 p.

Saab, V.A., and J.G. Dudley. 1998. **Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho**. U.S. Forest Service Res. Paper. RMRS-RP-11.

Schmitz R.F. and Gibson K.E. 1996. **Forest and Insect and Disease Leaflet 5.** USDA, pages 1-7.

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

Schmidt, W.C. and R.C. Shearer. 1990. In: **Silvics of North America Conifers**. USDA Handbook 654, p.168.

Shanahan, K. 1992. **Meadow Muffern environmental assessment: Watershed analysis. Prepared by Kelly Shanahan, Hydrologist**. U.S.D.A. Forest Service, Idaho Panhandle National Forests, Bonners Ferry Ranger District. Bonners Ferry, Idaho.

Smith, J.K, and W.C. Fischer. 1997. **Fire Ecology of Forest Habitat Types of Northern Idaho**. General Technical Report. INT-GTR-363. Ogden, UT: USDA, Forest Service, Intermountain Research Station.

Squires, J.R. and R.T. Reynolds. 1997. **Northern Goshawk, No. 298 in Birds of North America series**, c/o Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, Pennsylvania.

Thomas, J.W., and D.E. Toweill, eds. 1982. E**lk of North America – ecology and management**. Wildl. Manage. Inst., Stackpole Books, Harrrisburg, PA.

USFS (U.S. Forest Service). 1985. Snag and woody debris management guidelines. U.S. Forest Service, Idaho Panhandle National Forest, March 1985.

USFS (United States Forest Service). 1987. **Forest plan: Idaho Panhandle National Forests. U.S.D.A. Forest Service, Idaho Panhandle National Forests**. Coeur d'Alene, Idaho.

USFS (U.S. Forest Service). 1989. **Caring for our natural community**. Northern Region Wildlife and Fisheries publication.

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

USFS (U.S. Forest Service). 1992. **Interim management recommendations, sensitive species**. March, 1992.

USFS (U.S. Forest Service). 1992. **Wall-Meadow Timber Sale Environmental Assessment**., Bonners Ferry Ranger District. Bonners Ferry, Idaho.

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

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

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

USFS (United States Forest Service). 2000. **Kaniksu watershed assessment. Unpublished draft report prepared by the U.S.D.A. Forest Service**, Idaho Panhandle National Forests. Coeur d'Alene, Idaho.

USFS (U.S. Forest Service). 2000. **Northern Region snag management protocol**. U.S. Forest Service, Northern Region, Snag Protocol Team. January 2000.

USFWS (U.S. Fish and Wildlife Service). 1986. **Recovery Plan for the Pacific Bald Eagle**. U.S. Fish and Wildlife Service. Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 1987. **Northern Rocky Mountain wolf recovery plan**. USFWS, Denver, CO. 119 pp.

USFWS (U.S. Fish and Wildlife Service). 1993. **Grizzly bear recovery plan. Missoula, Montana**. 181 pp.

USFWS (U.S. Fish and Wildlife Service). 1994. **Selkirk Mountain caribou recovery plan**. Portland, Oregon. 63 pp.

USFWS (U.S. Fish and Wildlife Service). 1998. **Notice of 12-month finding on a petition to list the northern goshawk (Accipiter gentilis) in the contiguous United States west of the 100th meridian**. U.S. Fish and Wildlife Service. June 29, 1998. Federal Register 63(124): 35183-35184.

USFWS (U.S. Fish and Wildlife Service). 2000. **Endangered and threatened wildlife and plants; determination of threatened status for the contiguous U.S. distinct population segment of the Canada lynx and related rule; final rule**. Federal Register, Vol. 65, No. 58: 16052-16086. March 24, 2000.

WFPB (Washington Forest Practices Board). 1994. **Board manual: Standard methodology for conducting watershed analysis under Chapter 222-22 WAC**. Version 2.1. Washington Forest Practices Board. Olympia, Washington. November 1994.

Witmer, G.W., S.K. Martin, and R.D. Sayler. 1998. **Forest carnivore conservation and management in the Interior Columbia Basin: issues and environmental correlates**. T. Quigley (ed.). U.S. Forest Service, Pacific Northwest Research Station, PNW-GTR-420. July 1998.

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

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

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

APPENDIX A

Other Resource Concerns

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

1.1 Biodiversity

A. Biological Factors

1) Noxious Weeds

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

2) Threatened and Endangered Species

a. 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).

<u>Woodland Caribou</u> - Woodland caribou (*Rangifer tarandus caribou*) in the Selkirk Mountains are generally found above 4,000 feet elevation in Engelmann spruce/subalpine fir and western red cedar/western hemlock forest types (USFWS 1994). The species makes complex seasonal shifts in elevation, in response to food availability, cover, snowpack, and other environmental factors (USFS 1989, USFWS 1994). Woodland caribou are highly adapted to upper elevation boreal forests and do not occur in drier low-elevation habitats, except as rare transients. The Selkirk caribou population is threatened by habitat fragmentation and loss and excessive mortality from predators and illegal human take (USFWS 1994).

Woodland caribou were once widespread in the mountains of northern Idaho. The Selkirk caribou population was emergency-listed as endangered in 1983, and a final ruling of its status occurred in 1994 (USFWS 1994). The recovery area for the population is the Selkirk Mountains of northern Idaho, northeastern Washington, and southern British Columbia.

The Dry Wall project area is outside of the woodland caribou designated recovery area. Woodland caribou are not known to occur within the project area and are not likely to occur in this area, based on known distribution and habitat associations for the species. Consequently, none of the alternatives are expected to have any negative direct, indirect, or cumulative effects to woodland caribou or their habitat.

Grizzly Bear - Grizzly bears (*Ursus arctos horribilis)* are habitat generalists whose key habitat requirements are the availability of food and isolation from humans (USFS 1989). The bears usually move along an elevation gradient to take advantage of seasonal foods. Grizzlies commonly use low-elevation riparian areas and wet meadows during spring; and higher elevation meadows, ridges, and open brush fields during summer. Forests become a more important habitat component during late summer and fall. Controlling motorized access is one of the most important tools in securing habitat for grizzly bears (USFWS 1993).

The grizzly bear historically occurred throughout western North America. The Grizzly Bear Recovery Plan (USFWS 1993) estimates that the grizzly bear population in the conterminous U.S. has declined from historical levels of 50,000 to 100,000 bears down to fewer than 1,000 bears. Habitat loss and direct and indirect human-caused mortality are implicated and its decline (USFWS 1993).

Portions of the Bonner's Ferry Ranger District occur in the Selkirks and Cabinet/Yaak grizzly bear recovery zones. However, the Dry Wall project area occurs outside of these recovery zones. Grizzly bears are not known to reside in the project area vicinity and are not likely to reside in this area based on known distribution of the species. Consequently, none of the alternatives are expected to have any negative direct, indirect, or cumulative effects to grizzly bears or their habitat.

Gray Wolf - Wolves (*Canis lupus*) are highly social animals with large home ranges that include a variety of habitat types. Key components of wolf habitat, as identified in the Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987) include: (1) sufficient, year-round prey base of ungulates and alternate prey (i.e., beaver and smaller mammals), (2) suitable and somewhat secluded denning and rendezvous sites, and (3) sufficient space with minimal exposure to humans. On the Bonner's Ferry Ranger District, available ungulate prey include white-tailed deer, Rocky Mountain elk (*Cervus elaphus)*, and moose (*Alces alces*); deer are the most numerous and widespread ungulate species on the district. Wolf distribution is largely influenced by distance from human activity, and wolves are highly susceptible to human-caused mortality. The density and distribution of open roads provides an indicator of the level of risk of human-caused mortality to wolves.

Prior to extensive extirpation efforts, gray wolves were well-distributed in northern Idaho. By the 1940s, wolves were virtually eradicated from the area. Currently, gray wolves north of Interstate 90 are federally listed as endangered while wolves south of Interstate 90 are listed as part of an experimental population, with special regulations defining their protection and management.

The Dry Wall project area is located within the Northwestern Montana Wolf Recovery Area. Only occasional wolf sightings have been reported in northern Idaho, and the sighting information seems to indicate transient or lone individuals that are not associated with a resident pack. The Forest Service generally conducts further analysis for wolves if recent (i.e., within 5 years) probable or confirmed sightings have been documented within 5 miles of a given project area. The Conservation Data Center electronic files and Forest Service records indicate that no probable or confirmed wolf sightings have occurred within 5 miles of the Dry Wall project area within the past 5 years. Consequently, none of the alternatives are expected to have any negative direct, indirect, or cumulative effects to wolves or their habitat.

Bald Eagle - Bald eagles (*Haliaeetus leucocephalus)* require open-water habitats for foraging in both the nesting and wintering period. Nest sites are usually with ¼ mile of large bodies of water (i.e., rivers and lakes) and are generally in areas free from human disturbance (Montana Bald Eagle Working Group 1991). Nests are generally in the tallest trees in a stand, and nest trees are typically open-crowned ponderosa pine, Douglas-fir, western larch, or cottonwood trees (Montana Bald Eagle Working Group 1991). Wintering habitat is determined primarily by the availability of prey (i.e., fish and waterfowl, mostly). Tall trees provide winter perch and roost sites.

Bald eagles were historically common along rivers and large lakes in northern Idaho. Over the past several decades, bald eagles have largely recovered from DDT-induced declines, and habitat loss, alteration, and disturbance are likely the main factors currently affecting the species. The Bonner's Ferry Ranger District is included within the bald eagle recovery area, as designated in the Pacific Bald Eagle Recovery Plan (USFWS 1986).

Due to the lack of large bodies of water, the vicinity of the proposed Dry Wall treatment units does not contain suitable bald eagle nesting, foraging, or wintering habitat. The nearest known bald eagle nest site is along the Kootenai River, approximately 7.5 miles from proposed treatment units. Activities over ¼ mile from nest sites generally are not expected to affect nesting bald eagles (USFWS 1986). The nearest large water body that may provide potential nesting and winter foraging habitat is the Moyie River, which ranges from ¼ mile to over two miles from proposed treatment units. Consequently, none of the alternatives are expected to have any negative direct, indirect, or cumulative effects to bald eagles or their habitat.

Canada Lynx - Canada lynx (*Lynx Canadensis)* are associated with boreal forests throughout their range (Witmer et al. 1998; Aubry et al. 1999). The species requires a mosaic of forest seral stages connected by stands suitable for travel cover. Lynx use late-seral forests for denning and rearing young and use early-seral forests for foraging (Aubry et al. 1999). Primary prey is the snowshoe hare, although lynx will take other prey, particularly when hare density declines. Lynx are threatened by human-caused disturbance and mortality, and road access increases the likelihood of this threat (USFS 1992).

The Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) directed agencies to delineate lynx analysis units (LAUs) for evaluating and analyzing the effects of planned and on-going projects on lynx and their habitat. Conservation measures were developed for each LAU, including: (1) maintain denning habitat to comprise at least 10 percent of the capable lynx habitat within an LAU; (2) limit unsuitable habitat conditions to no more than 30 percent of lynx habitat within each LAU; (3) confine activities so they will not alter more than 15 percent of lynx habitat within an LAU to unsuitable conditions within a 10-year period; and (4) maintain vegetative structure that facilitates movement of lynx along important connectivity corridors such as riparian areas, saddles, and ridges.

The Wall Creek project area is contained within the Meadow Dawson LAU. Ten percent of the capable lynx habitat is considered denning habitat, and therefore denning habitat meets the recommended 10 percent level. Sixty-six percent of the lynx capable habitat in the LAU is currently unsuitable, and therefore the conservation measure of limiting unsuitable habitat to no more than 30 percent is not met for this LAU. However, the treatment units under the Dry Wall action alternatives would occur outside of lynx suitable and capable habitat. In addition, the action alternatives would not change road access to lynx habitat. Because the proposed treatment units do not provide suitable lynx habitat and because road access will be unchanged by the proposed actions, there would be no direct, indirect, or cumulative effects Canada lynx.

Peregrine Falcon - Peregrine falcons (*Falco peregrinus anatum)* usually nest on high cliffs near water where avian prey species are most common (Johnsgard 1990). Hunting territories of peregrine falcons vary considerably in size; in most instances, the birds hunt within 10 to 20 miles of their nest sites (Hayes and Buchanan 2002). Key prey includes waterfowl, shorebirds, and other flocking birds (Johnsgard 1990).

Historically, peregrine falcons were relatively sparse in northern Idaho, due to limited cliff-nesting habitat (USFS 1989). Large-scale population declines due to pesticide contamination resulted in the extirpation of peregrine falcons from Idaho by 1975. In 1982, the Peregrine Fund in cooperation with other agencies and organizations began a recovery effort to reintroduce peregrines into Idaho. Recent records indicate that peregrine falcons use the Kootenai National Wildlife Refuge, which is approximately 10 air miles from the Dry Wall project area, during spring. No nest sites are known in the Bonner's Ferry Ranger District. The nearest known nest site to the Dry Wall project area is on the Clark Fork River, over 50 miles from the project area. Because the project area contains no suitable cliff-nesting or foraging habitat and because the known distribution of peregrines indicates that the species does not occur near the project site, there would be no direct, indirect, or cumulative effects on peregrine falcon.

b. Fish

Bull Trout - Bull trout (*Salvelinus confluentus*) are listed as threatened under the 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).

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. Juvenile migratory bull trout rear in headwater streams for several years before migrating downstream to larger river systems (fluvial), lakes (adfluvial), or the ocean (anadromous). Adult bull trout spawn in August and September and fluvial 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.

Bull trout are known to exist in the Moyie River, but have not been found in the Meadow Creek drainage. Bull trout are unlikely to be found in the Meadow Creek drainage upstream of the culvert barrier located beneath the Spokane International Railroad crossing upstream from the mouth of Meadow Creek. Bull trout have access to the short reach of Meadow Creek below the railroad culvert, but habitat in this reach would not be suitable for bull trout spawning or rearing and use would likely be restricted to feeding activity near the mouth. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on bull trout or their habitat.

White Sturgeon – The white sturgeon (*Acipenser transmontanus*) inhabits large rivers, lakes, and marine environments from southern California to Cook Inlet of Alaska. It is a long-lived migratory species that reaches very large sizes (nearly 20 ft, weights of 1,970 lb, and ages of 100 years or more). It feeds on fish, crustaceans, mollusks, worms, and plant material (Brown 1971). White sturgeon typically spawn over large substrates, in higher than average water column velocities during the spring freshet (Parsley et al. 1993). Juvenile fish use a wide range of depths and water velocities as habitat.

Kootenai River white sturgeon exhibits 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 stretch below Bonners Ferry, ID. Some adult fish remain in the river and overwinter in the deep (> 30 m) 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 of the lack of gravel and cobble.

The white sturgeon is native to the Kootenai River drainage of Montana, Idaho, and British Columbia (Brown 1971), and has been geographically isolated from the lower Columbia River stocks by Bonnington falls (Cora Linn Dam), near Nelson, British Columbia. The primary causes cited in the listing were lack of recruitment and threats from reduced biological productivity. Poor water quality and toxic contamination from mining were cited as contributing factors to its endangered status.

White sturgeon are not known to occur in the Moyie River or its tributaries, including the Meadow Creek drainage. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on white sturgeon or their habitat.

3) Sensitive Species

a. Wildlife

The Bonners Ferry Ranger District contains habitat or populations for several sensitive wildlife species listed below.

Boreal Toad - Boreal toads (*Bufo boreas)* breed in marshes, small lakes, and slow-moving streams (Leonard et al. 1993). During the non-breeding season, adults live underground and can be found adjacent to their breeding habitat or in upland brush, grass, or forests, particularly near seeps (Corkran and Thoms 1996; Loeffler 1998). Availability of suitable breeding habitat is likely the key limiting factor for boreal toads.

Trends in the boreal toad population in northern Idaho are unknown. However, in other areas, the species appears to be in decline (Leonard et al. 1993; Loeffler 1998). On the Bonner's Ferry Ranger District, boreal toads are common and widespread, and no evidence indicates a decline in boreal toads on the District. The proposed treatment units for the Dry Wall project do not provide breeding habitat, although the toads may breed in the meandering portion of Meadow Creek near the proposed units. Implementation of BMPs and INFISH protection measures would prevent impacts to this habitat, as long as action alternatives are implemented as intended. In addition, the proposed actions are not expected to alter any non-breeding upland habitat use by the boreal toads, since the species uses a variety of upland habitat types. The project would not increase the risk of road-related mortality to the toads, since no new roads between breeding and upland habitat would be developed. For these reasons, there would be no direct or cumulative effects on boreal toad or their habitat. However, there could be indirect effects from the prescribed fire under Alternative 3. Given the fire behavior required to meet forest vegetation objectives, there is a fairly high-risk that such a fire would burn out of control, with potential impacts boreal toad habitat. Severe fire is also a long-term risk under Alternative 1, where increasing stand density would create higher fuel loads over time.

Coeur d'Alene Salamander - Coeur d'Alene salamanders (*Plethodon vandykei idahoensis)* are found along seeps, waterfall spray zones, and streamsides of small cascading creeks below 5,000 ft (USFS 1989). Fractured bedrock or gravel (which provide shelter and moisture) and a dense forest canopy (which moderates surface water temperature) are important habitat components.

Information on Coeur d'Alene salamander population trends in northern Idaho is not available. On the Bonner's Ferry Ranger District, the species is known to occur on the east side but has not been recorded in the Selkirks, presumably due to inappropriate geology. The proposed treatment units and adjacent streams for the Dry Wall project do not contain geologic types that are known to support Coeur d'Alene salamanders. For these reasons, there would be no direct, indirect, or cumulative effects on Coeur d'Alene salamander or their habitat.

Common Loon - Common loons (*Gavia immer)* generally nest in clear, oligotrophic, 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 only in lakes larger than 10 acres (USFS 1989). These birds are extremely sensitive to human disturbance.

Historic information on loon populations in northern Idaho is not available; however, they likely occurred as breeding individuals on the larger lakes in the area. In recent years, loons have been observed at Perkins Lake and Robinson Lake, approximately 7 miles and 10 miles, respectively, from the Dry Wall project area, but no breeding pairs have been documented. The project area contains no loon habitat, as there are no large lakes. The nearest potential loon habitat occurs at Dawson Lake, approximately 2¼ miles southwest of the project area. Because habitat does not occur within, or in proximity to the project area, no direct, indirect, or cumulative effects on common loon or their habitat.

Fisher - 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 (*Pinus contorta)*. Changes in human access can affect fishers, as the species is easily trapped and over-trapping can jeopardize fisher populations.

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. However, most local biologists believe that fishers were previously extirpated from the area and that fishers are currently rare. In recent times, fishers have been documented in the northwestern part of the Bonner's Ferry Ranger District, near Saddle Creek and Grass Creek, approximately 20 to 25 miles northwest of the Dry Wall project area. Fishers have not been documented in the vicinity of proposed harvests units and likely did not occur in these areas during historic times, due to the dry forests conditions.

The fisher habitat suitability and habitat capability models indicate that 11 acres of suitable fisher habitat and 328 acres of capable fisher habitat are currently present within the proposed treatment units. However, the fisher model overestimates capable fisher habitat in the area, because the model includes dry forests as habitat. As mentioned above, research indicates that fishers actual avoid dry forests (Jones 1991). The 11 acres of suitable habitat in a matrix of unsuitable habitat is not sufficient to sustain fishers. In addition, opportunity for increasing suitable habitat over time is limited, due to the generally dry forest conditions. Consequently, the action alternatives would have no direct, indirect, or cumulative effects on fisher

Harlequin Duck - Harlequin ducks (*Histrionicus histrionicus)* occur in mountain stream environments during the breeding season. Their breeding habitat consists of clear, clean, fast-flowing, low-gradient (less than 3 percent) mountain streams (2nd order or larger) with rocky substrate and riparian bank vegetation (USFS 1992). Potential threats to harlequin ducks include activities or disturbances that affect water quality, water yield, riparian habitat, and seclusion or isolation (USFS 1989).

Trends in harlequin duck abundance in northern Idaho are unknown. Harlequin duck habitat was likely more extensive prior to the alteration of hydrologic regimes along streams and rivers. The species has been documented in suitable streams on the Bonner's Ferry Ranger District. The Dry Wall project area does not contain suitable stream habitat for harlequin ducks. The upper portion of Meadow Creek near the proposed treatment units contains slow-moving water that does not provide harlequin habitat. However, farther downstream, water current is faster and the creek provides potential harlequin habitat in this area. Riparian buffers and implementation of Best Management Practices (BMPs) and Inland Native Fish Strategy (INFISH) protection measures would prevent downstream effects to the harlequin duck habitat, as long as action alternatives are implemented as intended. Consequently, there would be no direct or cumulative effects on harlequin ducks or their habitat. However, there could be indirect effects from the prescribed fire under Alternative 3. Given the fire behavior required to meet forest vegetation objectives, there is a fairly high-risk that such a fire would burn out of control, with potential impacts boreal toad habitat harlequin duck habitat. Severe fire is also a long-term risk under Alternative 1, where increasing stand density would create higher fuel loads over time.

Northern Bog Lemming - Bog lemmings (*Synaptomys borealis)* inhabit moderate to high elevation wet meadows, fens/bogs, alpine sedge meadow, krummholz (i.e., stunted forests that occur at timberline), spruce-fir forest with dense herbaceous and mossy understory, and mossy streamsides.

Information on the trends in the bog lemming population in northern Idaho is not available. On the Bonner's Ferry Ranger District, the only documented occurrence of the species is from a subalpine boggy meadow in the Selkirk Mountains. The Dry Wall proposed treatment units do not contain wet meadows, mossy streamsides, or other habitats that support bog lemmings. Consequently, there would be no direct, indirect, or cumulative effects on northern bog lemmings or their habitat.

Northern Leopard Frog - Northern leopard frogs (*Rana pipiens)* occur in and around wet meadows, potholes, and riparian areas with an abundance of vegetation to provide cover (Leonard et al. 1993). Breeding habitat typically includes areas with aquatic and emergent vegetation that provide sites for egg attachment, and with water depths of at least 20 inches (Corkan and Thoms 1996).

Information on northern leopard frog population trends in northern Idaho is not available. However, in other areas, such as Washington State, evidence indicates a declining population due to a variety of potential factors, including agricultural chemicals, introduced fish and bullfrogs, disease, and changes in hydrology from irrigation projects, development, and other land use practices (McAllister et al. 1999). Leopard frogs have not been recorded on the Bonner's Ferry Ranger District, despite intensive surveys in a portion of the District in 1999. Leopard frogs are known to occur just north of the Canadian border and along the Clark Fork River.

The proposed treatment units for the Dry Wall project do not provide suitable leopard frog riparian habitat, although the meandering portion of Meadow Creek near the proposed units provides potential habitat. Because the project would not affect Meadow Creek riparian habitat and because implementation of BMPs and INFISH protection measures would protect and maintain water quality and water yield (as long as action alternatives are implemented as intended), the proposed actions would have no affect on potential leopard frog habitat. Consequently, there would be no direct or cumulative effects on northern leopard frog or their habitat. However, there could be indirect effects from the prescribed fire under Alternative 3. Given the fire behavior required to meet forest vegetation objectives, there is a fairly high-risk that such a fire would burn out of control, with potential impacts boreal toad habitat harlequin duck habitat. Severe fire is also a long-term risk under Alternative 1, where increasing stand density would create higher fuel loads over time.

Townsend's Big-eared Bat - Townsend's big-eared bats (*Plecotus townsendi)* occur in a variety of habitat types where caves or cave-like structures (including mines) are present (USFS 1992). Moths are key prey, although other insects are also taken (USFS 1989). The bats are very sensitive to human disturbance and have been known to permanently abandon roost sites in response to human activities (USFS 1989).

Information on Townsend's big-eared bat population trends in northern Idaho is not available. Given the scarcity of natural caves in the region, it is likely the bats were historically very rare in the area. On the Bonner's Ferry Ranger District, natural cave habitat is virtually non-existent, due to lack of limestone. The bats have been documented at Bethlehem Mine and American Girl Mine, approximately 6 miles and 8 miles, respectively, from the Dry Wall project area. The project area contains no caves, abandoned mines, or other cave-like structures. Consequently, there would be no direct, indirect, or cumulative effects on townsend's big-eared bat or their habitat.

Wolverine - Wolverines (*Gulo gulo)* occur in mid-aged and mature remote forests near natural openings (e.g., cliffs, slides, meadows) (USFS 1989). The species uses higher elevations, especially subalpine fir forests, in summer, and moves to lower elevations, particularly riparian areas with large ungulate concentrations, during winter (USFS 1989 and 1992). District records suggest that denning habitat consists primarily of high-elevation cirque basins and avalanche chutes. Human-induced mortality (from shooting and incidental take by trapping) and availability of denning sites and food, particularly during winter, appear to be limiting factors for the species.

Heavy predator control and habitat loss has contributed to large-scale declines in the wolverine population (USFS 1989). Wolverines are considered rare in northern Idaho. On the Bonner's Ferry Ranger District, wolverine tracks have been recorded from eight locations, scattered throughout the District, in recent years.

The proposed treatment units for the Dry Wall project do not provide suitable habitat for wolverines. Forest types do not provide wolverine summer habitat, and wolverines are not expected to use the area during winter, due to inadequate winter food supply (i.e., ungulates). In addition, wolverines generally require remote areas away from human development. The proposed units are adjacent to a heavily used road and to human habitations. In addition, because the action alternatives would not change road access to more remote areas, human access to wolverine habitat would be unaffected. For these reasons, there would be no direct, indirect, or cumulative effects on wolverine or their habitat..

b. Fish

Redband Trout – The Redband trout (*Oncorhynchus mykiss*) is a subspecies of rainbow trout that 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 Subbasin. 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 the Moyie River or its tributaries, including the Meadow Creek drainage. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on redband trout or their habitat.

Torrent Sculpin – The torrent sculpin (*Cottus rhotheus)* is found in the Kootenai drainage. They are spring spawners and are known to require fast water, cobble stream reaches in the lower ends of tributaries for spawning and nursery areas. Torrent sculpin are not known to occur in Meadow Creek or Wall Creek. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on torrent sculpin or their habitat.

Burbot – The burbot (*Lota lota*) 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 basin spawn under ice during the winter months in water temperatures below 4°C (39°F) (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 1998; Paragamian et al. 1999). Burbot are not known to occur in Meadow Creek or Wall Creek. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on burbot or their habitat.

c. Plants

Rare plant surveys were conducted in July of 2002. No sensitive plant species were identified. A Forest species of concern (*Sanicula marilandica*) was identified in wetland habitat in the project area. Riparian buffers would protect the population and its habitat. Most units proposed for harvest and project related activities have low potential to support rare plants.

There would be no impact to any documented sensitive plant populations. Incidental impacts to undetected moonworts (*Botrychium* species) and impacts to marginally suitable moist forest habitat may occur. Such impacts would not lead to a loss of population or species viability. There is no suitable habitat for any threatened plant species in the project area; there would be no effect to threatened plant species.

A detailed report is located in the project file.

4) Management Indicator Species

a. Wildlife

American Marten - Marten (Martes americana) are associated with mature and old-growth forests, especially moist types where small mammals are more abundant. The species prefers stands with more than 40 percent cover and avoids stands with less than 30 percent cover (Patton and Escano 1990). An abundance of coarse woody debris and large snags are important habitat components for marten, as these features provide secure resting locations, denning habitat, and winter access to small mammals living beneath the snow (Patton and Escano 1990). Marten are easily trapped and over-harvested, and consequently, changes in human access can influence marten abundance. Because of habitat similarities with the fisher, the American marten is treated in this document as a guild with the fishers, and effects of the project on martens are the same as those effects on fishers.

White-tailed Deer - During most of the year, white-tailed deer use a wide variety of habitat types and seral stages (Jageman 1984). They are tolerant of disturbances such as agriculture and forestry practices and prefer areas modified by these activities if an adequate amount of cover and forage are available. However, during winter, forage is scarce, snow inhibits travel, and climatic conditions require greater use of cover habitats. Consequently, wintering deer are restricted mostly to gently-sloped, lower elevation (i.e., 3,000 ft or lower) forests with available forage, cover, and relatively low snow accumulations (Jageman 1984).

Historically, white-tailed deer flourished, but by the early 1900's, their populations were reduced to low numbers due to over exploitation by trappers, miners, and settlers. White-tailed deer numbers have since rebounded and have become the most abundant big game species in northern Idaho. Some of the largest white-tailed deer populations in Idaho occur in the northern panhandle. In 1985, the Idaho Department of Fish and Game estimated that 99 percent of the State's white-tailed deer population was found in the Departments' two northern regions.

The proposed treatment units for the Dry Wall project receive regular use by white-tailed deer during the summer, as evidenced by relatively fresh scat observed throughout the units during the July site visit. However, winter snowpack in the area largely prevents white-tailed deer use during this time. Because the availability of wintering habitat is a critical habitat component for the species, white-tailed deer habitat models evaluate wintering habitat only.

The white-tailed deer habitat suitability and habitat capability models indicate that no suitable wintering deer habitat and 250 acres of capable wintering deer habitat are currently present within the proposed treatment units. Capable habitat is currently not suitable mostly due to inadequate canopy cover. Over the broader Dry Wall project area, suitable wintering deer habitat currently is not present and 440 acres of capable habitat are present. Because suitable wintering deer habitat is not present in the project area, the proposed actions would have no effect on white-tailed deer and no further analysis is provided for the species.

5) Native Plant Species

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

6) Neotropical Migrant Birds

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

7) Linkages

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

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

8) Range

There are no range allotments within the Dry Wall analysis area.

1.2 SOCIAL/ECONOMIC FACTORS

A. Cultural Resources

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

B. Economics/Community Stability

The proposed sale is on productive forestland and could be offered with minimal investment. Estimated timber volume removed under Alternative 2 would be about 4.9 million board feet (MMBF). The timber sale appraisal conducted for this volume of timber estimated that the advertised rate for the sale of timber would be about $150 per thousand board feet (MBF). Past history on the Bonners Ferry Ranger District as shown that these types of sales are often bid up to twice their advertised rate, in this case $300/MBF would not be unusual. This would be far in excess of the estimated $75/MBF it costs the district to prepare a sale. The direct and cumulative effects of each alternative would be related to the costs and revenues generated by each.

Alternative 1 would generate no revenues and no costs.

Alternative 2, the only alternative that generates revenues, is expected to generate a minimum of $620,000 in net revenues. Alternative 2 would not only 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, but. Alternative 2 would also provide local employment opportunities for loggers, mill workers, equipment operators (i.e., for grapple piling, fireline construction, etc.), and reforestation crews.

Alternative 3 would generate no revenues, but would generate estimated costs of at least $1.1 million to implement restoration treatments. Alternative 3 would provide some of the same employment opportunities as Alternative 2 (i.e., equipment operators and reforestation crews), but Alternative 3 would generate no revenues to the Federal Treasury, and no trust funds that could be used to offset the costs of reforestation and fuels reduction. To pay for these costs the funds would need to come out of USFS appropriated funds, which are limited for projects of this nature.

The indirect effects of each alternative would be related to future costs of maintaining healthy forested conditions in the Dry Wall 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. Alternative 2 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. Alternative 3 would reduce the risk of severe fire in the short-term, but the risk of severe fire from a reburn event would be expected to increase over time. Consequently, Alternative 3 would be expected to reduce potential suppression and restoration costs the short-term, but increase these costs in the long-term.

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.

C. 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 Meadow Creek-Wall Creek area. Consequently, a visual analysis was conducted and this report is included in the Dry Wall project file.

Alternative 2 includes group selection harvests in combination with commercial thinning that will result in changing 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. Openings created would include clumps and stringers of large leave trees that would blend with the surrounding landscape characteristics. Continuous openings would vary in size from about one to three acres and would be irregulary shaped. All of the harvest unit treatments as proposed in Alternative 2 would blend with surrounding landscape characteristics and would meet or exceed the visual quality objectives (VQOs). Unit 12 would be treated with prescribed fire only and no timber would be harvested. Trees killed by the fire wouldl be easily visible in the middle-ground landscape until the red needles of recent dead trees fall off, at which time the remaining gray colored snags should begin to fade into the surrounding landscape colors and become less discernable.

Alternative 3 proposes to similarly treat the same acres as Alternative 2, but through the use of prescribed fire rather than mechanical treatment with removal of the undesireable trees. All trees killed by fire would be left except for what could possibly be cut and removed by personal use firewood cutters near roadsides. The expected visual results would be similar to what a natural wildfire would look like, a large area viewed through the range of roadside foreground out to the middleground landscape seen from Meadow Creek road, and with a mosiac of densely stocked dead trees and clumpy arrangement of live trees that survived the fire. The visual effects resulting from implementation of Alternative 3 would probably dominate the foreground and middleground landscapes. Most casual observers would probably think a natural wildfire had taken place within the project area. It is unknown what percentage of the public would consider the burned over area as visually pleasing or as an eyesore. Alternative 3 would not meet the Forest Plan VQO of partial retention because the resulting change in existing landscape character would dominate the landscape.

D. Recreation

Recreation use in the analysis area is primarily limited to dispersed sites. The short drive from the towns of Bonners Ferry and Moyie Springs (5-15 minutes) attracts a variety of users. The primary recreation activity within the analysis area is elk and deer hunting during the fall, woodcutting, berry picking, and driving for pleasure. Main roads within the analysis area generally open for automobile use. The Queen Mountain-Wall Mountain loop road is the primary access to the western portion of the project area and the Meadow Creek road, which is a heavily used County road, borders the area to the south. The closest developed facilities are at Meadow Creek Campground (one mile east), Dawson Lake picnic area (two miles south) and Smith Lake Campground (nearly 3 miles southwest). The closest maintained Forest Service trail, the Rutledge Creek trail, is a little over two miles north of the project area.

None of the alternatives would change the recreational opportunities with the project area. The primary effects on recreation would be related to the sights and sounds of timber harvest operations. The sights and sounds of these operations would be short-term. In the long-term, cumulative effects would relate to overall improved scenic quality of the landscape. Harvest units would be designed to blend into the natural landscape, while dense, overstocked stands of small-diameter trees are replaced with open-grown stands of large-diameter trees, mostly ponderosa pine and larch

E. Public Health and Safety

1) 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.

2) Minerals

There are no mining claims within the assessment area.

3) Roadless Areas

There are no roadless areas within the assessment area.

4) Water Resources And Aquatics

a. 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

b. 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.

c. Pesticides and Herbicides

Pesticides are not used by the Forest Service within Wall Creek. Herbicides are used sparingly and judiciously in Wall Creek 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.

d. 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.

e. 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 Wall Creek. 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.

f. 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 Dry Wall 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.

g. Stream Survey Data

Extensive stream habitat surveys were conducted in Wall Creek and Meadow Creek in 1991 for the Wall-Meadow Environmental Assessment (USFS 1992). In 2002, less extensive follow-up surveys were conducted in reaches of Meadow Creek from its mouth and upstream of the confluence with Wall Creek. Four survey reaches were selected. 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.

APPENDIX B

Summary of Biological Assessments and Evaluations

The following tables provide effects summaries for Threatened, Endangered, and Sensitive, wildlife, fish, and plant species. Species that may be affected (including beneficial effects) are tracked through Chapters 2, 3, and 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 A (Other Resource Concerns). Complete Biological Assessments and Evaluations for all of these species are included in the Dry Wall EA project file.

Table 1. 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*	No	No	No	No effect
Woodland caribou	*Rangifer tarandus caribou*	No	No	No	No effect
Bald eagle	*Haliaeetus leucocephalus*	No	No	No	No effect
Grizzly bear	*Ursus arctos horribilis*	No	No	No	No effect
Canada lynx	*Lynx canadensis*	Within project area, but not within treatment units	No	No	No effect

Table 2.Sensitive Wildlife Species

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
Common loon *Gavia immer*	√			
Harlequin duck *Histrionicus histrionicus*	√			
Northern goshawk[2] *Accipiter gentilis*				√
Peregrine falcon *Falco peregrinus anatum*	√			
Flammulated owl *Otus flammeolus*				√
Black-backed		√		

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
woodpecker[3] <u>*Picoides arcticus*</u>				
White-headed woodpecker <u>*Picoides albolarvatus*</u>				√
Fisher <u>*Martes pennanti*</u>	√			
Wolverine <u>*Gulo gulo*</u>	√			
Northern bog lemming <u>*Synaptomys borealis*</u>	√			
Townsend's big-eared bat <u>*Plecotus townsendi*</u>	√			
Coeur d'Alene salamander <u>*Plethodon vandykei idahoensis*</u>	√			
Northern leopard frog <u>*Rana pipiens*</u>	√			
Boreal toad <u>*Bufo boreas*</u>	√			

*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. The rationale for the conclusion of effects is contained in the EIS document and Project File.

[1]Considered a significant action under NEPA.

[2]Acres of suitable goshawk habitat would remain unchanged immediately following timber harvest. However, over the several decades following timber harvest, additional suitable habitat would be created as density of large trees would increase.

[3]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.

Table 3. 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*	Yes	Yes	Yes	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 4. 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 5. 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. Wet Forest species	X			
4. Moist Forest species, except # 5…	X			
5. *Botrychium* species		X		
6. Dry Forest species	X			
7. Peatland species	X			
8. Subalpine species	X			
9. Cold Forest species	X			

Comments: Rationale is contained within the NEPA document; a detailed sensitive plants report is located in the Project File.

APPENDIX C
Site Specific Best Management Practices

Introduction

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. The Environmental Protection Agency and the States of Idaho are responsible for enforcement of these standards. The Idaho Panhandle National Forest Plan states (Chapter II, p. 27) that the Forest will "maintain high quality water to protect fisheries habitat, water based recreation, public water supplies and be within state water quality standards". The use of BMP's is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The State's water quality standards regulate nonpoint source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho's waters do not contain pollutants in concentrations, which adversely affect water quality or impair a designated use. State recognized BMPs that will be used during project design and implementation are contained in these documents:

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
SAM = Sale Area Map
TSA = Timber Sale Administrator
COR = Contracting Officer Representative
PWC = Public Works Contract
IFPA = Idaho Forest Practices Act
SCA = Stream Channel Alteration Act
SWCP= Soil and Water Conservation Practices
BMP = Best Management Practices
SMZ = Streamside Management Zone
SPS = Special Project Specifications
EPA = Environmental Protection Zone
CFR = Code of Federal Regulations

KEY SOIL AND WATER CONSERVATION PRACTICES

Class * Soil and Water Conservation Practice (FSH 2509.22)

11 WATERSHED MANAGEMENT

W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.11 Petroleum Storage & Delivery Facilities & Mgt

13 VEGETATION MANIPULATION

G 13.02 Slope Limitations for Tractor Operation
G 13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E 13.04 Revegetation of Surface Disturbed Areas
E 13.05 Soil Protection During and After Slash Windrowing
E 13.06 Soil Moisture Limitations for Tractor Operation

14 TIMBER

A 14.02 Timber Harvest Unit Design
A 14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A 14.04 Limiting the Operating Period of Timber Sale Activities
E 14.05 Protection of Unstable Areas
A 14.06 Riparian Area Designation
G 14.07 Determining Tractor Loggable Ground
E 14.08 Tractor Skidding Design
E 14.09 Suspended Log Yarding in Timber Harvesting
A 14.10 Log Landing Location and Design
E 14.11 Log Landing Erosion Prevention and Control
E 14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E 14.13 Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
E 14.14 Revegetation of Areas Disturbed by Harvest Activities
E 14.15 Erosion Control on Skid Trails
E 14.16 Meadow Protection During Timber Harvesting
S 14.17 Streamcourse Protection (Implementation and Enforcement
E 14.18 Erosion Control Structure Maintenance
A 14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E 14.20 Slash Treatment in Sensitive Areas
A 14.22 Modification of the Timber Sale Contract

15 ROADS AND TRAILS

A 15.02 General Guidelines for Road Location/Design

E 15.03 Road and Trail Erosion Control Plan
E 15.04 Timing of Construction Activities
E 15.05 Slope Stabilization and Prevention of Mass Failures
E 15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E 15.07 Control of Permanent Road Drainage
E 15.08 Pioneer Road Construction
E 15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E 15.10 Control of Road Construction Excavation & Sidecast Material
S 15.11 Servicing and Refueling of Equipment
S 15.12 Control of Construction In Riparian Areas
S 15.13 Controlling In-Channel Excavation
S 15.14 Diversion of Flows Around construction Sites
S 15.15 Stream crossings on Temporary Roads
S 15.16 Bridge & Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)
E. 15.17 Regulation of Borrow Pits, Gravel Sources, and Quarries
E 15.18 Disposal of Right-of-Way and Roadside Debris
S 15.19 Streambank Protection
E 15.21 Maintenance of Roads
E 15.22 Road Surface Treatment to Prevent Loss of Materials
E 15.23 Traffic Control During Wet Periods
G 15.24 Snow Removal Controls
E 15.25 Obliteration of Temporary Roads
E 15.27 Trail Maintenance and Rehabilitation

18 FUELS MANAGEMENT

E 18.02 Formulation of Fire Prescriptions
E 18.03 Protection of Soil and Water from Prescribed Burning Effects

*** CLASSES OF SWCP (BMP)**

A = Administrative G = Ground Disturbance Reduction
E = Erosion Reduction W = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction

BEST MANAGEMENT PRACTICES

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil and Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

COMPLIANCE: No related FPA rule

IMPLEMENTATION: The following features will be designated on the SAM:

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) Meadow Creek - The entire mainstem length and its tributaries
2) Wall 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 not be located in ephemeral draws or swales that were created by or are prone to landslides.

2) During period of use, landing will be maintained in such a manner that debris and sediment are not delivered to any streams.

3) Landings shall be reshaped as needed to facilitate drainage prior to fall and spring runoff. Landings shall be stabilized by establishing ground cover or by some other means within one year after harvesting is completed.

4) Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

Skid Trails:

1) Unit design and location will facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they will be kept to a minimum and must be obliterated by the purchaser following completion of the logging activities. The obliteration will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.

2) Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff.

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 15.07 - 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 displayed in Figures 3.5.

3) Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill).

4) Maintain large organic debris appropriate to the habitat type (see "Managing Coarse Woody Debris in the Forests of the Rocky Mountains" by Graham et. al. 1994).

5) Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns.

APPENDIX D

Air Quality Decision Analysis

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

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

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

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

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

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

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

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

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

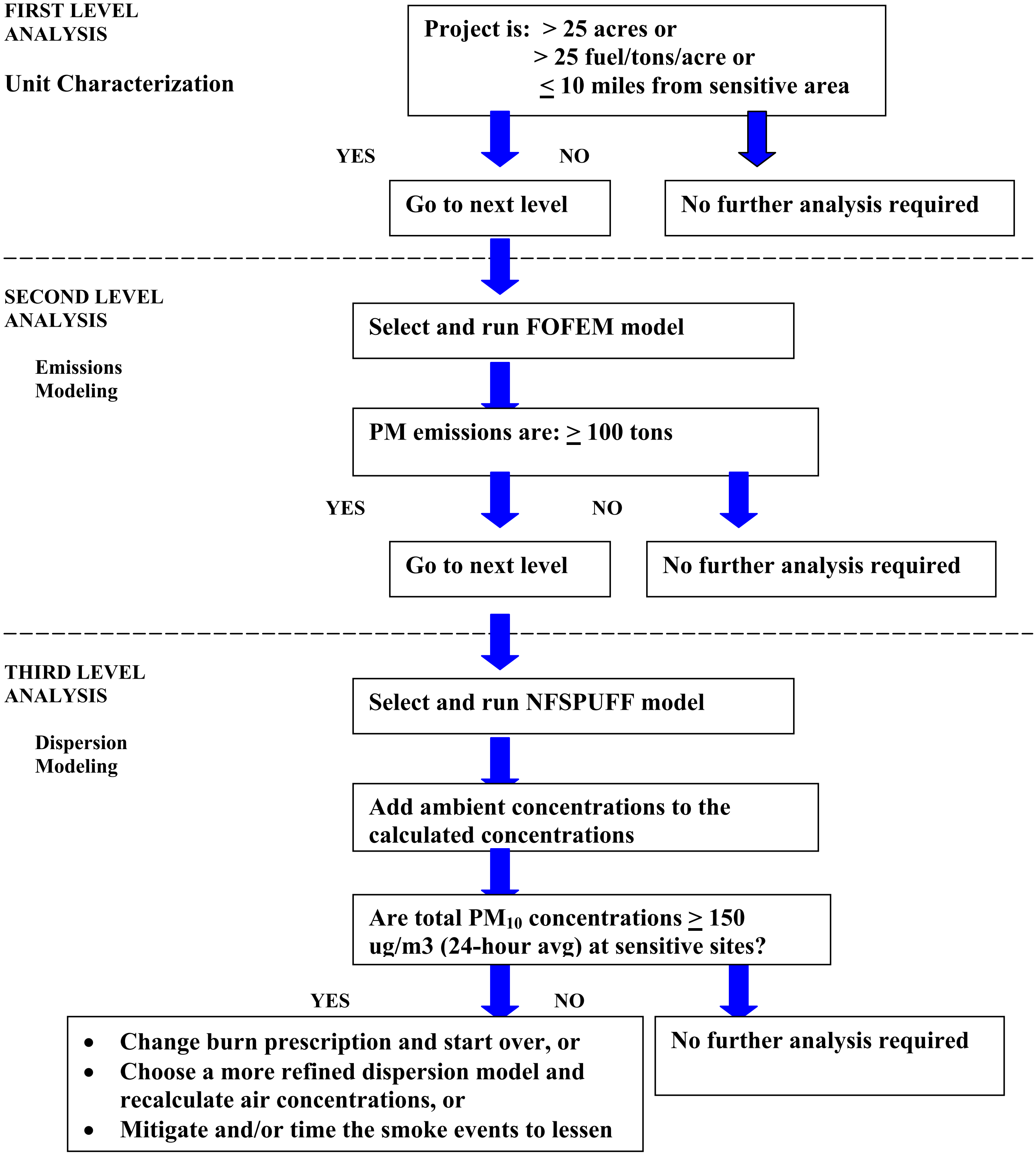
A “Decision Analysis” matrix (USFS 1998) shown in Figure C-1 is used to stratify burns based on levels of potential emissions. This matrix identifies the appropriate emissions and dispersion analysis to use. A “Second Level Analysis” using FOFEM (First Order Fire Effects Model) was conducted. FOFEM is an emissions production model for pile or broadcast burns for $PM_{2.5}$, PM_{10}, and CO (Reinhardt, et. al, 1997). The FOFEM model inputs include fuel loading by size class, vegetation, density (herbaceous, shrub, and tree regeneration), anticipated fire intensity, fuel moisture, duff, depth, and season of burning.

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

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

A list of all prescribed burns planned on the Bonners Ferry Ranger District would be forwarded to the smoke monitoring unit by February 15 for spring burns and by August 15 for fall burns. Then daily by 12:00 p.m., Pacific Time, the Bonners Ferry Ranger District will enter all burning planned for the next day onto a smoke monitoring web page. Typically, by 3:00 p.m., Pacific Time, the same day, the monitoring unit would inform the District if any restrictions will be in effect the following

Figure C-1. Decision Analysis for Smoke Modeling



day along with a list of approved burns for the following day. All of these precautions would limit smoke accumulations in the valley to legal, acceptable limits.

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

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

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