United States
Department of
Agriculture

Forest
Service

December 2011

Draft Environmental Impact Statement

For the Draft Land Management Plan

Kootenai National Forest

Art: by Frank Kujawa

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Land Management Plan
Draft
Environmental Impact Statement
Lincoln and Sanders Counties, Montana

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Abstract: This draft environmental impact statement (DEIS) documents analysis of four alternatives developed for programmatic management of the 2.2 million acres administered by the Kootenai National Forest. The Forest Service has identified Alternative B as the preferred alternative.

It is important that reviewers provide their comments at such times and in such a way that they are useful to the Agency's preparation of the environmental impact statement (EIS). Therefore, comments should be provided prior to the close of the comment period and should clearly articulate the reviewer's concerns and contentions. The submission of timely and specific comments can affect a reviewer's ability to participate in subsequent administrative review or judicial review. Comments received in response to this solicitation, including names and addresses of those who comment, become part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative or judicial reviews.

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Acronyms

AMS	Analysis of the Management Situation
ASQ	Allowable Sale Quantity
ATV	All Terrain Vehicle
AUMs	Animal Unit Months
BLM	Bureau of Land Management
BMUs	Bear Management Units
CER	Comprehensive Evaluation Report
CFR	Code of Federal Regulations
CYRZ	Cabinet Yaak Grizzly Bear Recovery Zone
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIA	Forest Inventory and Analysis
FSEIS	Final Supplemental Environmental Impact Statement
GA	Geographic Area
GIS	Geographic Information System
HRV	Historic Range of Variation
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IDT	Interdisciplinary Team
INFISH	Inland Native Fish Strategy
IPNF	Idaho Panhandle National Forest
IRAs	Inventoried Roadless Areas
KIPZ	Kootenai Idaho Panhandle Zone
KNF	Kootenai National Forest
LMP	Land Management Plan
LTSYC	Long-term Sustained Yield Capacity
MA	Management Area
MCF	Thousand Cubic Feet
MIS	Management Indicator Species
MMBF	Million Board Feet
MMCF	Million Cubic Feet
MOU	Memorandum of Understanding
MT DEQ	Montana Department of Environmental Quality
MVUMs	Motor Vehicle Use Maps
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NFS	National Forest System
NOI	Notice of Intent
NRLMD	Northern Rockies Lynx Management Direction
RCAs	Riparian Conservation Areas
RNAs	Research Natural Areas
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SRZ	Selkirk Grizzly Bear Recovery Zone
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	US Fish & Wildlife Service
WSA	Wilderness Study Area
WUI	Wildland/Urban Interface

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Summary

Proposed Action

The Kootenai National Forest (KNF) proposes to revise its Land and Resource Management Plan. The area affected by the proposal includes about 2.2 million acres of public land. The draft Forest Plan would designate seven management area (MA) themes across the Forest: Wilderness (Designated, Recommended, and Wilderness Study Area); Eligible Wild and Scenic Rivers; Special Areas (botanical, geological, historical, recreational, scenic, or zoological); Research Natural Areas (RNAs) (established and recommended); Backcountry; General Forest; and Primary Recreation Areas. The proposed MAs span a continuum (figure 1) that includes, at one end, an approach emphasizing passive management and natural restoration with little human-caused change, and on the other end, more active management with substantially more human-caused change designed to sustain the social, economic, and ecological attributes of the Forest.

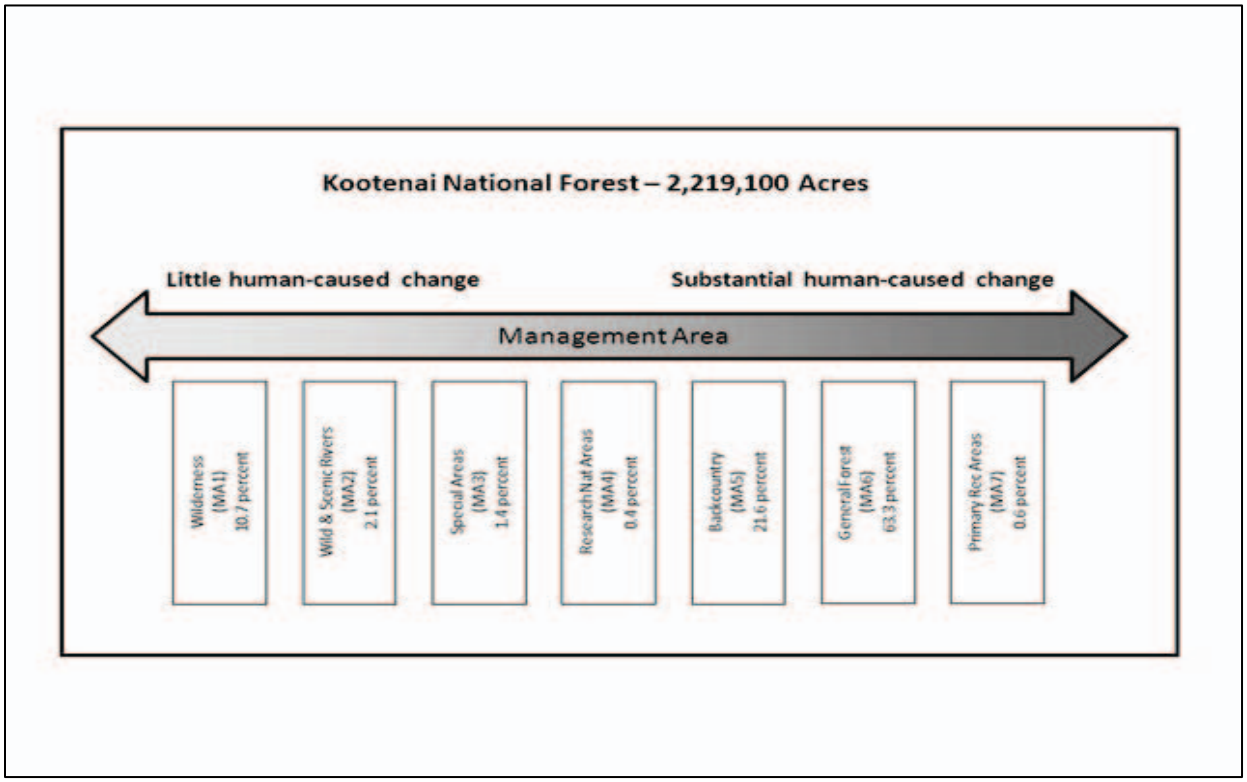


Figure 1. Management Area Continuum on the KNF (Draft Forest Plan)

Allocation to a specific MA is not intended to mandate or direct the Forest Service to propose or implement any action; rather, the MAs provide an array of allowable uses regarding:

- Timber harvest/timber production;
- Commercial and personal use of special forest products and firewood;
- Fire (prescribed and natural, unplanned);
- Livestock Grazing;
- Wheeled motor vehicle use;

- Over-snow vehicle use;
- Mechanized use;
- Road construction and reconstruction; and
- Minerals (leasable and minerals material).

Purpose and Need

The purpose of the action is to revise the 1987 Forest Plan for the KNF. The draft Forest Plan would guide natural resource management activities on the Forest, and address changed conditions and direction that have occurred since the original Plan (1987); while meeting the objectives of federal law, regulation, and policy. Specifically, the draft Forest Plan would provide management direction for identified revision topics forestwide, as well as MA direction.

The need for revision also comes from new public issues, new desires, and new expectations of public land and resource management including: forest access, vegetation, wildlife habitat, recreation, inventoried roadless areas (IRAs), fire, watershed, soils, aquatic species, and timber management.

In late 2000, the forest supervisor determined that revision was needed because significant changes had occurred in conditions and demands. The need for revision or change is based on legal requirements, changed conditions, and the Analysis of the Management Situation (AMS) (2003). Revision is also warranted because the Plan is beyond the 10 to 15 year duration provided by the National Forest Management Act (NFMA) (16 U.S.C. 1606(e) (5) (A)).

Public Involvement

In late 2000, the KNF began working on revision of the Forest Plan under the 2000 Planning Rule. In April 2002, the Forest published a notice of intent (NOI) in the *Federal Register*, announcing the revision of the Land Management Plan (LMP) with a 12-month public comment period.

From April 2002 to May 2004, the KNF hosted public meetings, open houses, field trips, and workgroup meetings. Approximately 21 informational and comment meetings took place in and around the local communities during the scoping process, which started in April 2002, with the NOI in the *Federal Register* and ended in May 2004. In addition to the public meetings; briefings and meetings were held with the Tribes, Congressional representatives, other elected officials, other agencies, and interest groups.

In addition, the KNF hosted approximately 38 workgroup meetings from August 2003 to May 2004. These meetings were held in the communities within the KNF and the workgroups focused on the geographic areas (GAs) surrounding each of these communities. The purpose of these workgroup meetings was to: 1) share information about the revision topics; 2) collaboratively discuss and develop desired conditions for each of the revision topics within the workgroup's GAs; and 3) gain an understanding of the issues and appreciation of others' viewpoints.

On May 12, 2006, the Forest released the Proposed Land Management Plan under the 2005 Planning Rule. Public comments on the proposed Plan were analyzed and summarized in a report (the Analysis of Public Comment Report, March 2007). Based on public and agency comments, the revision team began development of the final Plan. A court injunction (March 30, 2007) resulted in suspension of Forest Plan revision activities under the 2005 Planning Rule. The 2008 Planning Rule was released in April of 2008 and Forest Plan revision resumed under that Rule. A final Plan release was anticipated for winter of 2009 when a court ruling invalidated the 2008 Planning Rule in June 2009. The 2000 Planning Rule was reinstated in December of 2009. The 2000 Planning Rule was amended in 2002 to allow the Forest Service to follow the procedures of the 1982 Planning Rule. The Forest issued a second NOI in March

2010 to revise the Forest Plan using the 1982 procedures under the 2000 Planning Rule. All the public comment received on the various Forest Plan revision products over the life of the Plan revision have been used in developing the draft Forest Plan and draft environmental impact statement (DEIS).

Major Issues

The major issues are the seven primary revision topics addressed by the draft Forest Plan. These topics represent areas where there are unresolved conflicts concerning alternative uses of available resources.

- Access and Recreation
- Vegetation
- Timber Production
- Fire
- Terrestrial Wildlife
- Watershed and Aquatic Species
- Recommended Wilderness

Alternatives

These major issues led the agency to develop four alternatives:

Alternative A is the no-action alternative. This alternative is the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations. New information, inventories, and technologies were used to evaluate this alternative. Output levels were recalculated for this alternative based on these new sources of information and amended direction. The no-action alternative retains the 1987 Forest Plan goals and objectives, standards and guidelines, and MA prescriptions, as amended. This alternative serves as the baseline for comparison with the action alternatives.

Alternative B is the Proposed Action Alternative. This alternative is the result of collaborative efforts since 2003 and responds to the identified purpose and need. Alternative B is based on the Proposed Land Management Plan released May 2006, and its response to comments. This alternative emphasizes moving towards desired future conditions and contributing to ecological, social, and economic sustainability. Alternative B would manage approximately five percent of the Forest as recommended wilderness (MA1b), 22 percent as backcountry (MA5), and 63 percent as general forest (MA6). Thirty-six percent of the Forest would be suitable for timber production.

Alternative C emphasizes wilderness values and protection of backcountry while moving towards desired conditions. There is an increased emphasis on natural disturbance processes (such as unplanned wildfire ignitions for multiple objectives) and prescribed burning. Mechanical treatments (e.g., timber harvest, stream improvements) also occur in order to move towards watershed and vegetation desired conditions. Alternative C would have more opportunities for backcountry and nonmotorized recreation (MA1 − 342,600 acres; MA5 − 477,900 acres). This alternative also has more acres recommended as wilderness (214,800 acres) than any other alternative. About 59 percent would be allocated to general forest (MA6). Thirty-four percent of the Forest would be suitable for timber production.

Alternative D emphasizes achieving desired condition through mechanical means. Timber production is emphasized while moving towards vegetation desired conditions. This alternative has the most acres available for timber production and motorized access, with 75 percent acres allocated to MA6 (general forest). There would be fewer acres allocated to recommended wilderness (36,100 acres or about 2

percent) and backcountry (MA5 – less than 13 percent of the Forest). Thirty-eight percent of the Forest would be suitable for timber production.

All alternatives in this document adhere to multiple use and sustained yield of goods and services (Code of Federal Regulations (CFR) 36 CFR 219.1(a), (b))). In addition, they share objectives and standards for managing forest resources and complying with applicable laws and policies. They also contain the same direction to contribute to the diversity of desired native and non-native plant and animal communities and contribute toward the recovery of threatened and endangered species. Forestwide direction identified in the Plan would apply to all alternatives. The difference between alternatives is primarily the difference in allocation of acres by MA to meet the purpose and need for change, and address one or more of the major issues.

Each alternative was developed to be in compliance with applicable law and regulation, as well as national policy and direction including, but not limited to, the Healthy Forests Initiative, National Fire Plan, and National Energy Policy. Each alternative retains the following existing decisions to the 1987 Forest Plan and, where applicable, the associated Biological Opinion:

- Inland Native Fish Strategy (INFISH) (Decision Notice and Finding of No Significant Impact (1995));
- Northern Rockies Lynx Management Direction (Record of Decision (ROD)) USDA Forest Service 2007); and
- Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (FSEIS and ROD 2011).

The following would not change between alternatives:

- **Draft Forest Plan Goals, Desired Conditions, and Standards and Guidelines –** Management area and forestwide direction for goals, desired conditions, standards, and guidelines remains constant for all action alternatives.
- **Special Areas –** Allocation of special areas (MA3) remains constant for all action alternatives.
- **Research Natural Areas (RNAs) –** Allocation of RNAs (MA4) will remain constant for all action alternatives.
- **Developed Recreation Sites –** Existing developed recreation sites are retained in all alternatives. Alternatives do not make decisions to remove or to create developed recreation sites. Allocation of primary recreation areas (MA7) remains constant for all action alternatives.
- **Utility Rights-of-Way and Communication Sites –** Direction for and location of designated utility rights-of-way and communication sites remains constant for all alternatives.
- **Wild and Scenic Rivers –** Direction for and allocation of eligible wild and scenic rivers (MA2) remains constant for all action alternatives.
- **Wilderness Study Area –** The Wilderness Study Area on the Forest was established by an Act of Congress in 1977. The Ten Lakes Wilderness Study Area and its management would continue as outlined by the Wilderness Study Act, regardless of which alternative is selected for implementation.
- **Designated Wilderness –** The Cabinet Mountain Wilderness Designation remains constant for all alternatives.

Comparison of Alternatives

Chapter 3 of this DEIS presents a detailed description of the affects of the alternatives. The following tables provide a summary of management areas allocations by alternative (table 1) and effects by revision topic (table 2).

Table 1. Comparison Percent MA Allocation by Alternatives

MA	Alternative A[1]	Alternative B	Alternative C	Alternative D
MA1a – Designated Wilderness	4.2%	4.2%	4.2%	4.2%
MA1b – Recommended Wilderness	3.4%	5.0%	9.7%	1.6%
MA1c – Wilderness Study Area	1.5%	1.5%	1.5%	1.5%
MA2 – Eligible Wild & Scenic Rivers	n/a	2.1%	2.0%	2.3%
MA3 – Special Areas	0.1%[2]	1.4%	1.4%	1.4%
MA4 – Research Natural Areas		0.4%	0.4%	0.4%
MA5a – Backcountry (nonmotorized year-round)	15.5%	10.3%	15.2%	5.1%
MA5b – Backcountry (motorized year-round)	[3]	7.4%	5.5%	2.2%
MA5c – Backcountry (motorized winter)	n/a	3.9%	0.9%	5.3%
MA6 – General Forest	n/a	63.3%	58.7%	75.5%
MA7 – Primary Recreation Area	n/a	0.6%	0.6%	0.6%

1 Alternative A, the no-action alternative, is included even though it does not use the management areas shown in the draft Forest Plan. See table 4 in chapter 2 for a crosswalk of the 1987 Plan management areas to those used in the draft Plan and the action alternatives.

2 For Alternative A, MA3 and 4 are a combined total, from MA21 in 1987 Plan

3 For Alternative A, MA5a and 5b are a combined total from MAs 2, 3, and 29 in the 1987 Plan

Table 2. Comparison of Some Key Indicators for Revision Topics by Alternatives

Revision Topic (some Key Indicators)	Alternative			
	A	B	C	D
Access and Recreation				
Percent of the Forest and location of areas where roads & trails may be designated for wheeled motor vehicle use	76 percent	75 percent	68 percent	82 percent
Percent of the Forest and location of areas where over-snow vehicle use is allowed	88 percent	84 percent	79 percent	87 percent
Percent of the Forest and location of areas where mechanized use is allowed	96 percent	91 percent	87 percent	95 percent
Vegetation				
Forest composition, structure, and pattern	Least improvement towards DFC[1]	Greatest improvement towards DFC[1]	Second greatest improvement towards DFC[1]	Third greatest improvement towards DFC[1]
Carbon Sequestration	Greatest amount of carbon sequestered	Third highest amount of carbon sequestered	Second highest amount of carbon sequestered	Least amount of carbon sequestered
Timber				
Number of acres suitable for timber production	739,300 ac	791,400 ac	753,800 ac	852,700 ac
Percent Suitable	33 percent	36 percent	34 percent	38 percent
Predicted Volume Sold	50.3 MMBF	47.5 MMBF	40.2 MMBF	50.4 MMBF
Allowable Sale Quantity (ASQ)	76.0 MMBF	70.2 MMBF	68.6 MMBF	86.3 MMBF
Fire				
Use of fire (prescribed and wildfire)	Lowest emphasis	Second most emphasis	Most emphasis	Third most emphasis
Fuel treatment/risk reduction	Lowest emphasis	Most emphasis	Third most emphasis	Second most emphasis
Terrestrial Wildlife				

Revision Topic (some Key Indicators)	Alternative			
	A	B	C	D
Changes in forest composition, structure, and pattern	See Vegetation section above	See Vegetation section above	See Vegetation section above	See Vegetation section above
Acres of security habitat	Third most acres of security habitat	Second most acres of security habitat	Most acres of security habitat	Least acres of security habitat
Watersheds, Soils, Riparian, and Aquatic Habitat/Species				
Trend in watershed condition rating	Least improvement in overall trend	More improvement in overall trend	Slower improvement in overall trend	Potentially rapid improvement in overall trend
Trend in native aquatic species status	Least active improvement for active management; second lest passive improvement	Second most active improvement; second most passive improvement	Second least active improvement; most passive improvement	Most active improvement; least passive improvement
Recommended Wilderness				
Acres of recommended wilderness	76,500 ac	112,800 ac	217,300 ac	37,300 ac

1 Desired Forest Condition (DFC)

Chapter 1. Purpose of and Need for Action

Introduction

The U.S. Department of Agriculture (USDA), Forest Service, has prepared this draft environmental impact statement (DEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This DEIS discloses the environmental consequences that could result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1. Purpose of and Need for Action –** This chapter includes information on the history of the proposal, the purpose of and need for the action, and the Agency's proposal for achieving that purpose and need. This chapter also describes the public involvement process.
- **Chapter 2. Alternatives, including the Proposed Action –** This chapter describes the alternatives developed to address the purpose and need for change. It also describes alternatives not considered in detail. A summary comparison of alternatives is provided at the end of the chapter.
- **Chapter 3. Affected Environment and Environmental Consequences –** This chapter describes current conditions on the Kootenai National Forest (KNF) and the environmental consequences of implementing each alternative.
- **Chapter 4. List of Preparers –** This chapter provides a list of preparers and agencies consulted during the development of the EIS.
- **Glossary –** The glossary provides definitions of terms used in this document.
- **Appendices –** The appendices provide additional detailed information in support of the analyses presented in the EIS.
- **Map packet –** The map packet is a separate packet that includes management area maps for each action alternative.

Proposed Action

The Forest Service proposes to revise the Land Management Plan (hereafter referred to as the "draft Forest Plan" or "draft LMP") for the KNF. This draft Forest Plan is proposed to meet legal and regulatory requirements; and to address changes, issues, and concerns that have arisen since the Forest Plan was released in 1987. The area covered under this revision is shown in figure 2.

Alternative B has been developed to address all of the primary revision topics and needs for change identified in the 2003 Analysis of the Management Situation (AMS). Alternative B is also the result of a culmination of multiple scoping efforts, public informational and comment meetings, field trips, invited group presentations, and workgroup meetings as well as meetings with tribal partners, agency partners, and elected officials at various communities in and around the KNF. See the "Public Involvement" section of this chapter for a detailed summary of the KNF collaborative and public participation efforts.

Alternative B recommends approximately 112,800 acres for wilderness designation. These acres include recommended additions to the Cabinet Mountain Wilderness and the recommendation of new wilderness in the Roderick, Scotchman Peaks, and Whitefish Divide areas.

Alternative B emphasizes maintaining diverse, high quality outdoor recreation opportunities as well as a road and trail system that provides access to the KNF. Emphasis is also placed on

restoration of vegetation, protecting terrestrial and aquatic habitats, improving watershed conditions, and designating special areas. It reflects updated information and recent changes in law, regulation, and policy.

Alternative B also emphasizes contributing to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. It recommends providing timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and settings for recreation consistent with goals for watershed health, sustainable ecosystems, biodiversity and viability, and scenic/recreation opportunities.

The Planning Area

The KNF is located in the northwest corner of Montana (within Lincoln and Sanders counties) and includes about 2.2 million acres of public land. The Forest administers the entire proclaimed Kootenai and a portion of the Kaniksu National Forest (figure 2). The KNF is divided into five ranger districts: Rexford, Fortine, Three Rivers, Libby, and the Cabinet. Seven geographic areas (GAs) are defined within the draft Plan: Bull, Clark, Fisher, Koocanusa, Libby, Tobacco, and Yaak. Two major rivers, the Kootenai and the Clark Fork, along with several smaller rivers and their tributaries, dominate the Forest. The Whitefish Range, Purcell Mountains, Bitterroot Range, Salish Mountains, and Cabinet Mountains are all part of the rugged terrain radiating from the river valleys. In the north-central part of the Forest, the land is more open with gently rolling forested hills lying in the shadows of the Whitefish Range.

The KNF is one of the most diverse and productive forests in the Northern Region of the Forest Service. It is the home of several threatened and endangered plant and animal species, and it provides a diversity of aquatic and terrestrial habitat. Grizzly bear, Canada lynx, and bull trout are examples of some of these listed and rare species.

The principal population centers within the KNF are Libby, Troy, Eureka, and Trout Creek, Montana. Smaller communities that have social, economic, and historic ties to the KNF include Fortine, Trego, Stryker, the Yaak community, Rexford, Noxon, and Heron Montana. The nearest larger urban areas, Spokane, Washington, and the Flathead Valley in Montana have a social and economic influence on the local communities as well. The majority of land administered by the KNF is located in Lincoln and Sanders counties in Montana with smaller portions of land in Flathead County, Montana and Boundary, and Bonner counties in Idaho (table 3).

Table 3. Acres and Percent Administered by the KNF, by County

County	Acres Administered by KNF	Percent of County Administered by KNF
Boundary, ID	10,300	1%
Bonner, ID	39,200	3%
Lincoln, MT	1,690,300	72%
Sanders, MT	428,500	24%
Flathead, MT	49,100	1%
Total Acres	**2,217,400**	

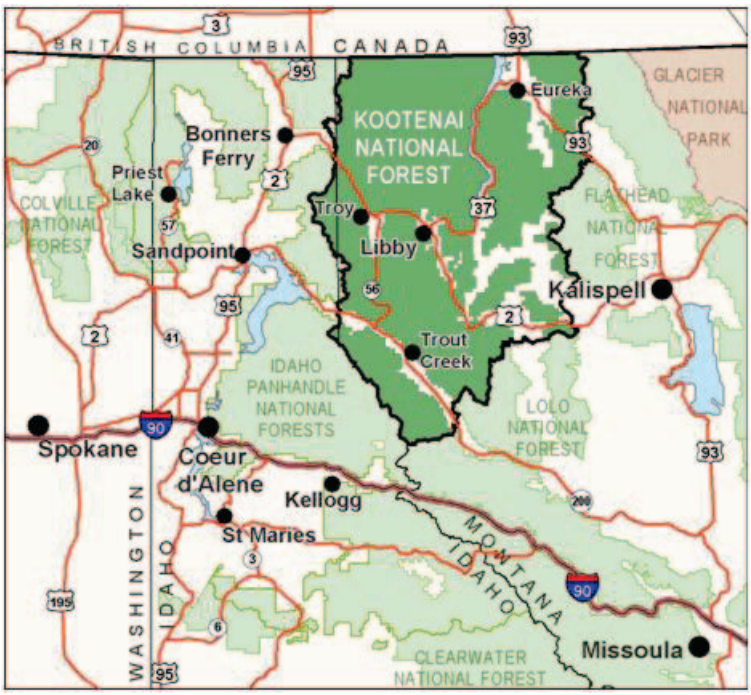


Figure 2. Kootenai National Forest Area Map

Purpose

The purpose of the action is to revise the 1987 Forest Plan for the KNF. The draft Forest Plan will guide natural resource management activities on the Forest, address changed conditions and direction that have occurred since the original Plan was released, while meeting the objectives of federal law, regulation, and policy. Specifically, the draft Forest Plan will provide management direction for identified revision topics forestwide, as well as management area (MA) direction.

The need for revision also comes from new public issues, new desires, and new expectations of public land and resource management. The public has new issues, desires and expectations about forest access, vegetation, wildlife habitat, recreation, inventoried roadless areas (IRAs), fire, watershed, soils, aquatic species, and timber management.

Need

The forest supervisor initiated revision based on legal requirements and significant changes that had occurred in conditions and demands since the 1987 Plan went into effect. The AMS (2003) documents the need to establish or change Forest Plan management direction. Revision is also warranted because the Plan is beyond the 10 to 15 year duration provided by the National Forest Management Act (NFMA) (16 U.S.C. 1606(e) (5) (A)).

Under the 1982 planning procedures, instructions to revise forest plans were formulated in the Code of Federal Regulations (CFR) at 36 CFR 219.10(g), 1982:

> "A forest plan shall ordinarily be revised on a 10-year cycle or at least every 15 years. It also may be revised whenever the forest supervisor determines that conditions or demands in the area covered by the plan have changed significantly, or when changes in Resource Planning Act policies, goals, or objectives would have a significant effect on forest level programs."

Need for Change

The revision of the Forest Plan is based on a need for change. The need for change approach analyzes the entire Plan, but proposes changes to the 1987 Plan where adjustments are necessary.

Monitoring and evaluation of implementation of the current Forest Plan has helped identify management concerns, new issues, new information, and better ways to achieve goals and objectives. Inventory information about the Forest's land and water resources is more accurate than it was in 1987, as a result of continued updates and new data management tools. The Forest now has geographic information system (GIS) technology, which greatly enhances analysis and the revision process. Knowledge of the physical, biological, and social processes occurring on the Forest has improved and increased during the life of the current Plan. This new and emerging information contributes to the need for revision.

The revision focuses on the most compelling needs for change in Forest Plan direction. These changes are generally important enough to:

- Affect large areas;
- Change the mix of goods and services produced; or
- Involve decisions in management direction where there is no public consensus on the best course of action.

Revision Topics

Revision topics are broad categorizations of major issues that identify where resource conditions, technical knowledge, or public perceptions of resource management have created a potential "need for change." The revision topics are the focus of this Forest Plan revision process. They address the central issues and public concerns to which future management of the KNF must respond. The revision topics provide the basis for development of the Proposed Action and alternatives.

The AMS identified seven primary 'need for change' or revision topics:

- Access and Recreation
- Vegetation
- Timber Production
- Fire
- Terrestrial Wildlife
- Watershed and Aquatic Species
- Recommended Wilderness

The following is a summary of each revision topic, including an issue statement, a description of the need for changes, and key indicators. For more information on revision topics, see the AMS.

Access and Recreation

Issue Statement: Forest Plan management strategies may affect recreation resources, experiences, and opportunities.

Need for Change: Access, specifically the motorized and nonmotorized use of National Forest System (NFS) lands, is recognized as one of the most controversial topics, both internally and externally, in forest management today. Because of this level of controversy, it is appropriate to address motorized and nonmotorized use as part of the Forest Plan revision.

The 1987 Plan does not provide adequate direction to address the changes in recreation demands, \technology, and shifts in management practices that have occurred over the past two decades. This issue was used in the development of forestwide and management area direction.

Key Indicators

- Percent of the Forest and location of areas where roads and trails may be designated for wheeled motor vehicle use;
- Percent of the Forest and location of areas where over-snow vehicle use is allowed;
- Percent of the Forest and location of areas where mechanized use is allowed;
- Percent of the Forest and location managed in the various recreation opportunity spectrum (ROS) classes; and
- Percent of the Forest managed for various scenery management systems and scenic integrity objectives categories.

Vegetation

Issue Statement: Forest Plan management strategies may affect the composition, structure, and landscape pattern of forests and this could influence the susceptibility and resiliency of the forests to significant disturbance agents such as large intense wildfires, insect and disease epidemics, weather events and climate change.

Need for Change: The focus on vegetation was largely due to concerns that the forest composition, structure, and pattern had shifted away from historical conditions to the extent that ecosystems, and the goods and services that it provided, may not be sustainable, especially in light of potential impacts from climate change.

This issue was used to develop desired condition descriptions for vegetation at various scales (e.g., forestwide and for each of three biophysical settings) and was used in the development of management direction (goals, desired conditions, objectives, standards and guidelines). The analysis conducted for this issue focuses on changes that may occur to forest composition, structure, landscape patterns of forest conditions, and the resistance and resiliency of the forest to disturbances and stressors, and lastly, the ability of the forest vegetation to sequester carbon. This analysis provides a foundation for how terrestrial vegetation may influence other resources such as wildlife habitat, aquatic resources, timber production, and fire risk.

Key Indicators

- Forest composition and structure – predicted changes to tree species composition and structure (tree size classes, old growth, and snags);
- Landscape pattern of the forest – potential changes to the patterns of forest conditions (e.g., successional stages, species composition, tree density, and fuels) on the landscape;

- Resistance and resiliency of the forest vegetation to disturbances and stressors – effects of the alternatives on the hazard of wildfire, key insects and diseases, weather disturbances and climate change; and
- Carbon sequestration.

Timber

Issue Statement: Forest Plan management strategies may affect the amount of lands suitable for timber production and sustainable timber volume managed by the Forest.

Need for Change: The 1987 Forest Plan established an allowable sale quantity (ASQ) as the maximum level of timber that could be harvested. Timber production levels have been well below the ASQ established in the 1987 KNF Plan. While timber harvest levels have not exceeded the maximums established in the ASQ, they also have not met expectations for management and output levels. Even though ASQ is the maximum harvest level, there was an expectation by the public that this level was achievable and predicted. The analysis conducted for the 1987 Forest Plan used this level of harvest in estimating effects from timber management on other resources and the impact to local jobs and income. With the reduced timber harvest levels, there is a need to reanalyze timber harvest levels and estimate the effects on other resources and the local communities.

The management direction in the 1987 Forest Plan emphasized the production of timber, with the majority of MAs allowing or promoting timber management. In the 1990s, the Forest Service began to focus on ecosystem management and ecological sustainability. This change in policy and direction resulted in a decreased emphasis on commercial timber production and an increased emphasis on timber harvest as a tool to restore vegetation or as a means to address other resource requirements or needs. There is a need to reanalyze timber harvest levels and revise.

In addition, evaluation of timber suitability is required to be reviewed every 10 years (1982 regulations 36 CFR 219.14). Since the adoption of the 1987 Forest Plan, many changes to timber suitability have occurred.

Key Indicators

- Number of acres suitable for timber production;
- Allowable sale quantity and predicted timber volume sold; and
- Long term sustained yield capacity.

Fire

Issue Statement: Forest Plan management strategies may affect the restoration and maintenance of the fire-adapted ecosystems on the KNF. In the wildland urban interface (WUI), the Forest Plan management strategies may affect the amount, arrangement, and type of hazardous fuels that exist and, therefore, the risk that potential wildfires pose to life, private property, and other values in these areas (e.g., campgrounds, utility improvements, communication sites, scenery values).

Need for Change: In order to restore and maintain the fire-adapted ecosystems on the Forest, there is a need to expand the use of wildland fire (both prescribed fire and wildfire) as a management tool.

A substantial amount of acreage on the KNF is fairly remote in terms of road access. In many of these areas, it can be difficult or undesirable to use mechanical treatments to manage the vegetation in order to help achieve the desired forest conditions. Therefore, in these areas, it is especially important to consider the use of fire when and where it is appropriate.

The AMS identified fire risk in the WUI as a growing concern since the 1987 Forest Plan was developed and recognized the need for more direction and emphasis on this issue in the draft Forest Plan.

Key Indicators

- How much, where, and under what conditions prescribed fire and wildfire may be used to help achieve desired conditions; and
- How much fuel treatment is anticipated and the relative reduction in risk that could occur.

Terrestrial Wildlife

Issue Statement: Forest Plan management strategies may affect habitat for terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act (ESA), Northern Region sensitive species, and forest management indicator species (MIS).

Need for Change: Since the 1987 Forest Plan, several changes have occurred that resulted in subsequent modifications in how we manage both species and habitats. The draft Forest Plan needs to address these changes.

Species listed as threatened and endangered have changed. Additionally, the sensitive species list has been amended. Knowledge related to habitat management for grizzly bear continue to evolve.

Items such as fragmentation, patch size, biodiversity, and ecosystem management strategies have evolved and need to be incorporated into the Forest Plan. The Interior Columbia Basin Ecosystem Management Project (ICBEMP) (United States Department of Agriculture (USDA)/United States Department of Interior (USDI) 1999) identified that current plan direction for special habitats, such as snags and down woody material, may not be adequate for species dependent on those habitats. In 2001, it was determined that the Migratory Bird Treaty Act applied to all federal agencies. The State of Montana completed an elk management plan in 2004, with specific habitat and population goals and objectives that did not always match those found in the Forest Plan (Montana Fish, Wildlife, and Parks 2004).

The analyses done in preparation for the Forest Plan revision show that physical and biological components of terrestrial wildlife habitats have changed, resulting in increased or decreased suitable habitat, depending on the wildlife species.

Key Indicators

- Changes in forest composition, structure, and pattern; and
- Security habitat (nonmotorized areas).

Watersheds and Aquatic Species

Issue Statement: Forest Plan management strategies have the potential to indirectly affect soil productivity, soil erosion rates and sedimentation, distribution and abundance of aquatic species, and changes in water quality and riparian function.

Need for Change: There are two primary reasons that the 1987 Forest Plan needs to be revised for watershed and aquatic dependent resources. The first is to establish management direction that recognizes and emphasizes watershed restoration activities and the second, is to address changes in the physical and biological components of the aquatic ecosystem, such as water quality impairments; threatened, endangered, and sensitive species; soil productivity; and habitat conditions.

Key Indicators

- Trend in watershed condition rating; and
- Trend in native aquatic species status.

Recommended Wilderness

Issue Statement: Management strategies for recommended wilderness may affect recreation opportunities and experiences within recommended wilderness areas.

Need for Change: There is continuing controversy associated with the management of IRAs, as well as updating guidance provided in the 1987 Forest Plan to reflect current direction for recommended wilderness. Evaluation of existing wilderness and areas for wilderness potential is a requirement of Forest Plan revision (1982 regulations 36 CFR 219.17).

Key Indicator

- Acres of recommended wilderness

Other Revision Topics

Additional topics were identified where there is a need to incorporate current law, regulation or policy as well as current data and science. The Plan direction that addresses these topics is common to all action alternatives:

- Air Quality
- American Indian Rights and Interests
- Cooperation and Community Involvement
- Cultural Resources
- Livestock Grazing
- Lands

- Minerals
- Special Forest Products
- Research Natural Areas
- Social and Economic systems
- Special Areas
- Wild and Scenic Rivers

Public Involvement

In April, 2002, a notice of intent (NOI) was published in the *Federal Register*, announcing that revision of the 1987 LMP had begun and asked for comment on preliminary issues, topics, and the preliminary proposed action. Informal discussions with the public regarding needed changes to the current Forest Plan began with a series of public meetings in 2002. This input, along with science-based evaluations, was used to determine the need for change. Additional meetings, correspondence, news releases, comment periods, and other tools were utilized to gather feedback from the public, forest employees, tribal governments, federal and state agencies, and local governments.

In March, 2003, the AMS and AMS Technical Report (USDA Forest Service 2003) were released to the public. The AMS documented the need for change, the seven primary revision topics and the KNF proposed action identified from public comment and internal (Forest Service) input.

From April 2002 to May 2004, the KNF hosted public meetings, open houses, field trips, and workgroup meetings. Approximately 21 informational and comment meetings in and around the local communities took place during the scoping process, which started in April 2002, with the NOI in the *Federal Register* and ended in May 2004. In addition to the public meetings, briefings and meetings were held with the Tribes, Congressional representatives, other elected officials, other agencies, and interest groups.

In addition, the KNF hosted approximately 38 workgroup meetings from August 2003 to May 2004. These meetings were held in the communities within the KNF and the workgroups focused on the GA surrounding each of these communities. The purpose of these workgroup meetings was to: 1) share information about the revision topics; 2) collaboratively discuss and develop desired conditions for each of the revision topics within the workgroup's GAs; and 3) gain an understanding of the issues and appreciation of others' viewpoints.

A Content Analysis Report, prepared in 2004, summarized what the KNF had learned from people that responded to the preliminary proposed action, revision topics, and need for change through the various public and workgroup meetings, open houses, field trips, invited group presentations, and meetings with tribal partners, agency partners, and elected officials up to that time.

Under the 1982 Planning Rule, the Forest was required to prepare an EIS in conjunction with the revised LMP. Therefore, beginning in June 2004, based on what the KNF learned during internal and external public participation and collaboration, the Forest and revision interdisciplinary team (IDT) developed alternative themes utilizing and identifying suitable uses for various forest management purposes. These themes were designed to reflect a mix of different management philosophies based on the Forest's dialogue with members of the public, other agencies and

governments, tribal partners, and employees. These alternative themes were shared with the public and workgroups during meetings held in the winter of 2004-2005.

In January of 2005, a new planning rule was released that did not require an EIS, and thus, a final set of alternatives was never developed. Emphasis shifted to the development of a "starting option" map. The starting option map was created utilizing the preliminary alternatives, revision topics, public scoping comments, and input from the workgroups and other meetings. The starting option map and associated direction was the focus of many public/workgroup meetings in July to September of 2005. The purpose of the workgroup meetings was for a diverse group of people to come together to discuss the starting option map and try and reach agreement on suggested changes. From July to September 2005, the KNF hosted several workgroup meetings in the same communities focusing on the GAs. The purpose of these workgroup meetings was to: 1) share the starting option map and discuss how it was developed; 2) validate the information on the starting option map; and 3) collaboratively discuss any possible changes to the starting option map.

In addition to the workgroup meetings, briefings and meetings were held with the Tribes, Congressional representatives, other elected officials, other agencies, and interest groups. Several elected officials, Congressional staffers, and other agency representatives participated in the workgroup meetings.

In October 2005, the draft Proposed Plan map, showing the major changes and providing the rationale for changes to the starting option map, was released to the public and workgroups. The revision IDT incorporated input from the starting option map into the Proposed Land Management Plan, which was released on May 12, 2006, for a 90-day public comment period. The comment period was extended an additional 30 days and ended September 11, 2006. Released along with the Proposed Land Management Plan was the draft Comprehensive Evaluation Report (CER). The draft CER built upon the AMS and documented the evaluation of the 1987 Forest Plan and proposed changes. The draft CER evaluated current social, economic, and ecological conditions and trends that contribute to sustainability and served as the principle document that supported the need to establish, amend, or revise a Plan. The draft CER identified factors that affect conditions and trends, and included information of what is causing conditions to change, and described the influence plan implementation would have on moving toward desired conditions.

Public comment on the Proposed Plan and draft CER was analyzed and documented in a report, *The Analysis of Public Comment Report* (March 2007). Based on public and agency comments the revision IDT began to develop the final LMP. A court injunction (March 30, 2007) resulted in suspension of Forest Plan revision activities under the 2005 Planning Rule. The 2008 Planning Rule was released in April of 2008 and Forest Plan revision resumed under that Rule. A final Plan release was anticipated for winter of 2009 when a court ruling invalidated the 2008 Planning Rule in June 2009. The 2000 Planning Rule was reinstated in December of 2009. The 2000 Planning Rule was amended in 2002 to allow the Forest Service to follow the procedures of the 1982 Planning Rule.

The Forest issued a second NOI in March 2010 to revise the Forest Plan using the 1982 procedures under the 2000 Planning Rule. All the public comment received on the various Forest Plan revision products over the life of the Plan revision have been used in developing the draft Forest Plan and DEIS

Decision Framework

The responsible official for this analysis is the regional forester. Based on the analysis and subsequent public comments, the responsible official will select an alternative to revise the Forest Plan and document the rationale in a record of decision (ROD). Forest Plan approval results in:

1. Establishment of forestwide multiple-use goals and objectives, including a description of the desired condition of the KNF and an identification of the quantities of goods and services that are expected to be produced during the planning period, as required by 36 CFR 219.11(b);
2. Establishment of forestwide standards and guidelines as required by 36 CFR 219.13 through 219.27;
3. Establishment of multiple-use prescriptions and associated standards and guidelines for each MA, including proposed and probable management practices, as required by 36 CFR 219.11(c);
4. Establishment of monitoring and evaluation requirements that provide a basis for a periodic determination and evaluation of the effects of management practices, as required by 36 CFR 219.11(d);
5. Recommendation of wilderness to Congress, as required by 36 CFR 219.17(a); and recommendation of rivers eligible for inclusion in the Wild and Scenic River System as described by 16 United States Code (U.S.C.) 1271-1287, 36 CFR 297, and 47 FR 39454; and
6. Determination of suitability and potential capability of lands for resource production (timber and grazing), as required by 36 CFR 219.14 and 219.20.

The Plan will set a course of action for managing the Forest for the next 10 to 15 years. However, project level environmental analysis will still need to be completed for specific proposals to implement the direction in the Forest Plan.

Related Decisions Which Implement the Forest Plan

The six Forest Plan decisions listed above are strategic. Implementation of the Forest Plan generally requires a site- or project-specific analysis and decisions. However, there are situations where a site-specific decision is made at a strategic level, with the Forest Plan ROD. For example, a strategic decision may allocate an area as nonmotorized to provide quiet recreation or to protect wildlife in winter range. To provide for this type of condition, the Plan would include a standard to not allow wheeled motor vehicle use. The Forest Plan ROD would then make a site-specific decision that restricts where motorized use can and cannot occur across broad areas and closure orders would be simultaneously issued with the decision.

Relationship to Other Entities

Forest Service planning regulations require the agency to consider other federal, state and local government and tribal plans and policies. As part of the outreach effort, a number of discussions with federal, state, local and tribal representatives were initiated.

County Governments

Beginning with initiation of the planning process, local government officials from the counties within the KNF lands have been invited to participate in Forest Plan development. All county plans were considered as the planning process developed.

State

Several Montana State agencies are affected by, or affect, Forest Service management. These include Montana Fish, Wildlife, and Parks, Montana State Environmental Protection Agency, Department of Natural Resource Conservation, and Montana Department of Transportation. The Forest coordinated information with Montana Fish, Wildlife, and Parks and Montana State Environmental Protection Agency during all phases of the process. Those offices provided formal comments during the scoping and other public involvement stages. Statewide assessments were considered in the development of the draft Forest Plan.

Tribes

Members of the planning IDT met with tribal representatives during development of the Plan. The forest supervisor met with the Confederated Salish and Kootenai Tribes; as a result, specific tribal comments were incorporated in this DEIS and draft Forest Plan.

Federal

Management of federal lands adjacent to the KNF was considered in the formulation of alternatives and their cumulative effects.

Consideration of national scenic and historic trails, utility corridors, recommended wilderness, and other management concerns across boundaries were discussed with the Flathead and Lolo National Forests. The Forests met to ensure management problems weren't created because of KNF draft Forest Plan direction.

Relationship to Other Assessments or National Policy

There are several broad scale assessments or national policies in place that affect management decisions on the KNF. Following is a brief description of these assessments or policies and their affect on the KNF plan revision.

National Scale

In March 1999, the Committee of Scientists published a report entitled, "Sustaining the Peoples' Lands: Recommendations for Stewardship of the National Forests and Grasslands into the Next Century" (USDA 1999). This report emphasizes ecosystem management and the need for sustainability of all forest lands. The report also emphasizes the need for standards and guidelines, or any other technical requirements, to be based on scientific research. The KNF has incorporated this guidance by using accepted scientific data and recovery plans as the basis for developing resource-specific requirements.

Policy decisions, such as the Healthy Forest Initiative, National Fire Plan, and the Associated Cohesive Strategy direct the management of national forests to curb uncharacteristic wildfire and reduce the risks to people, property and resources. These policies were considered in the development of the proposed action.

In July 2010, the Chief of the Forest Service announced the National Roadmap for Responding to Climate Change and the Performance Scorecard. The Forest, in partnership with the Idaho Panhandle National Forests, completed a USDA Forest Service Kootenai and Idaho Panhandle National Forests Planning Zone (KIPZ) Climate Change Report (2010), parts of which are incorporated in this EIS and, where applicable, used to guide draft Forest Plan elements.

Regional Scale

Regional assessments consider different geographic scales, and can help identify or maintain future public land management options. As part of the context for revision efforts, it was important to consider the findings and management strategies contained in these larger assessments, such as the Columbia River Basin Assessment (2003), Northern Region Overview (1998), INFISH (USDA Forest Service 1995), and how they applied to the Forest.

Forestwide Scale

In October 1995, the social and economic assessment for the KNF was completed under private contract and updated in 2003. This information was used in describing current conditions and as a basis for the effects analysis.

In October 2008, the Special Areas; Roadless Area Conservation; Applicability to the National Forests in Idaho (Idaho Roadless Rule) was made into law. The Rule designated 250 Idaho Roadless Areas and established five management themes that provide prohibitions with exceptions or conditioned permissions governing road construction, timber cutting, and discretionary mineral development (73 FR 201 [61456-61496]). The Rule provided a basis for MA direction for roadless areas on the KNF that are in Idaho.

Monitoring and evaluation reports for the 1987 Forest Plan contributed significantly to the knowledge of the need for change.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the KNF draft Forest Plan. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. The revision includes changing all, or a portion of, the programmatic decisions that make up the Plan. This chapter provides the following five discussions:

1. Development of alternatives;
2. Elements common to all alternatives;
3. Description of each alternative;
4. Alternatives considered but eliminated from detailed study; and
5. Comparison of alternatives.

Development of Alternatives

As discussed in chapter 1, this revision of the Forest Plan is based on "need for change." Only those topics specifically identified as a need for change, are being changed. A list of key issues, or revision topics, based on the need for change was identified. These topics drove alternative development. A list of issues common to all alternatives was also developed. Some additional items are addressed in the revision because they are required by planning regulations (i.e., 36 CFR 219.14 through 219.26 (1982)).

Alternative A, the "no-action alternative," reflects current management practices under the existing Forest Plan, as amended and implemented, and provides the basis for comparing alternatives to current management and levels of output. While all alternatives provide a wide range of multiple uses, goods, and services, some give slightly greater emphasis to selected resources based on the theme of the alternative and response to revision topics.

Alternatives to the no-action alternative were based on the need for change identified in the AMS (2003), implementation and monitoring of the current Plan, workgroup meetings (2003-2004), informational and comment meetings (2002-2004), public issues raised during review of the AMS and scoping, public comments on the Proposed Land Management Plan in 2006, and comments received on the NOI published in 2010. Alternatives represent a range of possible management options from which to choose. Each alternative emphasizes specific land and resource uses and de-emphasizes other uses in response to the revision topics. This is done by changing management area allocations, resulting in trade-offs between the alternatives.

Forest Plans do not make budget decisions. However, alternatives emphasize different programs to different degrees, with an expectation of appropriate funding. Should Congress emphasize specific programs by appropriation, a redistribution of priorities would follow, regardless of the alternative implemented.

All reasonable alternatives to the Proposed Action must meet the purpose and need for change and address one or more of the revision topics. These alternatives are considered for detailed study. However, not all possible alternatives were carried into detailed study as the list of options would have been prohibitively large. Instead, the responsible official identified those alternatives

that both met the criteria and created a reasonable range of outputs, direction, costs, management requirements, and effects from which to choose.

Important Points about all Alternatives

All alternatives represent, to varying degrees, the philosophies of multiple-use and ecological and economic sustainability. The alternatives provide basic protection of forest resources and comply fully with environmental laws. All the alternatives would:

- Meet law, regulation, and policy;
- Incorporate ecosystem management objectives and strategies, and contribute towards ecological, social and economic sustainability;
- Meet the purpose and need for change and address one or more significant issues (revision topics);
- Provide integrated restoration direction as included in the forestwide goals, desired conditions, objectives, standards and guidelines;
- Retain all existing permitted activities and facilities[1]; and
- Provide sustainable and predictable levels of products and services.

The Preferred Alternative

The responsible official, the regional forester for the Northern Region, has identified Alternative B as the preferred alternative for this draft EIS. **This does not represent a decision, but rather an indication of the agency's preference at this stage of analysis**. Public comments on the effects analysis and additional analysis of effects may result in refinement of this alternative in the final EIS, or selection of a different alternative in the ROD.

Description of Alternatives

Management Areas

For the action alternatives, management area prescriptions have been grouped into categories which have similar management characteristics. For example, MA1 is broken down into subcategories, which represent designated wilderness (MA1a), recommended wilderness (MA1b), and wilderness study areas (WSA) (MA1c). Management areas range from little human-caused alteration to the Forest (MA1 − wilderness) and focus on passive management to more substantial human-caused change (MA7 − primary recreation areas) and focus on active management. Each alternative allocates different amounts of land to the MA. For a more complete description of categories and MA prescriptions, see the draft Forest Plan. Alternative A (1987 Forest Plan as amended and implemented) was not remapped with these new MAs. Table 4 displays whether there is a MA from 1987 that corresponded with the draft Forest Plan, or whether this is a new MA.

[1] All permits will be reviewed for compliance with the new Plan. Any permit found to be out of compliance will be brought into compliance as soon as practicable using a variety of tools, including modifications or amendments to the permit.

Table 4. Draft Forest Plan Management Area Descriptions Common to All Action Alternatives

MA	Category	Category Description	1987 MA
1a	**Wilderness Designated**	The KNF manages one Congressionally designated wilderness area – the Cabinet Mountains Wilderness – as part of the National Wilderness Preservation System. If, over the life of this Plan, Congress designates any additional wilderness areas on the KNF, those areas would be allocated to this MA (FSM 1923 and 2320; FSH 2409.19).	7
1b	**Wilderness Recommended**	These areas are recommended as additions to the National Wilderness Preservation System. The wilderness character and potential for the each area recommended to be included in the National Wilderness Preservation System is to remain intact until Congressional action is taken.	8
1c	**Wilderness Study Area (WSA)**	The KNF manages one Congressionally designated WSA – the Ten Lakes WSA.	9
2	**Eligible Wild and Scenic Rivers**	This MA applies to river segments that have been identified as eligible for inclusion as part of the Wild and Scenic Rivers System under the authority granted by the Wild and Scenic Rivers Act of 1968, as amended.	new
3	**Special Areas**	These areas are administratively designated areas and managed to protect and conserve the values for which they were identified.	21
4	**Research Natural Areas (RNAs)**	Research natural areas are established to provide for research, observation and study, and are designated jointly with the Forest Service Research Station. The KNF has eight established RNAs totaling 5,210 acres under the 1987 Plan.	21
5a	**Backcountry**[1]	These areas provide semi-primitive nonmotorized recreation year-round.	2, 29
5b	**Backcountry**[1]	These areas provide nonmotorized and motorized recreation year-round.	3, 29
5c	**Backcountry**[1]	These areas provide semi primitive nonmotorized recreation year-round and over-snow motor vehicle recreation.	new
6	**General Forest**	Most of this MA consists of relatively large areas with roads, trails, structures, and signs of forest management activities. This MA provides a variety of recreation opportunities, both motorized and nonmotorized. This MA contains lands suitable for timber production, with timber harvest contributing to regulated timber harvest estimates. Some lands within this MA are not suitable for timber production, based on the timber suitability analysis.	Mixture of: 3, 5, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, and 31
7	**Primary Recreation Areas**	This MA applies to two areas on the KNF. They are the Turner Mountain. Ski area and the area around Lake Koocanusa.	6, 30

[1] Backcountry areas are relatively large areas, generally without roads, and provide a variety of motorized and nonmotorized recreation opportunities.

Elements Common to Alternatives

All alternatives in this document adhere to multiple use and sustained yield of goods and services (36 CFR 219.1(a), (b)). In addition, they share objectives and standards for managing

forest resources and complying with applicable laws and policies. They also contain the same direction to contribute to the diversity of desired native and non-native plant and animal communities and contribute toward the recovery of threatened and endangered species. Forestwide direction identified in the Plan would apply to all action alternatives. The difference between alternatives is primarily the difference in allocation of acres by MA to meet the purpose and need for change, and address one or more of the revision topics.

Each alternative was developed with the intent of complying with all applicable law and regulation, as well as national policy and direction including, but not limited to, the Healthy Forests Initiative, National Fire Plan, and National Energy Policy. Each alternative retains the following existing decisions to the 1987 Forest Plan and where applicable, the associated Biological Opinion:

- Inland Native Fish Strategy (INFISH) (Decision Notice and Finding of No Significant Impact (1995));
- Northern Rockies Lynx Management Direction (ROD, USDA Forest Service 2007); and
- Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones. (FSEIS and ROD (2011)).

Direction for the retained decisions is located in appendix B of the draft Forest Plan.

The following would not change between alternatives:

- **Draft Forest Plan Goals, Desired Conditions, and Standards and Guidelines** – Management area and forestwide direction for goals, desired condition, standards, and guidelines remains constant for all action alternatives.
- **Special Areas –** Allocation of special areas (MA3) remains constant for all action alternatives.
- **Research Natural Areas (RNAs) –** Allocation of RNAs (MA4) remain constant for all action alternatives.
- **Developed Recreation Sites –** Existing developed recreation sites are retained in all alternatives. Alternatives do not make decisions to remove or to create developed recreation sites. Allocation of primary recreation areas (MA7) remains constant for all action alternatives.
- **Utility Rights-of-Way and Communication Sites –** Direction for and location of designated utility rights-of-way and communication sites remains constant for all alternatives.
- **Wild and Scenic Rivers –** Direction for, and allocation of, eligible wild and scenic rivers (MA2) remains constant for all action alternatives.
- **Wilderness Study Area –** The Wilderness Study Area on the Forest was established by an Act of Congress in 1977. The Ten Lakes Wilderness Study Area and its management would continue as outlined by the Wilderness Study Act, regardless of which alternative is selected for implementation.
- **Designated Wilderness –** The Cabinet Mountain Wilderness Designation remains constant for all alternatives.

Alternative A – No-action Alternative

This alternative reflects the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations. New information, inventories (e.g., tentatively suitable timber lands), and

technologies (e.g., Spectrum Model) were used to evaluate this alternative. Output levels were recalculated for this alternative based on amendments and new sources of information. The no-action alternative retains the 1987 Forest Plan goals and objectives, standards and guidelines, and MA prescriptions, as amended. This alternative serves as the baseline for comparison with the action alternatives.

This alternative satisfies the NFMA procedures (36 CFR 219.12(f)(7)) to reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues.

Alternative A Relationship to Revision Topics and Need for Change

Access and Recreation: Roads would continue to be managed to meet requirements (36 CFR 212). Wheeled motorized recreation opportunities on roads and trails would be determined by project level travel management decisions and displayed on current motor vehicle use maps (MVUMs). Alternative A would continue to provide both motorized and nonmotorized recreational opportunities as well as opportunities for mechanized use (e.g., mountain bikes) and over-snow motorized use. Existing developed recreation sites would be maintained. Dispersed recreation opportunities would continue to be available. Wheeled motor vehicle use would be allowed on 76 percent of the NFS lands on the KNF. Over snow vehicle use would be allowed on 88 percent and mechanized use on 96 percent of the land base.

Vegetation: The 1987 Forest Plan does not contain direction on moving towards historic conditions or to improve resistance and resiliency in the light of climate change. Continued deviation from historic conditions would lead to changes in disturbance and succession processes, making it difficult to provide for a sustainable ecosystem. Old growth is managed to provide for a minimum of 10 percent of effective and replacement old growth.

Timber: Based on historic and current condition and trends, timber harvest levels would continue to be well below the ASQ in the Plan of 227 million board feet (MMBF)[2]. Direction is to maximize growth and yield through short rotations, a high use of regeneration harvest, and intensive timber management. The 1987 Forest Plan emphasizes timber production, and does not incorporate ecosystem management and principles of ecological sustainability. Suitable timberlands would continue to be adjusted to make corrections to the 1987 Forest Plan. Based on adjustments for plan amendments and new data, lands suitable for timber production equal 739,300 acres, or 33 percent of the Forest. Based on modeling for Plan revision, the predicted volume sold for the first decade is 50.3 MMBF/year and the ASQ (unconstrained budget) 76.0 MMBF/year.

Fire: Under the 1987 Forest Plan, each MA lists standards for prescribed fire and wildfire. The AMS identified several impediments to the use of fire in the 1987 Forest Plan. The MAs were numerous and generally small in size. Adjoining MAs often had different or unclear direction on the use of fire and this resulted in creating a difficult situation for developing subsequent fire management plans and implementing an integrated fire management program. Also, because the 1987 Forest Plan did not contain an emphasis or much analysis on the use of fire (especially

[2] The 1987 Forest Plan set the ASQ at 227 MMBF annually. In November, 1995, the Chief of the Forest Service issued a decision on a Forest Plan appeal related to a technical error in the calculation of the KNF's ASQ. The issue centered on how timber age classes were catalogued in the inventory information used to calculate ASQ. A description of the problem is in the FY92 Monitoring and Evaluation Report. The decision required that the Forest is not to exceed a sell volume of 150 MMBF per year until the Forest Plan is either amended or revised.

natural unplanned wildfire), it was generally believed that the Plan did not adequately authorize the use of wildfires for resource benefits.

Terrestrial Wildlife: Since the 1987 Plan, research shows that certain forest cover types are not as well represented as they were historically. There has been a shift from late and early succession forest to a more uniform mid-succession forest. The size of uninterrupted blocks of forest is smaller than it was historically. Current direction for some habitats may not be adequate for species needing those habitats (e.g., snags, down wood).

Watersheds and Aquatic Species: Legacy effects from past timber harvest, mining, and other human-caused disturbances continue to effect watershed condition and health. The 1987 Forest Plan, as amended by the INFISH (USDA Forest Service 1995), provides a passive conservation strategy and reduces the risk to watersheds and aquatic biota from land management activities. For some resources, INFISH standards and guidelines contain general direction for repairing past damage (roads, grazing, recreation), although it is lacking for other resources (timber harvest, mining). In addition, INFISH did not address the need to restore aquatic ecosystems.

Recommended Wilderness: The 1987 Forest Plan recommended 78,500 acres for wilderness designation: the Scotchman Peaks recommended wilderness (36,200 acres (in addition to 22,000 acres on the IPNF, which joins the Kootenai portion of the Scotchman area and is also recommended for wilderness in the 1987 IPNF Forest Plan)); 35,500 acres of Cabinet Mountain Wilderness additions; and 6,800 acres in the Northeast corner of the Forest, along the periphery of the Ten Lakes Montana Wilderness Study Area.

Alternative B – Proposed Action

This alternative describes the draft Forest Plan that responds to the identified purpose and need. This alternative was designed around numerous public meetings and public comments on the AMS and the May 2006 proposed Management Plan. This alternative emphasizes moving towards desired conditions and contributing to ecological, social, and economic sustainability. Alternative B would manage approximately five percent of the Forest as recommended wilderness (MA1b), 22 percent as backcountry (MA5), and 63 percent as general forest (MA6) (see figure 3).

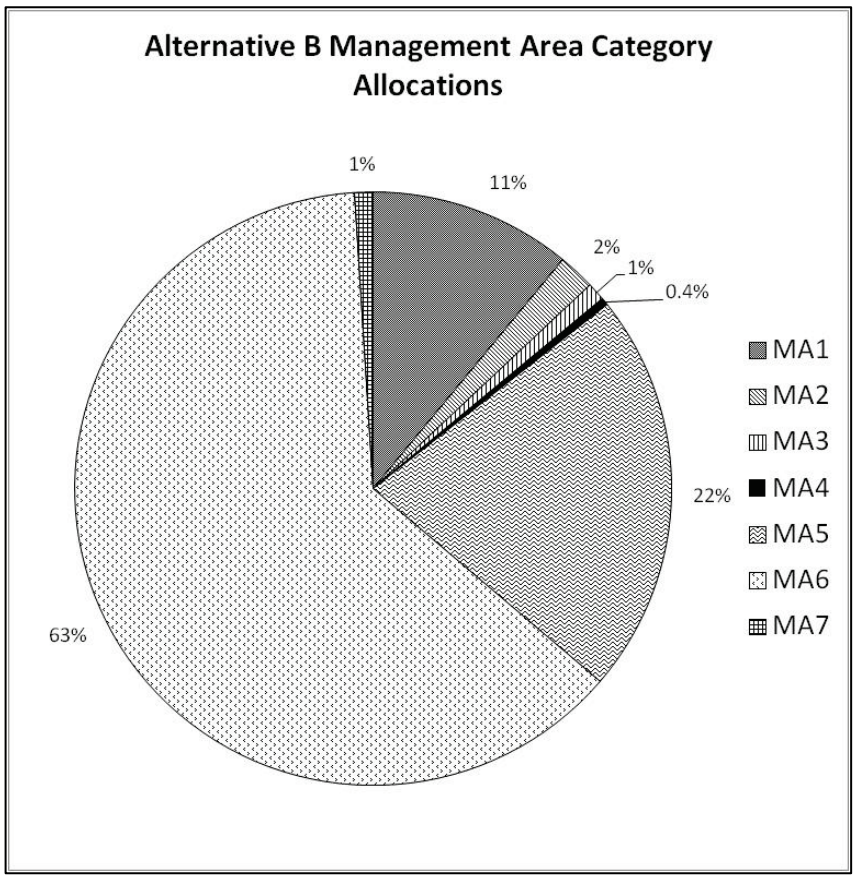


Figure 3. Allocation by MA Group – Alternative B

Alternative B Relationship to Revision Topics

Access and Recreation: Wheeled motorized recreation opportunities on roads and trails would be determined by travel management decisions and displayed on current MVUMs. Alternative B would provide the opportunity for wheeled motor vehicle use on 75 percent of the Forest. Over-snow vehicle use would be allowed on 84 percent of the Forest and mechanized use (e.g., mountain bikes) on 91 percent of the Forest. Dispersed recreation opportunities would continue to be available with some improvements made to concentrated use areas.

Vegetation: Movement towards desired future condition would be emphasized in MA6 (63 percent of the Forest) and would rely on a variety of management techniques (e.g., timber harvest, planting, thinning, natural unplanned fire, prescribed burns, and mechanical fuel treatment). MA1 and 5 (approximately 33 percent of the land allocation in this alternative) emphasize using natural ecological processes (e.g., plant succession) and disturbances (e.g., fire,

insects and diseases) as the primary forces affecting the vegetation. Management practices to restore vegetation on these MAs would include natural unplanned wildfire ignitions for resource benefit and prescribed burns. Some mechanical treatments (timber harvest) may occur in backcountry areas. The amount of acres of ponderosa pine, western larch, and white pine increase while Douglas-fir and lodgepole pine decrease. The amount of large/very large stands and lands managed for old growth increase over time.

Timber: There are 791,400 acres suited for timber production (or 36 percent of the Forest). The predicted volume sold for the first decade is 47.5 MMBF/year and the ASQ (unconstrained budget) is 70.2 MMBF/year.

Fire: This alternative emphasizes the use of unplanned wildfire ignitions for multiple objectives and prescribed fire, particularly in the backcountry (MA5 – 477,500 acres). The direction also emphasizes hazardous fuels reduction in the WUI.

Terrestrial Wildlife: This alternative allocates 238,000 acres to MA1 and 477,500 acres to MA5 which would maintain areas of large undisturbed land and habitat for forest interior species. These MAs also emphasize natural processes with minimal human intervention/disturbance, providing wildlife security habitat. This alternative also has opportunities for active restoration of vegetative conditions (wildlife habitat) that are currently outside of desired conditions (MA6 – 63 percent or 1,403,900 acres).

Watersheds and Aquatic Species: A combination of active and passive restoration of subwatersheds rated as ‘Moderate’ or ‘High’ would occur under this alternative. Improvements to water quality, soil productivity, and riparian and aquatic habitats occur under this alternative, especially in areas of recommended wilderness and backcountry MAs.

Recommended Wilderness: This alternative recommends 112,800 acres for wilderness. This includes recommending three new wilderness areas (Roderick at 23,500 acres, Scotchman Peaks at 35,900 acres, Whitefish Divide at 23,500 acres) and recommending 29,900 acres added to the existing Cabinet Mountain Wilderness.

Alternative C

Alternative C emphasizes wilderness values and protection of backcountry while moving towards desired conditions. There is an increased emphasis on natural disturbance processes, with an increased use of unplanned wildfire ignitions for multiple objectives, and prescribed fire, in addition to mechanical treatments in order to move towards watershed and vegetation desired conditions. Alternative C would have more opportunities for backcountry nonmotorized recreation (MA1 − 342,600 acres; MA5 − 477,900 acres) and more acres recommended as wilderness (217,300 acres) than any other alternative (see figure 4). About 59 percent would be allocated to general forest (MA6).

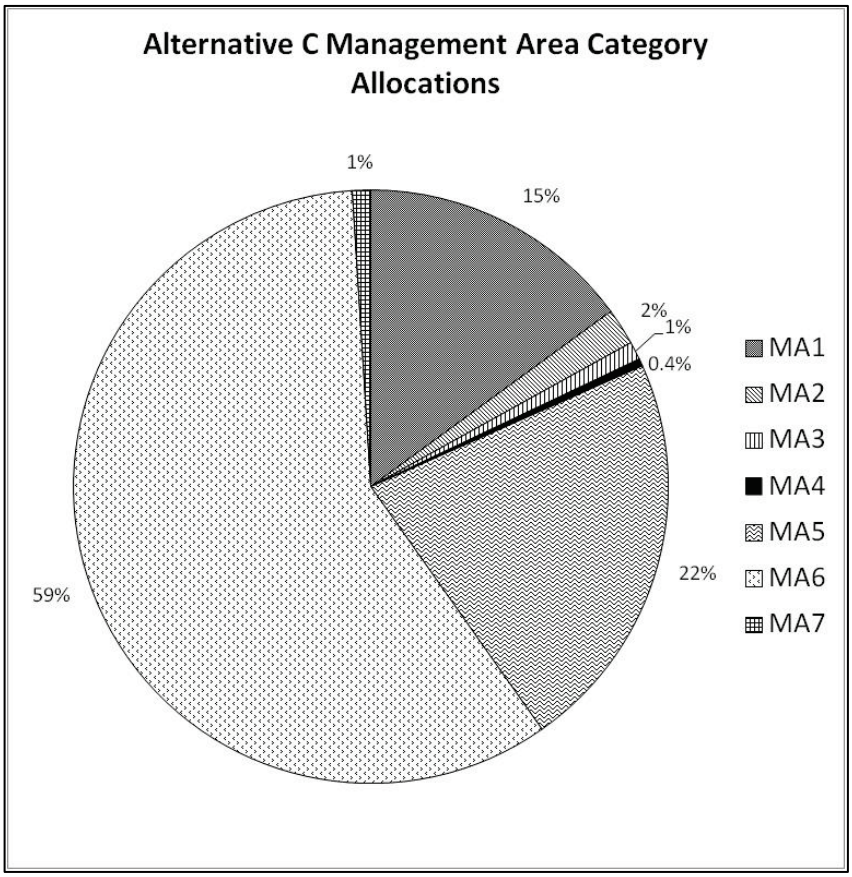


Figure 4. Allocation by MA Group – Alternative C

Alternative C Relationship to Revision Topics

Access and Recreation: Wheeled motorized recreation opportunities on roads and trails would be determined by travel management decisions and displayed on current MVUMs. Alternative C would provide the opportunity for wheeled motor vehicle use on 68 percent of the NFS lands on the KNF. Over snow vehicle use would be allowed on 79 percent and mechanized use (e.g., mountain bikes) on 87 percent of the Forest. Dispersed recreational opportunities would continue to be available with few improvements made to concentrated use areas.

Vegetation: Movement towards desired future condition would be emphasized in MA6 (59 percent of the Forest) and would rely on a variety of management techniques (e.g., timber harvest, planting, thinning, natural unplanned fire, prescribed burns, and mechanical fuel treatment). MA1 and 5 (approximately 37 percent of the land allocation in this alternative)

emphasize using natural ecological processes (e.g., plant succession) and disturbances (e.g., fire, insects and diseases) as the primary forces affecting the vegetation. Management practices to restore vegetation on these MAs would include natural unplanned wildfire ignitions for resource benefit and prescribed burns. Some mechanical treatments (timber harvest) may occur in backcountry areas. The amount of acres of ponderosa pine, western larch, and white pine increase while Douglas-fir and lodgepole pine decrease. The amount of large/very large stands and lands managed for old growth increase over time.

Timber: There are 753,800 acres (34 percent of the Forest) suited for timber production. The predicted volume sold for the first decade is 40.2 MMBF/year and the ASQ (unconstrained budget) is 68.6 MMBF/year.

Fire: This alternative emphasizes unplanned wildfire ignitions for multiple objectives and prescribed fire in all MAs except MA3, 4 and 7. Natural unplanned wildfire ignitions and prescribed fire is an important tool for moving vegetation towards desired condition and reducing fuel hazard, particularly in the backcountry (MA5). Hazardous fuels would continue to be reduced in the WUI.

Terrestrial Wildlife: This alternative allocates 342,600 acres to MA1 and 477,900 acres to MA5 which would maintain areas of large undisturbed land and habitat for forest interior species. These MAs emphasize natural processes with minimal human intervention/disturbance, providing wildlife security habitat. There would potentially be less land available for active restoration of habitat for native species preferring open canopied, large tree forest conditions (MA6 – 59 percent of the Forest or 1,302,200 acres).

Watersheds, Soils, Riparian, and Aquatic Species: A combination of active and passive restoration of subwatersheds rated as ‘Moderate’ or ‘High’ would occur under this alternative. Improvements to water quality, soil productivity, riparian, and aquatic habitats are more likely to occur under this alternative, especially in areas of recommended wilderness and backcountry MAs.

Recommended Wilderness: This alternative recommends 217,300 acres for wilderness. This includes seven new wilderness areas (Allen Peak at 20,500 acres; Big Creek at 6,600 acres, Gold Hill West at 12,200 acres; Roderick at 23,500 acres; Saddle Mountain at 14,300 acres; Scotchman Peaks at 37,300 acres; and Whitefish Divide at 40,100 acres), an addition to Ten Lakes (9,100 acres) and an addition to the Cabinet Mountains Wilderness (53,700 acres).

Alternative D

This alternative emphasizes achieving desired future conditions through mechanical means. Under this alternative, timber production is emphasized while moving towards desired vegetation conditions. This alternative has the most acres available for timber production and motorized access, with 75 percent acres allocated to MA6 (general forest) (see figure 5). There would be fewer acres allocated to recommended wilderness (MA1b – less than two percent of the Forest) and backcountry (MA5 – less than 13 percent of the Forest).

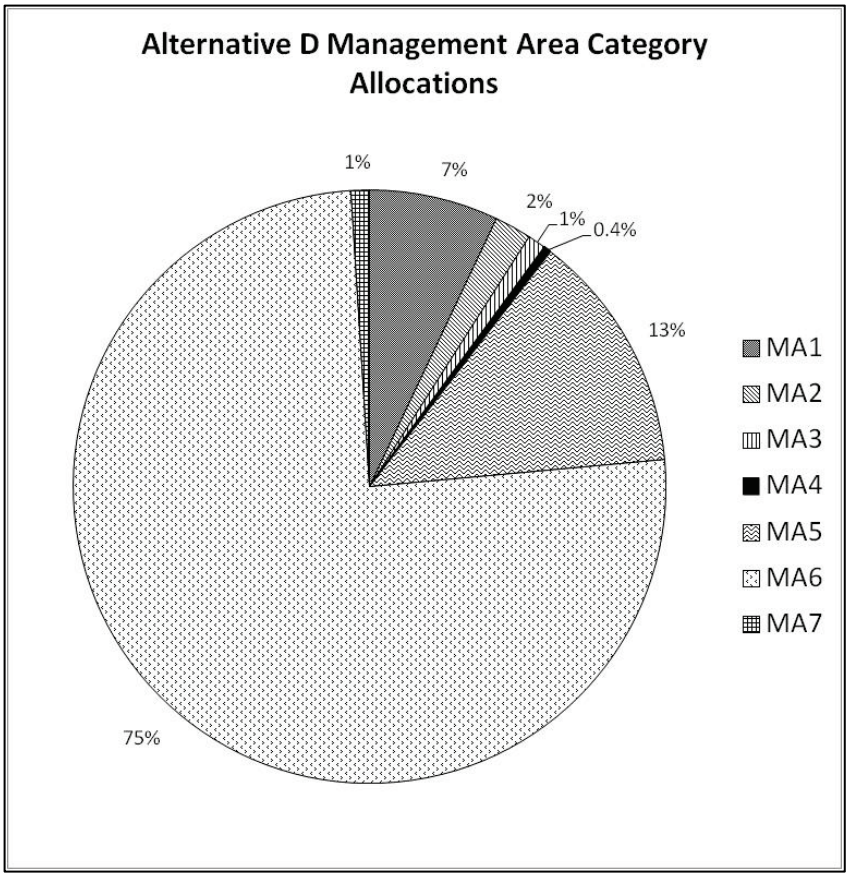


Figure 5. Allocation by MA Group – Alternative D

Alternative D Relationship to Revision Topics

Access and Recreation: Wheeled motorized recreation opportunities on roads and trails would be determined by travel management decisions and displayed on current MVUMs. Alternative D would provide the opportunity for wheeled motor vehicle use on 82 percent of the Forest. Over-snow vehicle use would be allowed on 87 percent of the Forest and mechanized use (e.g., mountain bikes) on 95 percent of the Forest. Existing developed recreation sites would be maintained. Dispersed recreation opportunities would continue to be available with some improvements made to concentrated use areas.

Vegetation: Movement towards desired future condition would be emphasized in MA6 (75 percent of the Forest) and would rely on a variety of management techniques (e.g., timber harvest, planting, thinning, natural unplanned fire, prescribed burns, and mechanical fuel treatment). Timber management and production is emphasized while moving towards vegetation desired conditions. MA1 and 5 (approximately 20 percent of the land allocation in this

alternative) emphasize using natural ecological processes (e.g., plant succession) and disturbances (e.g., fire, insects and diseases) as the primary forces affecting the vegetation. Management practices to restore vegetation on these MAs would include natural unplanned wildfire ignitions for resource benefit and prescribed burns. Some mechanical treatments (timber harvest) may occur in backcountry areas. The amount of acres of ponderosa pine, western larch, and white pine increase while Douglas-fir and lodgepole pine decrease. The amount of large/very large stands and lands managed for old growth increase over time.

Timber: This alternative has the highest amount of timber production from suitable timberlands. There are 852,700 acres (38 percent of the Forest) suited for timber production. The predicted volume sold for the first decade is 50.4 MMBF/year and the ASQ (unconstrained budget) 86.3 MMBF/year.

Fire: Hazardous fuels would be reduced in the WUI and other areas where values are at risk. Fuels will be actively treated. Under this alternative, use of unplanned wildfire ignitions for multiple objectives and prescribed fire would be utilized in backcountry MAs while use of fire and timber harvest practices would be utilized on the rest of the Forest.

Terrestrial Wildlife: This alternative would have the greatest amount of land available for active restoration of those vegetative communities that are outside of desired conditions. It would also have the least emphasis on security habitat due to the greater emphasis on motorized use. Insects and disease would be actively controlled and prevented.

Watersheds and Aquatic Species: A combination of active and passive restoration of subwatersheds rated as ‘Moderate’ or ‘High’ would occur under this alternative. Improvements to water quality, soil productivity, riparian, and aquatic habitats may be less in this alternative because of increased active management and reduced opportunities for passive restoration under MA1 and 5.

Recommended Wilderness: This alternative recommends 37,300 acres for wilderness as additions to the Cabinet Mountain Wilderness area.

Alternatives Considered But Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of this revision effort or, duplicative of the alternatives considered in detail. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

The 1987 Forest Plan

This alternative was considered as the IDT was developing a no-action alternative. This alternative is identical to Alternative A, which was described previously, except that the outputs would be those stipulated in the 1987 Plan. For example, the ASQ would be as shown on page II 4 of the 1987 Forest Plan.

This alternative was considered, but not analyzed in detail because it has been apparent since early monitoring and evaluation reports that the outputs projected in the 1987 Plan cannot be achieved. Alternative A provides a more realistic baseline for comparing current management to Alternatives B, C, and D than would this alternative.

Forest "Restoration" Alternative

This alternative responds to public comment to eliminate commercial extraction and uses (e.g., logging), eliminate commercial grazing, eliminate motorized use in IRAs and wilderness, eliminate off-road all terrain vehicles (ATV) and over-snow motorized use, eliminate ASQ from roadless, and recommend all IRAs as wilderness.

The revision process for all alternatives recognizes the importance of functioning ecosystems. This was identified in the AMS. The Plan direction includes desired conditions as well as allowable uses for each MA. Alternatives studied in detail look at varying degrees of allowing commercial timber harvest. In addition, appropriate use of timber harvest is needed in order to address a number of Need for Change topics (i.e., Vegetation, need to improve composition, structure and landscape patterns; Timber, need to provide a reasonable level of goods and services; and Fire, need to provide strategies to affect the amount, arrangement, and types of hazardous fuels in the WUI).

National forests were established and are managed for a variety of multiple uses. No scientifically credible rationale was provided by the commenter's requesting these actions as to why these resource uses should be discontinued, other than personal preference. Motorized use is already not permitted in congressionally designated Wilderness. The IDT developed alternatives that looked at providing a broad range of nonmotorized use within roadless areas; many of the IRAs were designated to varying amounts to MA1b – recommended wilderness, or MA5 – backcountry allocations. Most of the roadless area lands would not be in the suitable base under any alternative, although timber harvest could still be used as a tool to meet management objectives in some areas. No information has been identified on the need to eliminate commercial grazing.

Conservation Alternative

This alternative would place heavy emphasis on restoration of damaged lands and rivers and restoring declining fish and wildlife populations. It would also prohibit approval of new resource extraction or road building projects unless the Forest Service establishes that it has adequate funding to monitor and/or maintain such projects throughout their lifetime. This alternative would especially emphasize river health including protection of riparian areas, wetlands, aquatic species, and water quality. This would include prohibiting any activities that would harm sensitive, threatened or endangered aquatic species. This alternative would also require the Forest Service to take specific actions to improve water quality on water quality limited stream segments and to maintain good water quality where it already exists. This alternative would identify certain areas that should be targeted for special protection due to their ecological importance or their sensitivity. This alternative would include separate, more prescriptive standards for mining operations that protect streams, roadless areas, fish, wildlife, and other resource values. This alternative would place strict limits on the method and location of new road construction.

Many restoration activities are already occurring and are projected to continue to occur under any alternative (stream restoration, road decommissioning, and fuels treatment). Forestwide and MA direction emphasizes restoration, ecosystem resiliency, and improved watersheds, trending toward desired ranges for vegetation composition, structure, patterns, and processes; incorporating climate change; and striving to maintain sustainable recreation and other uses across the Forest. The IDT felt that the conservation emphasis outlined in this proposed alternative were adequately addressed in Alternatives B and C.

Wilderness/Roadless Related Alternatives

All roadless areas determined to be capable and available for wilderness were considered by the IDT for inclusion as recommended wilderness. The Forest evaluated 43 IRAs for wilderness recommendation. The full set of capable and available areas represents the maximum potential for wilderness recommendations. The last step of the evaluation process is to determine if the area is needed as part of the National Wilderness Preservation System. The assessment focused on social and ecological factors. Social factors included current levels of use in designated wilderness in the Northern Region, national and local trends in outdoor activities, and population statistics. Ecological factors included the representation of vegetative cover types and ecological sections, fisheries, and wildlife.

The Idaho Roadless Rule (36 CFR 294 Subpart C) applies to inventoried roadless areas managed by the KNF, that are within the State of Idaho. This rule was promulgated in 2008 (73 FR 201). The Rule designated management direction for roadless areas in Idaho. This rule went through a separate public review and analysis process. The rule states “the prohibitions and permissions set forth in the rule are not subject to reconsideration, revision, or rescission in subsequent project decisions or land and resource management plans or revisions undertaken pursuant to 36 CFR 219” (36 CFR 294.28). Therefore, the rule provides higher level management direction for roadless areas in Idaho and limits the scope of changes made in this Forest Plan revision effort. The rule only provides management direction for road construction, reconstruction, timber cutting, and discretionary mineral development as these are the factors that have been found to substantially affect roadless character. Based on this higher level direction, all KNF alternatives were developed to conform to the management designations and direction in the Idaho Roadless Rule for those portions of inventoried roadless areas in Idaho.

This Plan is being developed under the 1982 planning procedures. The 1982 procedures require roadless areas to be evaluated and considered for recommendation as potential wilderness. The 1982 procedures require alternatives to be distributed between the minimum and maximum resource potential to reflect, to the extent practicable, the full range of major commodity and environmental resource uses and values that could be produced from the Forest. In order to meet this requirement, the EIS considers an alternative that would recommend more wilderness than the proposed action, as well as an alternative that recommends less.

Recommending Additional Roadless Areas for Wilderness

Some people wanted additional roadless areas recommended as wilderness; however, they did not explicitly identify areas to consider. As noted above, the IDT evaluated each roadless area for its inherent capability and availability to be considered for wilderness. Based on this evaluation thirteen roadless areas were rated as high in both capability and availability. These roadless areas were recommended for wilderness in Alternative C. Alternative C recommends nine areas as wilderness (217,300 acres) versus Alternative B (the proposed action) which recommends four areas (112,800 acres). The IRAs not recommended for wilderness were primarily placed into either MA5 or MA3. These designations also limit activities such as road construction and timber cutting that could affect wilderness character.

Wild River Designation

Some commenter's wanted to see wild river designation only for those rivers that lie within wilderness. Wild river designation is based on a rivers ability to provide certain attributes; not its overlap with MAs.

KNF Managed as Roadless Area Complexes

This alternative responds to public comment to identify and manage the Forest in roadless complexes. All roadless and unroaded areas would be free from road building, logging and other development and resource extraction activities. This alternative was dropped from detailed study because it is similar to the alternatives considered in detail. Under Alternative C, almost all of the lands in IRAs would be managed to retain their roadless character because they would be allocated to MA1 (342,600 acres) or MA5 (477,900 acres). Under this alternative, only 6,100 acres of IRAs are allocated to MA6 general forest. Road construction and timber cutting would be permitted in these areas. These areas were allocated to general forest because of the need to provide vegetation management options to treat and reduce hazardous fuels and restore vegetation.

The comment also refers to managing unroaded areas as roadless. The analysis evaluated all lands with wilderness potential. Other "unroaded" parcels were addressed in the forestwide direction where they provided some pertinent resource protection. For example, some unroaded lands provide grizzly bear core habitat. Requirements for managing grizzly bear core habitat were made in the Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (FSEIS and ROD (2011)), and have been carried forward into all alternatives (FW-STD-WL-03). Other unroaded lands may provide secure areas for elk. The forestwide direction includes direction for increasing elk security (OBJ-WL-02-Elk, FW-GDL-WL-13 Big game).

Reduction of Roadless Areas

Many public comments were received asking for a reduction of roadless areas and opening them up to access and timber harvest. Managing for timber production requires intensive activity and roads. It is possible to manage for timber production without roads; however, the cost to thin, treat fuels, or commercially thin and harvest are high. When projects involve IRAs the planning cost alone becomes prohibitive. Based on past actions and cost of implementation, it did not seem reasonable to consider an alternative to manage for timber production in IRAs. If an area is not allocated for suitable timber in IRAs, it does not mean commercial timber harvest will not take place. Harvest may be the best tool to accomplish fuels reduction, vegetation improvement or some other management objective. If removal for commercial value is decided as the best means to meet the need for the project, after NEPA analysis at the project level, commercial harvest may take place. Therefore, this alternative was not analyzed in detail.

Open All Roadless Areas to Snowmobile Use

Comments suggested that the Forest include an alternative that opened all roadless areas to snowmobile use. Approximately 84 percent of the lands (regardless of whether they are in an IRA or not) within the KNF allow over-snow vehicle use under Alternative B, 79 percent under Alternative C, and 87 percent under Alternative D. All roadless areas outside MA1a (designated wilderness) and MA1b (recommended wilderness), MA2 (eligible wild and scenic rivers), MA3 (special areas), and MA4 (research natural areas) may be available for snowmobile use based on MA direction.

Other areas on the Forest are closed to over-snow vehicle use to provide nonmotorized recreation opportunities. These areas provide opportunities for primitive and semi-primitive nonmotorized recreation activities. Several other areas are closed to provide secure winter range for elk.

No Winter Motorized Recreation Alternative

This alternative was proposed as a means to evaluate the impact of winter recreation on wildlife habitat, particularly grizzly bear, or other resources. The request that easily-accessible, nonmotorized, winter recreation areas are provided was addressed in Alternative C, with the emphasis on more recommended wilderness (MA1b) and winter nonmotorized backcountry (MA 5a and 5b). In addition, area closures for winter motorized use may occur where needed to protect wildlife and other resources under any of the alternatives.

Access and Roads

This alternative responds to public comments to open all available roads for use, make all trails and roads available to multi-use recreationalists, with no designation to any one particular user group. It would take out all gates and leave roads open on a year-round basis. This increased access would provide additional recreational opportunities for the general public. Consideration of an alternative to open all available roads and trails for use would adversely impact resources by not protecting big game winter range and sensitive wildlife habitats. This alternative would not provide wildlife security and could adversely impact threatened and endangered species. It also would not provide any quiet recreation opportunities. Therefore, it is not considered reasonable and was not analyzed in detail. In addition, the ROD for the Final Supplemental Environmental Impact Statement Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones USDA Forest Service, Kootenai, Lolo and Idaho Panhandle National Forests (USDA Forest Service 2011) includes a set of motorized access and security guidelines to meet our responsibilities under the Endangered

Species Act (see Forest Plan standard FW-STD-WLF-03) to conserve and contribute to recovery of grizzly bears.

Site-Specific Travel Management

Some public comments requested that individual roads or trails, or all unclassified roads/trails be evaluated and decisions made concerning their use through the revision process. A road-by-road or trail-by-trail review requires more site-specific analysis than would be practical during Forest Plan revision. However, the draft Forest Plan would make programmatic decisions about uses that are compatible with MA direction, such as where motorized and nonmotorized use would be allowed in certain areas. Based on the MAs certain roads and trails may need to be closed to conform to the draft Forest Plan. Therefore, the decision would identify which roads and trails will be restricted in order to conform to the draft Forest Plan, such as those areas in recommended wilderness (MA1b) (see "Access and Recreation" section of the EIS). This will apply to all roads and trails in MAs that restrict the authorization of motorized use.

Small Sales only Alternative

Some groups were in support of an alternative that would employ the small, local mill owners and employees. This alternative would look at no more clear-cutting but would instead focus on smaller timber sales, the logging of smaller trees, and the use of single tree selection management and no even-age management (i.e., clear-cutting). Clear-cutting is considered a desirable tool to create openings for a variety of ecological and social benefits on the Forest. Other considerations, such as support to local mills and employees, could be applied at the project level, to different projects, and nothing in the Plan would prohibit this.

Defenders of Wildlife Alternative

This alternative would respond to comments received from the Defenders of Wildlife, about habitat connectivity on landscape and regional scales, and wildlife corridors across jurisdictions and private land. They requested the development of specific MAs for habitat linkages with their own set of goals, objectives, standards, and guidelines. In addition, they requested at least one Plan alternative be created to focus on maximizing habitat connectivity in the face of climate change.

Some small scale habitat change has occurred on the KNF due to timber harvest, road development, and recreation site development. However, the KNF features natural diversity with a mosaic of habitats and although these habitats depart from the HRV, the departures are the result primarily of fire suppression. None of the departures are irreversible.

All of the action alternatives have a desired condition of facilitating movement between separated parcels of NFS lands, and maintain options to address wildlife crossing concerns as they develop. In addition, some of the MA allocations such as (wilderness or backcountry) would provide linkages based on their allocation across the Forest. In addition, riparian area management direction, limiting the type and scope of activities in riparian areas, provides additional linkage with wilderness and backcountry MAs.

The Old Growth alternative described below addresses old growth habitat connectivity and vegetation management on national forest lands.

Natural Fires

Some commenter's wanted to let all natural fires burn to return to a natural cycle. In the AMS, several impediments to the use of fire were identified in the 1987 Forest Plan direction. The MAs were numerous and generally small in size. Adjoining MAs often had different or unclear direction on the use of fire and this resulted in creating a difficult situation for developing subsequent fire management plans and implementing an integrated fire management program. Also, because the 1987 Forest Plan did not contain an emphasis or much analysis on the use of fire (especially natural wildfire), it was generally believed that the Plan did not adequately authorize the use of wildfires for resource benefits. The use of unplanned natural wildfire ignition is allowed and promoted under all action alternatives.

Old Growth Reserves, Linkages between Reserves, and Differing Management Direction for Old Growth Management

The suggestion, or concept of old growth reserves and linkages between reserves, was brought forward by The Lands Council. Under this alternative, areas designated as old growth reserves would be assessed for restoration needs that would move them toward a desired condition. At the same time, the non-reserve areas would be assessed for active timber management. Projects would proceed only after a comprehensive inventory process was completed that identified (mapped) all old growth and mature/late-successional forest for each "Old Growth Management Unit" wholly or partially encompassed within the project area. This updated inventory would form the basis for the process to set-aside (commit to protecting) the old growth and mature/late successional forests.

The concept of creating old growth reserves was considered but the Forest determined not to carry this suggestion forward for a number of reasons. The scale of "Old Growth Management Units" (approximately 10,000 acres) is too small to ensure that old growth is distributed across the Forest in a "natural" way that would support old growth associated species. Historically, stand replacing fires have been larger than the size of Old Growth Management Units, having the potential to kill all existing stands of old growth in a unit. In addition, some areas of the Forest have had more old growth than others historically, due to variations in climate, topography and other factors that influence fire return intervals and severities. Thus, the use of Old Growth Management Units would not capture the natural distribution of old growth on the landscape.

The action alternatives provide for protection and enhancement of old growth stands (see the "Vegetation" section of chapter 3 of this DEIS). Draft Forest Plan desired conditions provide for increases in the amount of lands managed for old growth while standards provide protection of stands that are currently old growth.

In addition, some people suggested that we manage for a certain percentage of old growth, by watershed and elevation, and to prohibit new roads in old growth habitat. The action alternatives provide for increased amounts of old growth and protection of current old growth. In addition, MA allocations provide for large areas of little or no active vegetation management (i.e., MA1 and 5). The draft Forest Plan also includes a guideline that road construction or other developments should generally be avoided in existing old growth stands. Thus, these concerns have been incorporated into the action alternatives.

Varying/Additional Standards and Guidelines

Alternatives were suggested that would add additional guidelines or standards proposed in the Plan, or vary the levels of protection offered from the current ones, by alternative. The requests included the following, among others:

Proposed Standards

- **Maximum road density of 1.5 miles/section –** Road densities standards were included in the 1987 Plan as a way to provide secure habitat for big game and other species, such as grizzly bears. The Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (FSEIS and ROD (2011)), which is incorporated into the Plan for all alternatives, addresses the habitat requirements for grizzly bears. This decision established standards for total motorized open routes, which is similar to the concept of road densities. The action alternatives include management direction for elk by requiring a certain level of elk security in lieu of road densities. In addition, the alternatives incorporate different amounts of each MA. Alternative C allocates the most areas to recommended wilderness and backcountry, which provides lower road densities than the general forest areas.
- **No net gain in ATV or snowmobile access over the next 15 years –** This is considered indirectly through the alternatives. Alternative C essentially would result in no net increase in ATV or snowmobile access over what currently exists.

Proposed Guidelines

- **More restrictive grazing –** Grazing is very limited on the KNF. Based on the AMS and the analysis, the IDT did not find any reason to restrict grazing nor was there any specific reasoning given by the commenter.
- **Permit motorized use in recommended wilderness –** Motorized use is a non-conforming use in wilderness; therefore, the alternatives do not permit motorized use in recommended wilderness so that the use does not become established. Instead, the alternatives included varying amounts of recommended wilderness to address this concern.
- **Stricter guidelines for watersheds/aquatics, access and recreation (seasonal closures, road and landing locations in riparian conservation areas, sediment transport, decommissioning) –** The alternatives incorporate management direction for watershed/aquatics. Based on the analysis, additional protective measures were not found to be warranted.

Conformance with the Resource Planning Act (RPA)

The National Forest Management Act (NFMA) regulations require development of at least one alternative which incorporates the Resource Planning Act (RPA) Program's tentative objectives for each national forest as displayed in Regional Guides (36 CFR 219.12(f)(6). The last RPA Program was developed in 1995. The Forest Service Strategic Plan 2004-2008, in lieu of an RPA Program, was completed in accordance with the Government Performance Results Act and the Interior and Related Agencies Appropriations Act. The Strategic Plan does not recommend outputs to incorporate in specific forest plans, but all alternatives analyzed in detail in this DEIS incorporate the broad strategic objectives.

Comparison of Alternatives

This section provides a summary of the land allocations and effects of implementing each alternative. Table 5 provides a comparison of management area allocations by alternative. Alternative A, the no-action alternative, is included even though it does not use the management areas shown in the draft Forest Plan. Where possible, Alternative A was crosswalked to the draft Forest Plan MAs for comparison purposes.

Table 6 summarizes the effects by alternative. Information in this table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively between alternatives.

Table 5. Comparisons of Alternatives by Management Area Allocation, Acres*, and Percent

MA	Alternative A		Alternative B		Alternative C		Alternative D	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1a	93,500	4.2%	93,700	4.2%	93,700	4.2%	93,700	4.2%
1b	76,500	3.4%	110,200	5.0%	214,800	9.7%	36,100	1.6%
1c	34,100	1.5%	34,100	1.5%	34,100	1.5%	34,100	1.5%
2	n/a	n/a	47,300	2.1%	45,100	2.0%	50,200	2.3%
3	15,900	0.1%	31,600	1.4%	30,500	1.4%	31,700	1.4%
4	--[1]	--	8,400	0.4%	8,400	0.4%	8,400	0.4%
5a	343,800	15.5%	227,600	10.3%	336,700	15.2%	112,600	5.1%
5b	--[2]	--	163,800	7.4%	121,200	5.5%	47,900	2.2%
5c	n/a	n/a	86,100	3.9%	20,000	0.9%	117,500	5.3%
6	n/a	n/a	1,403,900	63.3%	1,302,200	58.7%	1,674,500	75.5%
7	n/a	n/a	12,400	0.6%	12,400	0.6%	12,400	0.6%
Total Acres	**563,800**		**2,219,100**		**2,219,100**		**2,219,100**	

*Acres are based on a single management area designation; where management areas overlap, the following hierarchy was used: MA1a, MA4, MA1b, MA1c, MA2, MA3, and MA7.

1 For Alternative A, MA3 and 4 are a combined total, from MA21 in 1987 Plan

2 For Alternative A, MA5a and 5b are a combined total from MAs 2, 3, and 29 in the 1987 Plan

Table 6. Comparison of Resource Key Indicators by Alternatives

Resource and indicator(s)	Alternative			
	A	B	C	D
Access and Recreation				
Percent of the Forest and location of areas where roads & trails may be designated for wheeled motor vehicle use	76 percent	75 percent	68 percent	82 percent
Percent of the Forest and location of areas where over-snow vehicle use is allowed	88 percent	84 percent	79 percent	87 percent
Percent of the Forest and location of areas where				

Resource and indicator(s)	Alternative			
	A	B	C	D
mechanized use is allowed	96 percent	91 percent	87 percent	95 percent
Percent of Forest by Scenic Integrity Objectives				
Category(ies)	11 percent	12.9 percent	17.5 percent	9.6 percent
Very High	31 percent	0.1 percent	0.1 percent	0.1 percent
High		23.9 percent	23.9 percent	15.1 percent
High/Moderate	47 percent	0.7 percent	0.7 percent	0.7 percent
Moderate	11 percent	0 percent[3]	0 percent	0 percent
Moderate/Low		62.4 percent	57.8 percent	74.5 percent
High to Low				
Percent of Forest by ROS Class				
Summer ROS:	10 percent[2]	4.6 percent	4.6 percent	4.6 percent
Primitive		19.8 percent	26.5 percent	12.7 percent
Primitive/Semi-primitive Nonmotorized	57 percent	2.3 percent	2.3 percent	2.3 percent
Semi-Primitive Nonmotorized		8.7 percent	6.7 percent	3.4 percent
Semi-Primitive Motorized	10 percent	2.0 percent	2.0 percent	2.0 percent
Semi-Primitive Motorized/Roaded Natural	23 percent	62.6 percent	57.9 percent	75.0 percent
Roaded Natural/Rural				
Winter ROS:	5.0 percent	4.6 percent	4.6 percent	4.6 percent
Primitive		15.9 percent	25.5 percent	7.4 percent
Primitive/Semi-primitive Nonmotorized	13.5 percent	0.8 percent	0.8 percent	0.8 percent
Semi-Primitive Nonmotorized	66.7 percent	14.1 percent	9.2 percent	10.3 percent
Semi-Primitive Motorized		2.0 percent	2.0 percent	2.0 percent
Semi-Primitive Motorized/Roaded Natural	14.7 percent	62.6 percent	57.9 percent	74.9 percent
Roaded Natural/Rural				
Vegetation				
Forest composition	Least improvement towards DFC	Greatest improvement towards DFC	Second greatest improvement towards DFC	Third greatest improvement towards DFC
Forest structure	Least amount of active management to improve forest structure	Greatest amount of active management to improve forest structure	Second greatest amount of active management to improve forest structure	Third greatest amount of active management to improve forest structure

Resource and indicator(s)	Alternative			
	A	B	C	D
Landscape pattern	Least opportunity to use mechanical and non-mechanical treatments to improve landscape pattern	Greatest amount of active management to improve forest pattern	Second greatest amount of active management to improve forest pattern	Third greatest amount of active management to improve forest pattern
Susceptibility and resiliency of the Forest to key disturbances	Least opportunity to use mechanical and non-mechanical treatments to improve susceptibility and resiliency	Greatest amount of active management to improve forest susceptibility and resiliency	Second greatest amount of active management to improve forest susceptibility and resiliency	Third greatest amount of active management to improve susceptibility and resiliency
Carbon Sequestration	Greatest amount of carbon sequestered	Third highest amount of carbon sequestered	Second highest amount of carbon sequestered	Least amount of carbon sequestered
Timber				
Tentatively Suitable for Timber Production	1,711,800 ac	1,711,800 ac	1,711,800 ac	1,711,800 ac
Other resources limit timber or management precludes timber production as an objective	972,500 ac	920,400 ac	958,000 ac	859,100 ac
Number of suitable acres available for timber production	739,300 ac	791,400 ac	753,800 ac	852,700 ac
Percent Suitable	33 percent	36 percent	34 percent	38 percent
Predicted Volume Sold	50.3 MMBF	47.5 MMBF	40.2 MMBF	50.4 MMBF
Allowable Sale Quantity (ASQ) Long-term Sustained Yield	76.0 MMBF 15.0 MMCF	70.2 MMBF 16.8 MMCF	68.6 MMBF 16.3 MMCF	86.3 MMBF 17.7 MMCF
Fire				
Use of fire (prescribed and wildfire)	Lowest emphasis	Second most emphasis	Most emphasis	Third most emphasis
Fuel treatment/risk reduction	Lowest emphasis	Most emphasis	Third most emphasis	Second most emphasis
Terrestrial Wildlife				

Resource and indicator(s)	Alternative			
	A	B	C	D
Changes in forest composition, structure, and pattern	See Vegetation section above	See Vegetation section above	See Vegetation section above	See Vegetation section above
Acres of security habitat	Third most acres of security habitat	Second most acres of security habitat	Most acres of security habitat	Least acres of security habitat
Watersheds, Soils, Riparian, and Aquatic Habitat/Species				
Trend in watershed condition rating	Least improvement in overall trend	More improvement in overall trend	Slower improvement in overall trend	Potentially rapid improvement in overall trend
Trend in native aquatic species status	Least active improvement for active management; second lest passive improvement	Second most active improvement; second most passive improvement	Second least active improvement; most passive improvement	Most active improvement; least passive improvement
Recommended Wilderness				
Acres of recommended wilderness	76,500 ac	112,800 ac	217,300 ac	37,300 ac

1 Alternative A (No-action – Existing Forest Plan) does not have scenic integrity objectives established using the scenery management system. In 1987 when the original Plan was completed Scenery was described using the Visual Management System (Agriculture Handbook Number 462) with areas of the forest classified using Visual Quality Objectives.

2 Alternative A does not have ROS classes, but general categories by Management Area.

3 Turner Mountain Ski Area (MA7) is the only area that has this scenic integrity objectives Classification (Moderate/Low) and totals 852 acres.

Chapter 3. Affected Environment and Environmental Consequences

Introduction and Organization of Chapter 3

Chapter 3 summarizes the physical, biological, social, and economic environments that may be affected by the alternatives presented in chapter 2. It also presents the effects that the alternatives may have on those resources. The discussion of affected environment and environmental consequences was combined into one chapter to provide a clear picture of what the resources are, and what could happen to them under the different alternatives. The analysis of environmental consequences provides the basis for the comparison of alternatives that appears at the end of chapter 2, table 6. This introduction prefaces the context in which the alternatives are analyzed.

Relationship between Programmatic and Site-Specific Analysis

This draft EIS is a programmatic document. It discloses the environmental consequences on a large scale, at the planning level. This is in contrast to analyses for site-specific projects. The draft EIS presents a programmatic action at a forest level of analysis but does not predict what will happen each time the standards and guidelines are implemented. Environmental consequences for individual, site-specific projects on the Forest are not described. The environmental effects of individual projects will depend on the implementation of each project, the environmental conditions at each project location, and the application of the standards and guidelines in each case.

The affected environment and environmental consequences discussions in this chapter allow a reasonable prediction of consequences for any individual location on the Forest. However, this document does not describe every environmental process or condition.

Budget Levels

Because activities, outcomes, and effects are sensitive to budget levels, each alternative has been analyzed at two different budget levels. The full implementation or unconstrained budget level, and the constrained budget, which reflects a 5-year average of fund allocated to the Forest for fiscal years 2006 through 2010. Funding by program area was adjusted by alternative to meet the theme of the alternative.

Affected Environment and Environmental Consequences Section

The remainder of chapter 3 is organized by resource, focusing on those resources related to issues described in chapter 1. Following the overview of the KNF, the chapter is divided into four major categories:

- Physical and Biological Elements
- Uses and Designations of the Forest
- Production of Natural Resources
- Economic and Social Environment

Each resource section is further divided into the following sub-sections:

- Introduction
- Legal and Administrative Framework
- Analysis Area
- Analysis Methods and Assumptions
- Key Indicators
- Affected Environment
- Environmental Consequences (direct, indirect, and cumulative effects)

Overview of the KNF

Physical and Biological Environment

In order to provide a better understanding of the ecological setting and importance of the KNF, one must first look at where the Forest is in relation to a larger landscape.

The KNF is set within the Northern Rocky Mountain Steppe-Coniferous Forest – Alpine Meadow Province and includes two ecological subsections, the Flathead Valley and Northern Rockies section, both of which are influenced by inland maritime and continental weather patterns.

The KNF falls within various hierarchical land units such as the Northern Rocky Mountain Ecological Province (Bailey 1994), the Canadian Rocky Mountains Ecoregion, the Upper Columbia River Basin, and the Kootenai River Basin. Recent broad scale assessments, such as the ICBEMP, have been completed for each of these land units, which have included all, or portions of the Forest. In addition, assessments have been completed or are ongoing for large portions of the Forest (upper Kootenai Sub-basin Assessment on the KNF). These broad-scale assessments were reviewed and the resulting information incorporated into this analysis.

Ranges of high craggy peaks mark the Forest with Snowshoe Peak in the Cabinet Mountains Wilderness at 8,738 feet, the highest point. The Whitefish Range, Purcell Mountains, Bitterroot Range, Salish Mountains, and Cabinet Mountains are all part of the rugged terrain radiating from the river valleys. In the north central part of the Forest, the land is more open with gently rolling timbered hills lying in the shadows of the Whitefish Range. Topography, aspect, and elevation serve to modify local climate in a very complex fashion. The climate of the KNF has been described as "modified pacific maritime" in character, meaning that compared to the remainder of Montana, this area's climate resembles that found along the Pacific coast. The character becomes "modified" by occasional intrusions of the arctic air masses, more commonly found in the remainder of the State, which can bring winter temperatures down to -30° F with heavy snowfalls in the mountains. Average annual temperatures of 45° F reflect the moderating influence of the pacific air masses. Summer temperatures are moderate with few days reaching over the 90° mark. The wet season in the Forest usually occurs in the fall and early winter.

The Forest is dominated by two major rivers, the Kootenai and the Clark Fork, along with several smaller rivers and their tributaries. Two hydroelectric dams on the Clark Fork have created the Cabinet Gorge and Noxon reservoirs within the Forest boundary. State Highway 200 parallels these reservoirs as it crosses the Forest. The Kootenai River is spanned by another hydroelectric (and flood-control) project, Libby Dam. This structure located about 18 miles upstream from Libby, Montana, has created Lake Koocanusa, a 90-mile-long reservoir reaching

northward into the Canadian Rockies. Lake Koocanusa is almost totally surrounded by national forest lands...no private summer home or condominium developments here. State Highway 37 follows the east shore to Rexford and beyond to Eureka, Montana. The elevation of the Kootenai River as it leaves the Forest and the State is 1,862 feet, the lowest point in Montana.

The Yaak, Fisher, Tobacco, and Vermillion Rivers are smaller rivers within the confines of the Forest. There are over 100 lakes inside the boundaries of the KNF ranging from small alpine lakes to 1,240-acre McGregor Lake.

Severe winters are usual, average temperatures can range from below 0 degrees Fahrenheit in the winter to above 100 degrees in the summer. Precipitation averages 20 to 40 inches annually, but can attain over 80 inches within some GAs. Most of the region has been glaciated with landforms typical of this process.

Mixed evergreen-deciduous forest predominates with Douglas-fir, larch, and cedar-hemlock as common forest types.

Soils are mostly cool, moist inceptisols with a variety of igneous, sedimentary, and metamorphic rocks forming the mountain masses.

Large mammals in this province include grizzly and black bear, caribou, deer, moose, elk, mountain goat, mountain lion, and bobcat. Smaller mammals include red squirrel, flying squirrel, marten, fisher, redtailed chipmunk, picas, hoary marmots, and bushytail woodrat. Birds found most often are eagles, hawks, grouse, turkeys, chickadees, nuthatches, thrushes, and bluebirds. Fish include bull trout, landlocked salmon, sturgeon, rainbow trout, brook trout, and cutthroat trout.

Ecological Sustainability

Many of the decisions to be made in the Forest Plan will affect the Forests' contribution to ecological sustainability. Desired future conditions, goals, objectives, standards, MA allocation, and monitoring will all have effects to the components of ecological sustainability.

Over the last half-century, scientists and natural resource managers have learned much about how ecosystems contribute to the fulfillment of human life (Costanza et al. 1997). An ecosystem is an interacting system of living organisms and their environment. Most obviously, ecosystems provide many of the goods that are harvested and traded in the human economy − food, timber, forage, biomass fuels, and many pharmaceuticals (Daily 1997a). Ecosystems also provide indirect benefits to humans through their impacts on nutrient flux and cycling, mitigation of flood and drought, and maintenance of biodiversity, all of which feedback in important ways on the production of ecosystem goods that humans directly derive from ecosystems (Chapin et al. 1996). Finally, ecosystems also provide less tangible, but equally important, benefits in the form of recreational, spiritual, and intellectual stimulation (Postel and Carpenter 1997). Because of these important and necessary goods and benefits provided to humans, the long-term sustainability of ecosystems is central to natural resource management.

Ecological sustainability is defined as: "The ability to maintain diversity, productivity, resilience to stress, health, and yields of desired values, resource uses, products, or services over time in an ecosystem while maintaining its integrity" (USDA 1995a). Integrity, in turn, is defined as: "…the capacity to support and maintain a balanced, integrated, and adaptive biological system having the full range of elements and processes expected in a region's natural habitat" (Karr 1991).

Critical elements of integrity include vegetation measures of structure, composition, and process and they are defined as:

- Structure – the horizontal and vertical physical elements of forests and grasslands and the spatial interrelationships of ecosystems.
- Composition – the component tree, shrub, grass, and forb classes in a stand or community.
- Function – includes energy flows of materials across and within the landscape and how one ecosystem influences another. Function also relates to energy processes such as fire, hydrological processes (including floods), and matter and energy exchange throughout the food chain.

A system subject to external disturbance will retain its integrity if it preserves all its components as well as the functional relationships among the components (De Leo and Levin 1997).

Based on Haynes et al., a working definition of aquatic sustainability can be described as the inherent capability or existing potential for a watershed system to provide water quality, water bodies (streams, lakes, wetlands, ponds, etc.), riparian environs (wetlands, flood plains, stream banks, lake shores, and other lands including terrestrial lands proximal to water bodies that can directly influence the water), and the biologic organisms that live in or are dependent on the water that are necessary to support the beneficial uses of the water (based on: USDA 1996).

Ecosystem diversity is the variety of ecological structures, communities, and processes across spatial scales such as regions, sub-regions, landscapes, and localities. Ecosystem diversity arises from variation in abiotic and biotic components and ecological processes over space and time (Huston 1994). History plays a strong role in the ecosystems we see today through the long-term effects of geological and climate change and biological evolution, and the shorter-term effects of weather, disturbance, and succession, and migration of organisms. Ecosystems are open, linked, and adaptive systems. Linkages among ecosystem components can be weak or strong and the system's responses to change in one component can be spatially and temporally lagged (Wu and Loucks 1997).

Social and Economic Environment

Issues related to socio-economic resources are analyzed in detail in this chapter. These resources include Recreation, Access, Wilderness, Wild and Scenic Rivers, Special Areas, Timber, Livestock Grazing, Minerals, and Tribal Rights and Interests. The chapter includes an analysis on the social and economic effects of these resources on the planning area. As part of Forest Plan revision, an assessment was completed on the conditions and trends of the social and economic setting for the KNF (Russell et al. 2006). Following are excerpts from this document, giving a general description of the historical and socio-economic setting for the KNF.

Historical Setting

The social and economic environment for the KNF incorporates a geographic region including northwestern Montana and portions of the panhandle region of northern Idaho. The Canadian provinces of Alberta and British Columbia are across the international border with Idaho and Montana. The states and provinces of this region are the historical homeland for Native American tribes including the Kootenai-Salish and Flathead. These tribes relied on the natural resources of these lands, including camas roots, salmon, elk, deer, and other fish, game, and plant material. After the acquisition of horses, some also trekked across the mountains to hunt

buffalo. A lifestyle tied to following the natural cycles of resource production and availability characterized these tribes before contact with Europeans and Americans.

Fur traders and explorers, including David Thompson and others of the North West Company and Hudson's Bay Company, were among the first to make this contact. By 1809 David Thompson had established Kullyspell (Kalispell) House on Lake Pend d'Oreille. Other fur traders of the North West Company and Hudson's Bay Company were followed by Christian missionaries including the Jesuit Priest Father Peter DeSmet who established one of the first missions in what was to become northern Idaho. In 1805-1806, as Lewis and Clark descended from Lolo Pass, they were greeted by members of the Nez Perce Tribe. Tribal members assisted them with horses, food, and travel through their territory. Lewis and Clark took back to the east stories about the resources of this region, stimulating further exploration and a trickle of new settlers who were seeking to use and develop the resources of the region.

Gold was found along Libby Creek in northwestern Montana about 1860. Around this same time (1863) gold was discovered in British Columbia attracting miners who traveled along the Wild Horse trail and across the Kootenai River, aided by Bonner's ferry. The discovery of gold, silver, zinc, and other metals south of the Canadian border attracted a new influx of miners, cattlemen, farmers, and entrepreneurs into this region. Mining flourished in the communities of Libby and Troy. Development of the region was further fueled by construction of the Northern Pacific Railroad and Great Northern Railroad during the 1880s and 1890s. During this same time period (1890) Forest Reserves were created in this part of Idaho and Montana and these eventually became National Forest System lands.

The open spaces, rich natural resources, and scenic beauty aided by the Homestead Act of 1909 continued to fuel growth in the region. Once the railroad provided adequate transportation, timber resources also became an important source of economic and population growth. White pine, fir, and other timber resources attracted lumber interests from the east that established mills and company towns such as Libby in Montana. The first farmers arrived in the region around 1869 growing flax and other grains. These first farmers provided the food resources for the mill towns, miners, and shop keepers who were essential to the development of the entire region.

The history of this region is steeped in logging, mining, agriculture, and the railroad connecting the east to the west. These railroads were essential to enabling development of the region's resources. The present day socioeconomic environment of the project area has a foundation in this history of natural resource development and settlement driven by the economics and lifestyle issues of western exploration that was supported by the federal government policies such as the Homestead Act.

Social Setting

National forests are public lands that influence and are influenced by the local and national public. The local public is represented in the communities of place and interest adjacent to national forest lands. Many of these communities were formed from the development of timber, gold, silver, grazing lands, and other natural resources. Historically, individuals in these communities developed strong place attachments to public lands that provided recreational, aesthetic, employment, and other contributions to their social environment. Work, place, and lifestyles became an integral part of the culture and social characteristics of such communities. These communities developed particular interests in the interactions of public lands with their ways of life and their economic present and future. These interests are expressed in their interactions with public lands in addition to the actions and comments of local interest groups.

The KNF contains portions of five counties in two states: Flathead, Lincoln, and Sanders counties in Montana and Bonner and Boundary counties in Idaho. These counties comprise the analysis area for the social and economic environment. These are the counties that are likely to be affected by KNF management. These counties are also influenced by a larger regional economy comprised of the surrounding counties.

Within this larger region, several different categories of communities can be identified by characteristics such as population size, patterns of residence, and lifestyles. Spokane (population of 471,000 persons) and Missoula (60,722) are *regional centers* with larger populations, more dense urban-like residence patterns, and access to airports that connect to larger transportation hubs. Similarly, Spokane and Missoula also offer access to diverse specialty services as well as diverse shopping and amenities. A second community grouping is the *regional hub* that provides services, shopping, amenities, and employment opportunities for residents of nearby smaller communities and rural residents, although not the diversity of services and amenities offered in the regional centers. These communities are the next largest in population size and they also have urban-like residence patterns and population densities. Regional hub communities include Kalispell (16,391), Sandpoint (7,378), Coeur d'Alene (37,262), Moscow (21,707), and, Lewiston (30,937). *Rural centers* are the third community category. Rural centers may be a county seat or other incorporated entity offering basic services and amenities for nearby smaller communities and rural residents. Places such as Libby (2,606), Thompson Falls (1,323), St. Maries (2,589), Kellogg (2,236), and Bonner's Ferry (2,647) exemplify these rural centers. *Rural towns* provide limited services and amenities, but they foster a sense of local identity and community among those living in their vicinity. These rural towns are exemplified in communities such as Troy (957) and Eureka (1,017) in Lincoln County, Plains (1,126) in Sanders County, Moyie Springs (685) in Boundary County, and Clark Fork (566) and Priest River (1,863) in Bonner County.

Traditionally, the county communities relied on the use of natural resources in activities such as farming, ranching, mining, and timber production. Recreation has also been an important use of forest resources among the residents of nearby communities as well as others from more distant urban areas such as Spokane, Missoula, and elsewhere. Recreation usage also appears to be increasing as urban populations increase and more diverse residents are moving to rural towns and cities. The institution of the Forest Service has also been a part of the social environment of communities in this region since development of the NFS.

Physical and Biological

This section includes the following resources:

- Vegetation
- Rare Plants
- Non-native Invasive Plants
- Fire and Fuels Management
- Watersheds, Soils, Riparian and Aquatic Habitat/Species
- Terrestrial Wildlife
- Air Quality

Vegetation is listed first as it is often referred to in several of the following sections

Vegetation

Introduction

The ecosystems and vegetation of the KNF are dynamic. The processes of succession and disturbance patterns have produced the current vegetative conditions. These natural processes, both part of and necessary for ecosystem function, will continue to produce changes in the future. Therefore, the following descriptions of current vegetation represent only one point in time. Some of the changes will be generally predictable, others less so. Accordingly, any description of future vegetation is a prediction subject to uncertainty. The level of uncertainty depends on the degree to which natural processes are allowed to operate. Natural disturbance events such as fire, windstorms, landslides, and insect and disease outbreaks are generally difficult to predict. On the other hand, changes associated with succession and human-caused disturbance such as timber harvest and prescribed burning are fairly predictable. Although the Forest will experience natural disturbance events, the degree to which they are allowed to occur will influence the ability to predict future vegetative conditions at any given point in time.

Legal and Administrative Framework

Law and Executive Orders

- **The Forest and Rangelands Renewable Resources Planning Act of 1974:** Provides for maintenance of land productivity and the need to protect and improve the soil and water resources.
- **The National Forest Management Act (NFMA) of 1976:** "It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yields. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objective."
- **Federal Noxious Weed Act of 1974:** Authorizes the Secretary to cooperate with other federal and state agencies and individuals in carrying out measures to eradicate, suppress, control or prevent the spread of noxious weeds.
- **The Endangered Species Act (ESA) of 1973:** Requires federal agencies to conserve threatened and endangered species.
- **Executive Order 13112:** Directs federal agencies whose actions may affect the status of invasive species to (1) prevent the introduction of invasive species, (2) detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, as appropriations allow.

Key Indicators

- Forest composition and structure – predicted changes to tree species composition and structure (tree size classes, old growth, and snags);
- Landscape pattern of the forest – potential changes to the patterns of forest conditions (e.g., successional stages, species composition, tree density, and fuels) on the landscape;

- Resistance and resiliency of the forest vegetation to disturbances and stressors – effects of the alternatives on the hazard of wildfire, key insects, and diseases, weather disturbances and climate change; and
- Carbon sequestration.

Methodology and Analysis Process

The broad vegetative management approach that is being used in the draft Forest Plan is one of providing ecological components, patterns, and processes at multiple scales on the landscape, and thereby providing the full spectrum of habitats and conditions needed for all of the biological organisms associated with the various ecosystems. This general strategy is often called the "coarse-filter" approach to ecosystem management, and is followed by a fine-filter approach that focuses on more species-specific management strategies (see AMS Technical Report (USDA Forest Service 2003)) for more detailed information). In order to preserve species, their populations, genetic structure, biotic communities, and landscapes, there has been an increased emphasis on the maintenance of ecological functions, processes and disturbance regimes (West and Whitford 1995).

As a way to understand the various ecosystems on the Forest and sustain the biodiversity within them, it is necessary to have some reference for understanding the potential productivity of the land, the natural diversity of the relevant ecosystems, and what processes sustain this productivity and diversity. The concept of ecosystem ranges of variability has been suggested as a framework for coarse filter analysis (Landers et al. 1999). Historic range of variability concepts were developed in part to better understand how disturbance, vegetation, and other ecosystem components interact, and in turn how interaction affects biophysical characteristics such as plants, animals, fish, and soil and water resources. Historical perspectives increase our understanding of the dynamic nature of landscapes and provide a frame of reference for assessing current patterns and processes (Swetnam et al. 1999).

The HRV analysis focuses on forest composition, structure, landscape pattern, and processes (disturbance and succession). Not only was the HRV considered in revising forest plan direction, but the potential impacts that climate change might have on the future range of variability was contemplated. The concept of comparing current vegetation conditions to both the historical as well as the potential future conditions is described by Gärtner et al. (2008). In summary, this approach is designed to provide insights into how ecosystems have changed, as well as how they may change in the future. The knowledge gained from this approach can then be used to "inform" management decisions regarding how climate change may affect future landscape conditions (Keane et al. 2008). Given these insights, climate change adaptive strategies such as fostering "resistance" and "resiliency" in the forest ecosystems can be considered.

Historic and Desired Conditions

A historic range of variation (HRV) was developed to determine historic conditions and provide context for building the vegetation desired conditions for the Forest Plan. The AMS Technical Report for the KIPZ Forest Plan Revisions (March 2003) contained preliminary information on HRV for the KNF. This report defined the Historic Range of Variability (HRV) as the range of variation in spatial, structural, compositional, and temporal characteristics of ecosystem elements as affected by minor climatic fluctuations and disturbances. This range is measured using a reference period prior to intensive resource use and management. For the KNF, this period is considered to be approximately 2500 years ago up until 1880 (Chatters and Leavell 1994). The HRV is the baseline for comparison with current conditions to assess the degree of past change.

To complete the HRV and analyze current conditions, KIPZ chose the following three ecosystem characteristics to quantify and describe:

- Composition (Dominance type or species composition)
- Structure (Size class)
- Landscape pattern (Fragmentation)

Historic ranges for dominance type and size class were developed both forestwide and by biophysical (ecological) setting. Landscape pattern was assessed by geographic area and forestwide.

The HRV analysis used a wide variety of sources and methods to assess historic conditions, including:

- Information about post-glacial (last 11,00 years – Holocene Era) climate and vegetation changes to set context for more recent conditions;
- Narrative descriptions from the early expeditions (Stevens Expedition during 1853-55 and Mullan Road Journals for 1859-61);
- Data, maps, and narrative descriptions from the 1890s contained in government surveys done in conjunction with the establishment of the Forest Reserves (Leiberg's reports);
- Data, maps, and narrative descriptions from numerous Timber and/or Forest Management Plans done on most proclaimed national forests on approximately a decadal basis from 1910s through the 1960s;
- John Losensky's 1993 report: Historical Vegetation in Region 1 by Climatic Section;
- Data from various Region 1 reports on timber conditions on national forests during the first half of the 20th century;
- Information on fire return intervals from fire history investigations in these ecosystems;
- Historical accounts of the 1910 and other fires;
- Maps of large fires dating from approximately 1880s through the 1970s;
- Spatial and numerical analysis of 1930s/1940s maps on six townships selected to portray the diversity of the KNF landscape;
- Historical and vegetation change information from the late 1990s Interior Columbia River Basin Assessment;
- Change information from the 1998 Forest Service, Northern Region Overview;
- Pollen, sediment, and charcoal analysis (Chatters and Leavell 1994); and
- Negative exponential model for age classes.

A variety of historic data and information sources was assessed and compared to avoid omissions and biases that may be inherent in any one source. Trends through time from one data source to another were examined to uncover any information that may be in contradiction to the preponderance of evidence. Information in both narratives and historical forest inventories was also compared to objective evidence such as historic landscape scale photos, historical records and maps of major forest fires, and various fire history studies. Findings from the Interior Columbia River Basin Assessment, the US Forest Service Northern Region Overview (USDA Forest Service 1998), and model (negative exponential model) results were also included in the analysis.

Development of HRV was an iterative process, involving teams of specialists from the Districts and Supervisor's Offices, including silviculturists, ecologists, timber managers, wildlife biologists, and fire managers with extensive field knowledge. These specialists reviewed the historic and current information to develop historic conditions for their study area.

In addition, two parametric fire history models (the negative exponential and the Weibull models) were used to develop theoretical age class distributions. These models were tailored for forest fire regimes and diversity. These outputs were reviewed and adjusted based on data from existing stands (analysis of age class and structure) and an understanding of historic disturbance effects.

The resulting HRV was then reviewed in the context of climate change. Results from HRV were found to be consistent with conditions that would improve resistance and resiliency under climate change. This resulted in the ranges for vegetation desired conditions by species and size class presented in the draft Forest Plan. Because it will take many decades to achieve these desired ranges, the desired condition for vegetation is to move towards these ranges.

Vegetation Condition

Vegetation composition and structure was assessed using two primary sources of data: a spatial map source and an inventory source.

The spatial map source used in analysis of vegetation was the Northern Region Vegetation Mapping Project (R1-VMP). This mapping project was completed for the Northern Region of the Forest Service in April 2004, and provides a geospatial database of vegetation and land covers (USDA Forest Service 2004). These datasets were produced following consistent analytical logic and methods and mapped continuously across all ownerships. From this, four GIS layers were produced:

- Lifeform
- Tree Dominance Type
- Tree Diameter Class
- Tree Canopy Cover

The inventory source used in analysis was data from the forest inventory and analysis (FIA). The National Forest Inventory and Analysis (FIA) program provides a congressionally mandated, statistically based, continuous inventory of the forest resources of the United States. Since 1930, the FIA program has been administered through the Research and Development branch of the Forest Service, which makes it administratively independent from the NFS. The FIA program is administered by employees of the Interior West Forest Inventory and Analysis work unit, which is headquartered at the Forest Service Rocky Mountain Research Station in Ogden, Utah.

The FIA program collects analyzes, and reports information on the status and trends of America's forests (i.e., how much forest exists, where it exists, who owns it, and how it is changing), providing data related to the changing conditions of trees and other forest vegetation. The FIA program combines this information with related data on insects, diseases, and other types of forest damages and stressors to assess the health and potential future risks to forests. The FIA program also projects these trends through the next 50 years and displays how various management scenarios would affect forest vegetation through time.

The FIA data used for forest planning was collected from 1993 to 1995 on the KNF. The FIA data was used to quantify both species and size class at the forest and biophysical scales. The FIA data was also used to develop growth and yield tables for the vegetation modeling.

Analysis Area

The affected area for direct and indirect effects to terrestrial vegetation is the lands administered by the KNF. This area represents the NFS lands where changes may occur to vegetation as a result of management activities or natural events.

The affected area for cumulative effects to terrestrial vegetation includes the lands administered by the KNF, as well as the lands of other ownership both within and adjacent to the KNF boundaries.

Affected Environment (Existing Condition)

Biophysical Setting

To characterize the existing, historical and desired forest vegetation across the KNF, three Biophysical Settings were recognized: Warm/Dry; Warm/Moist; and Subalpine.

- **Warm/Dry:** This biophysical setting includes the warmest and driest sites that support forest vegetation. These sites cover approximately 22 percent of KNF NFS lands and occur either at low elevations, at mid-elevations on southerly aspects, or on droughty soils. Vegetation response units 1 through 3 occur in this setting.
- **Warm/Moist:** This biophysical setting includes moist sites that are relatively warm and these sites cover approximately 37 percent of the KNF NFS forested lands. This setting includes low-elevation upland sites with deeper soils on north and east aspects, extensive mid-elevation moist upland sites, and most low and mid-elevation wet stream bottoms and riparian benches and toe-slopes. Vegetation response units 4 through 6 occur in this setting.
- **Subalpine:** This biophysical setting occurs over approximately 41 percent of the KNF NFS forested lands and occupies the higher elevations of the Forest. This setting ranges from the cool and moist lower subalpine sites, up to the cold and dry high elevation sites that have more open forests, and occur between forest and alpine tundra. The moist end of this setting is common on northwest to east-facing slopes, riparian and poorly drained subalpine sites. The cool to cold dry sites occur at higher elevations and typically have a short growing season. Vegetative response units 7 through 11 comprise this setting.

These biophysical settings are broad groupings of vegetative response units that have been aggregated by factors that regulate disturbance regimes and successional responses (such as landform and other topographic characteristics); combined with climatic factors such as temperature and moisture gradients. The vegetative response units are equivalent to the land unit, or ecological land unit, as described in the National Hierarchical Framework of Ecological Units (Cleland et al. 1997). A comprehensive discussion of each of the individual vegetative response units, and a discussion of the methodology used to delineate them, is presented in USDA 1999.

Areas within each of the biophysical setting have similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate and natural processes (e.g., nutrient and biomass cycling, succession, productivity, and fire regimes). Biophysical settings on the KNF are displayed in figure 6.

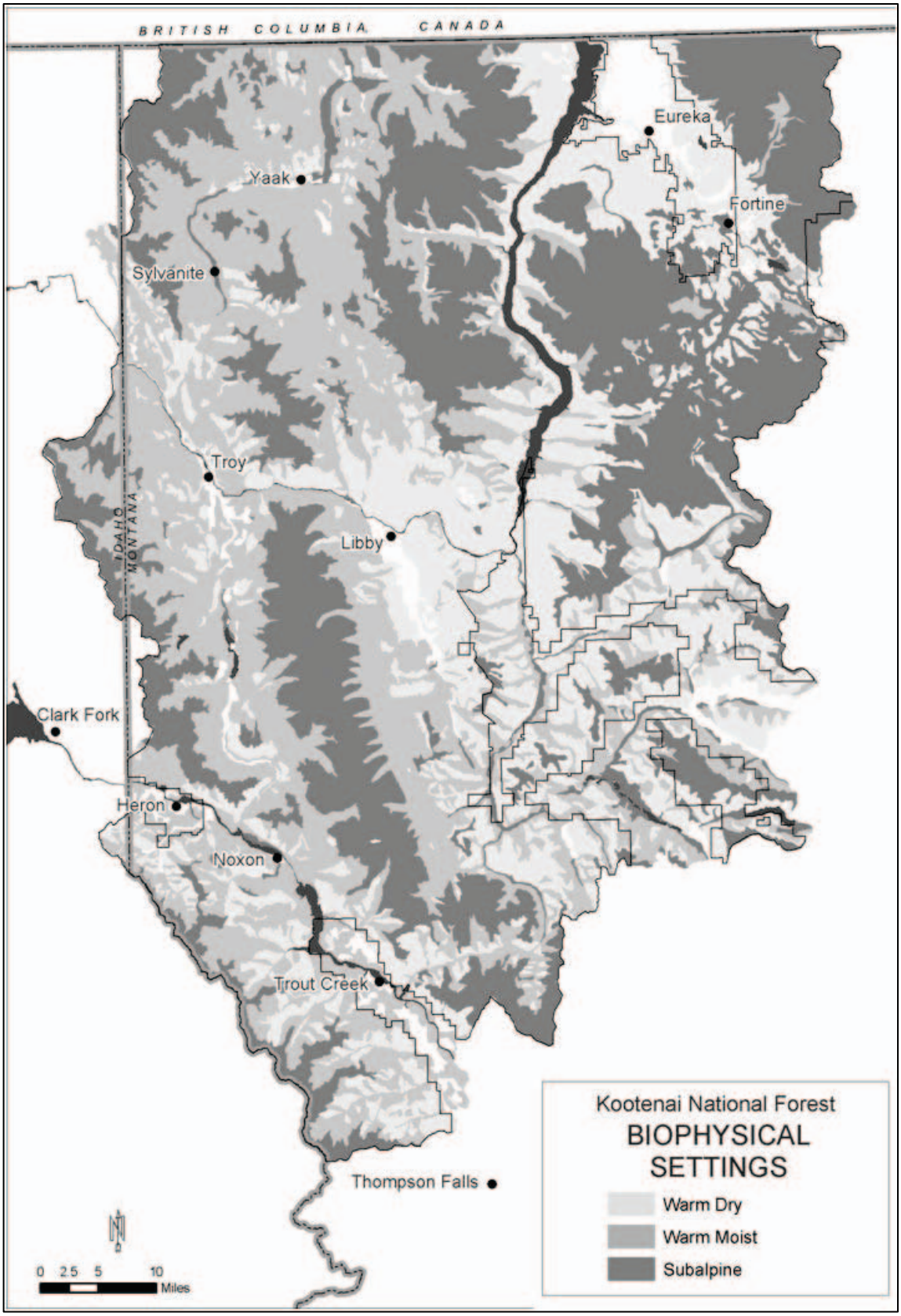


Figure 6. Map of the three Biophysical Settings on the KNF

Disturbance Types and Processes

The AMS Technical Report (USDA Forest Service 2003) described the historic and current disturbance processes (pages 3 to 7). Disturbance processes include the following: climate; weather; wildfire; management activities of timber harvest and prescribed burning; and insects and disease. These disturbance processes have a great influence on vegetation composition and function. Following is additional information to that found in the AMS Technical Report.

Climate

Because of the strong influence of inland marine airflow, precipitation in northern Idaho and northwest Montana is generally heavy compared to the rest of the Rocky Mountains. However, precipitation tends to vary on a decadal basis, with wet periods and dry periods each lasting several years to decades (Finklin and Fischer 1987). Extended droughts raise the fire danger and stress trees, especially the more drought intolerant species. During drought times, these stressed trees are less able to resist insect and pathogen attacks. Recent research has found evidence that decadal scale fluctuations in climate, such as those caused by the pacific decadal oscillation, can have a large influence on forest disturbance processes such as wildfires and insect outbreaks (Bollenbacher 2010, Hessl et al. 2004, McKenzie et al. 2009, Morgan et al, 2008, Westerling et al. 2006). This climatic variability creates an environment prone to a high frequency of a variety of disturbances. Rocky Mountain forest ecosystems are (and were historically) a mosaic of disturbance-derived patches of various ages and composition. Historically, fire was the primary disturbance agent throughout most Rocky Mountain ecosystems (Barbour and Billings 2000), but insects, pathogens, and weather events were also important.

An assessment on climate change for the planning zone (KIPZ Climate Change Report (USDA Forest Service 2010)) synthesized the most recent scientific information regarding how future climate change may impact forest resources and disturbance processes on the KNF and the IPNF. This report concluded the average annual temperatures will increase 2.2°F by the 2020s and 3.5°F by the mid 21st century. The greatest temperature increases are predicted for the summer season. Precipitation predictions are considered less certain, but most of the climate change models project decreases in summer precipitation, increases in winter, and little change in the average. It is also predicted that some extreme events will occur more frequently or with greater magnitude, while others may be less frequent (i.e., more unusually warm periods and fewer really cold spells). Other research for the northern Rockies (Westerling et al. 2006, Running 2006, Morgan et al. 2008) predicts warmer springs, earlier snowmelt, and hotter, drier summers with longer fire seasons and larger, more intense fires.

Weather

The weather of the KNF is unique to the inland area of the western United States. Strong maritime air flow carries high levels of moisture to this area. Moist maritime air that moves across the Northwest carries significant moisture descending from the Cascade Mountains and across the Columbia Plateau. When this warm/moist air is driven into the KNF, heavy/wet snows can occur. These storms often result in significant windthrow and breakage in species of trees such as Douglas-fir, western hemlock and grand fir, especially when the ground is not frozen. The narrower crowns of western white pine, the deep rooting habits of ponderosa pine and the deciduous nature of western larch make them less susceptible to this damage. Root diseases make Douglas-fir especially vulnerable to windthrow events. Dense stands, where tree canopies form contiguous “interlocking” tree crowns and trees tend to be relatively tall and have small diameter trees, are especially susceptible to damage from heavy snows and/or winds. This can lead to heavy fuel loadings for decades afterwards.

In general, weather events raise the probability of subsequent insect or fire disturbances. Trees broken or blown down in severe weather events provide breeding grounds for some bark beetles species. Weather events that cause large amounts of tree breakage or blowdown are frequently the precipitating event that leads to bark beetle epidemics. In turn, blowdown from weather events and trees killed by insects both create woody fuels that increase fire hazard (USDA 2000).

In the northern Rocky Mountains, precipitation tends to vary on a decadal basis, with wet periods and dry periods each lasting several years to decades (Finklin 1983). Extended droughts both raise the fire danger and stress trees, especially the more drought-intolerant species. Western hemlock and grand fir are two of the more drought-intolerant tree species on the KNF, and are highly stressed during drought periods. In an ecosystem subject to periodic droughts, the succession to these shade-tolerant, drought and fire-intolerant forest types creates an increased risk of large-scale insect and disease mortality. During droughts these stressed trees are less able to resist insect and pathogen attacks. This climatic variability creates an environment prone to a high frequency and variety of disturbances.

Wildfire

The dominant, historical fire regime that occurred within forested vegetation on the KNF can be characterized as a variable or mixed-severity fire regime (Brown and Smith 2000, Kilgore 1981, Zack and Morgan 1994). This type of fire regime commonly had a moderately short fire return interval for nonlethal or mixed severity fires, with lethal crown fires occurring less often. Relative to the other two common fire regimes that are often recognized for forested vegetation-the nonlethal and stand-replacement regimes, the mixed-severity fire regimes are the most complex (Agee 2004). Individual mixed-severity fires typically leave a patchy pattern of mortality on the landscape, which creates highly diverse communities. These fires kill a large percentage of the more fire-susceptible tree species (e.g., hemlock, grand fir, subalpine fir, lodgepole pine) and a smaller proportion of the fire-resistant species, including western larch, ponderosa pine, whitebark pine, and western white pine (Arno et al. 2000). The three fire severity types that occur in this mixed-severity regime are briefly discussed below.

Stand-replacing (lethal) fires are those that result in killing most of overstory tree canopy over a significant area and restarting the successional sequence. Historically, on landscapes dominated by moist habitat types, the mean fire return interval was approximately 200 years for stand-replacing fires (plus or minus 80 years), with slightly drier sites burning more frequently and wetter sites burning less frequently (Leavell 2000, Smith and Fischer 1997, Zack and Morgan 1994). The fire-adapted, shade-intolerant tree species in these ecosystems commonly live 140 to 400+ years. Because the historic mean stand replacing fire return interval was shorter than the life-span of many shade-intolerant early successional tree species, these fire regimes trended forest succession towards dominance by fire-adapted, shade-intolerant, potentially long-lived early seral tree species (ponderosa pine, larch, white pine, and whitebark pine), as well as towards fire-adapted plant species in the shrub and herb lifeform layers.

Major fire years occur most commonly during regional summer droughts. Lightning storms and wind contribute to the likelihood of a major fire year. During major fire years, stand-replacing fires were commonly on the order of tens of thousands of acres, with some individual fire patches 50,000 acres or larger (Pyne 1982, Zack and Morgan 1994). During major fire events some watersheds were almost entirely burned over, while other large areas were unaffected. In any particular watershed, major stand-replacing disturbances came in pulses, with long intervals between the pulses. During the last 100 years, these pulses were synchronized with the

occurrence of the warm phases of the pacific decadal oscillation, and the result was hot and dry local weather (Morgan 2008).

While stand-replacing fires in the Northern Rockies favor long-term dominance by early successional, shade-intolerant tree species, the mean time interval between stand replacing fires was long enough to allow development of mature and old growth forest structural stages, particularly in locations where fire intervals tended to be longest.

Mixed-severity fires kill a moderate amount of the overstory tree canopy, but do not replace the whole stand. Mean fire return intervals typically ranged from 55 to 85 years, depending upon landscape location. On very moist sites they may have been significantly less common, while on drier sites return intervals were 25 years or less (Smith and Fischer 1997, Zack and Morgan 1994). Mixed-severity fires create an irregular patchy mosaic of small to moderate-sized openings, thinned areas, underburned areas, and unburned areas. Mixed severity fires generally prolonged the period of dominance by early successional fire-adapted species and at a larger scale, allowed for the development of mature and old growth structural stages dominated by large trees. A classic example of this is the influence that periodic low to moderate severity wildfires had on releasing western larch from competing, shade tolerant tree species. The periodic thinning effect that this had on stands of old growth larch at the Coram experimental forest allowed for this early seral species to be maintained in the forest (Elzinga and Shearer 1997). Fire also played many additional ecological roles as a carbon and nutrient recycling agent, dormancy breaking and stimulating agent for herb and shrub seeds and sprouts, and creator of tree cavities and snags (used by wildlife). Historically, mixed-severity fires were extremely variable in size (less than one acre to more than 1,000 acres) and introduced both variable sized patches and internal diversity within larger blocks created by the less frequent stand-replacing fires (Zack and Morgan 1994).

Low-severity (nonlethal) fires are typically underburns that kill very little of the overstory tree canopy. They are most important on drier habitat types where conditions are dry enough to burn more frequently. Mean fire return intervals typically range from 10 to 30 years (Smith and Fischer 1997). Low-severity fires typically remove most small understory trees, particularly the more shade-tolerant, fire-intolerant species. On drier habitat types where these fires are common, the frequent burns maintain a large portion of the landscape in relatively open stands of large, shade-intolerant, fire-tolerant species (larch and ponderosa pine with lesser amounts of Douglas-fir).

The large, infrequent stand-replacing wildfire disturbances created a dynamic shifting mosaic of forest successional stages on a very large scale. In between the stand-replacing fires, vegetation, aquatic systems, and wildlife habitat had long periods to recover. Intermediate disturbances (low and mixed severity fire; some insect, pathogen, and weather events) introduced finer scale variability within these larger patches. As a result, blocks of wildlife habitat tended to be large, and blocks of mature/late-successional forest also tended to be large, but internally diverse. Terrestrial/aquatic interactions meant that watershed conditions and fish habitat also tended to form a dynamic, large-scale shifting mosaic. Over time any individual watershed could vary from predominantly mature/old forest (with wildlife and fish habitat that results) to almost all recently burned over. However, at any given time, at the larger scale of a river sub-basin (500,000 – 2,000,000 acres), the whole range of these conditions was represented in watershed-sized blocks of thousands, to tens of thousands of acres (USDA 2000, Hessburg et al. 2007).

With the aid of the cool phase of the pacific decadal oscillation and resultant cool and moist regional climate from 1940 to 1980, the Forest Service was very successful in suppressing

wildfires. For the period from 1970 to 2010, over 95 percent of all the fires were less than 10 acres in size, mostly due to fire suppression. Suppression efforts have been particularly effective for low and mixed-severity fires, virtually removing this agent as a significant disturbance process for the last 60 years. Rapid suppression of all fire starts has also removed most opportunity for fires to grow in size and intensity to become stand-replacing fires.

The success of fire suppression efforts (aided by the cool phase of the pacific decadal oscillation) and resource management activities over the last 100 years has had a large influence on the structure and composition of forest and rangeland fuel conditions. The function and process of ecological systems has changed and fire suppression and some management activities have altered fuel loadings. As documented in Keane et al. (2002), the changes include an increase in shade-tolerant species, decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics.

The influence of climate change on the occurrence and types of wildfires in the future is documented in the KIPZ Climate Change Report (USDA Forest Service 2010). The report concludes climate changes are likely to increase the frequency of large fire years in the Northern Rockies and that fire seasons will be longer. Some of the climate change modeling efforts has suggested that by the 2080s, the amount of area burned by wildfires in the Pacific Northwest region (including Idaho and western Montana) would double or triple. However, as explained in the KIPZ Climate Change Report in more detail, there are a number of key sources of uncertainty regarding this issue.

Timber Harvest and Prescribed Burning

Because of the success of fire suppression efforts over the last several decades, regeneration timber harvests are the current predominant stand-replacing disturbance process. Regeneration harvest systems (clearcut, seed-tree, shelterwood) followed by prescribed fire can emulate some of the functions of stand-replacing fire, but not all of them. These silvicultural systems are generally successful in regenerating mixed species stands dominated by early successional shade-intolerant species. However, regeneration harvests conducted prior to the mid-1990s tended to create unnaturally uniform conditions, and did not leave the scattered residual snags, residual live tree patches and scattered fire-tolerant large live trees (larch and ponderosa pine) that were characteristic of historic fires. In addition, the size of these regeneration harvest units (2 to 40 acres) was much smaller than patches created by historic, natural-fire regimes.

Over the last 15 years, silvicultural prescriptions in the Northern Region have largely been designed to emulate forest composition and structures created by historic fire regimes (Bollenbacher 2010). Intermediate harvest prescriptions such as thinning can favor species that are resistant to fire and create stand structures that are less likely to burn with high intensities. Even or two-age and multi-age regeneration harvests can change species composition of forests by removing all or part of the current stand, replacing it with different species. The initial open-stand conditions created by even and two-age harvest prescriptions generally favors resilient shade-intolerant species such as western larch, ponderosa pine, western white pine, and aspen. However, the number of acres that are being treated annually with some form of harvest has decreased dramatically during the last two decades. For example, from 1988 to 1997, the acres harvested with regeneration prescriptions on the KNF went from over 11,000 acres per year down to approximately 5,000 by 1997. This downward trend continued so that by the years 2001 and 2002, the annual regeneration harvest was approximately 1,000 acres (KNF Monitoring and

Evaluation Reports for 1997, 2001, and 2002). Relative to the entire forested acreage on the KNF, the 1,000 acres per year represents less than five-hundredths of one percent.

The effects of timber harvest on successional processes often depend on whether or not harvest is accompanied by prescribed fire. Where prescribed fire is used, impacts on understory vegetation may more closely replicate the effects of natural fire, and favor fire-adapted, shade-intolerant tree species. Where there is timber harvest with neither prescribed fire nor any other type of site preparation advanced regeneration of shade-tolerant, drought and fire-intolerant species are more likely to dominate the post-harvest stand (Zack 1994).

Prescribed fire has the potential to emulate many natural-fire ecosystem functions. However, the scale, seasonality, severity, and internal variability of natural fires need to be considered in developing fire prescriptions. To date, prescribed fire efforts of this sort have been relatively small scale compared to natural disturbances.

Insects and Pathogens

Many insects and diseases are found on the KNF and most are native and exist at endemic levels. However, there are some native as well as non-native insects and diseases that are likely functioning outside of their historic role. Other forest diseases, such as stem decays, rusts, needle diseases and dwarf mistletoe exists on the KNF but is generally not considered to be significant as they are likely functioning within their historic role.

Mountain pine beetles in white pine and lodgepole pine (and occasionally spruce beetles) are capable of serving as stand-replacing agents. These beetles have a mixed effect on succession. They can open canopies enough to provide regeneration opportunities for shade-intolerant tree species, but more commonly they release shade-tolerant understory tree species. By the fuels they create, bark beetles can influence the probability of large stand-replacing fires, which in turn can reset the successional sequence. In some situations, Douglas-fir bark beetle can also do the same thing on a smaller scale.

As part of the assessment on climate change (KIPZ Climate Change Report (USDA Forest Service 2010)), a hazard analysis was conducted to determine how much of the Forest was susceptible to mortality from mountain pine beetle, Douglas-fir beetle, and western pine beetle. This report summarizes the current hazard rating as well as the estimated losses that may occur to stands for the period from 2005 to 2020 (table 7). It is estimated that during that period, up to 29.9 percent of the lodgepole pine may be killed by mountain pine beetle, up to 19.2 percent of the Douglas-fir may be killed by the Douglas-fir beetle, and up to 1.0 percent of the ponderosa pine could be killed by either mountain pine beetle or western pine beetle.

Historically, root pathogens most commonly acted as thinning agents. In natural mixed-species stands, root pathogens caused the greatest mortality in Douglas-fir, followed by true firs. White pine and larch were the most resistant tree species (Hoff and McDonald 1994; Monnig and Byler 1992). Root pathogens thinned out the Douglas-fir and favored the pines and larch, which increased the amount of pine and larch over the first 150+ years of stand life (Rockwell 1917). A recent analysis was conducted to determine what the root disease hazard was on lands within the boundaries of the KNF. The results indicate that approximately 6.8 percent of the area has a high hazard, 27.2 percent is moderate, 65.2 percent is rated as low and approximately 9.2 percent has no hazard (additional information about this analysis is available in the project record).

Table 7. Estimated Bark Beetle Hazard and Estimated Loss 2005-2020

Bark Beetle and Tree Species	Hazard Class				Estimated Loss			
	High	Moderate	Low	None	High	Moderate	Low	Total
Mountain Pine Beetle in Lodgepole Pine	5.6%	13.2%	5.8%	75.4%	4.5%	6.6%	18.9%	29.9%
Mountain Pine Beetle/Western Pine Beetle in Ponderosa Pine	0.8%	2.9%	1.8%	94.6%	0.4%	0.5%	0.1%	1.0%
Douglas-fir Beetle In Douglas-fir	5.1%	19.6%	21.0%	54.3%	3.1%	8.8%	7.4%	19.2%

1 This information was derived by using FIA data and the mountain pine beetle hazard rating model imbedded in the Forest Vegetation Simulator model

Historically, western white pine was a common tree species on the KNF, and dominated a very large part of the moist habitat types. In the early part of the 20th century, white pine blister rust (a Eurasian disease) was accidentally introduced to western North America. This exotic disease, combined with a mountain pine beetle outbreak in white pine in northern Idaho in the late 1930s, was the primary cause for the loss of white pine in this area (Neuenschwander et al. 1999). With the loss of white pine, there have been large increases in the amount of Douglas-fir and subalpine fir cover types, and a major acceleration of forest succession toward shade-tolerant, late-successional true firs (Grand fir), hemlocks, and cedars.

Historically, western white pine had an important ecological role in forests of the Interior Northwest (Harvey et al. 1995, Monnig and Byler 1992). Especially important was this species ability to form a stable, relatively long-lived, forest that was perpetuated by a combination of mixed-severity and stand-replacing wildfires (Zack and Morgan 1994). Even though fire occurred in this forest type fairly regularly, old-growth structures often persisted for several centuries. Across its range, western white pine is now estimated to be less than 5 percent of what it was at the turn of the 20th century (Neuenschwander et al. 1999).

In an attempt to restore this species to the landscape, there have been successes in genetically improving tree resistance, planting those trees and then using cultural treatments like pruning to improve survival (Schwandt, Marsden, and MacDonald 1994). The best strategy to save white pines from blister rust is to increase the numbers of rust resistant white pines in these ecosystems by aggressively planting them in openings (Samman et al. 2003, p. ii; and Fins et al. 2001, p. 10).

With the impact of white pine blister rust and the decrease in fire, the role of insects and pathogens as disturbance agents is growing and changing. White pine blister rust accounts for major changes in forest successional patterns, having removed more than 90 percent of two conifer species (white pine and whitebark pine). With the absence of white pine and decreased amounts of ponderosa pine and larch, root pathogens have been transformed from thinning agents into major stand-change agents in Douglas-fir and true fir stands. Root pathogens now produce significant canopy openings on many sites. Depending upon the habitat type, root pathogens may either stall stands in a diseased shrub/sapling/open pole successional stage, or strongly accelerate succession towards shade-tolerant species.

Bark beetles have also changed their role. Because there is more Douglas-fir relative to historical conditions, Douglas-fir bark beetles are now more important change agents than they were historically. In all but the driest habitat types, Douglas-fir bark beetles accelerate succession in the short-run, and in the long-run create fuel conditions and stand structures that may increase the risk of stand-replacing wildfires.

Native insects and pathogens are also now responsible for a relatively much larger proportion of forest disturbance than they were historically. The impact of insects and pathogens in the short-term is to strongly accelerate succession towards late seral, shade-tolerant tree species. An analysis of pathogen and insect impacts in northern Idaho and western Montana by Hagle et al. (2000) examined successional changes for the period 1935 to 1975. This analysis shows that in 40 years, pathogens and insects changed forest cover types to more late-successional, shade-tolerant tree species on over 80 percent of the area dominated by moist forest habitat types (Byler and Hagle 2000). The same analysis of insect and pathogen impacts also showed that almost 40 percent of the moist habitat type area analyzed was either stalled in small tree structures or was actually moving back towards the small tree structures as a result of the removal of the largest trees.

The potential influence of climate change on some of the key forest insects and diseases of the Northern Rockies is discussed in the KIPZ Climate Change Report (USDA Forest Service 2010). In addition, a literature review of climate change and forest diseases of Western North America is presented in Kliejunas et al. (2009). These documents conclude that climate change will lead to reductions in tree health and will improve conditions for some insects such as bark beetles and damaging pathogens such as root diseases.

Forest Vegetation Condition

Forest composition, structure, and function are used in describing forest vegetation condition. Composition is described by the tree species and their amounts on the Forest. Structure is described by size-class, snags, and density of stands. Function is described by landscape patterns. As described in the preceding sections, disturbance affects all these attributes, resulting in current forest vegetation conditions and shaping conditions into the future. The combination of these vegetation conditions reflects its resistance and resiliency to disturbance and stressors, resulting in potential future conditions and the ability to adjust to climate change.

Forest Composition

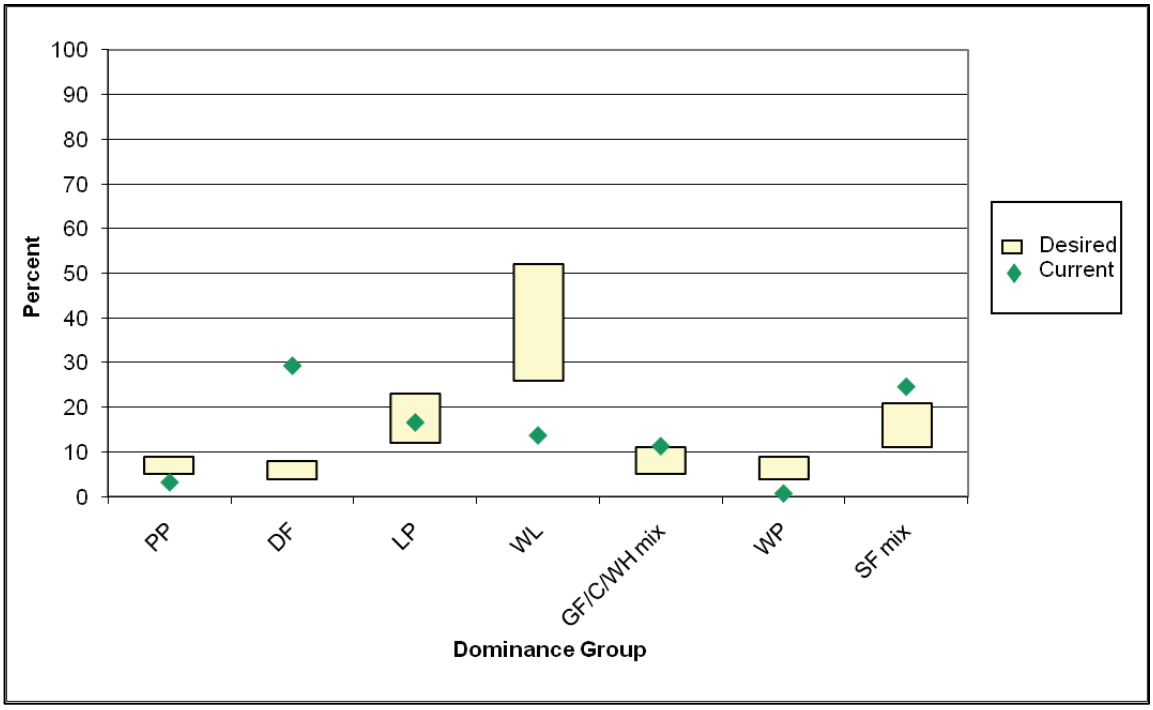
Approximately 93 percent of the national forest land on the KNF is classified as being forested (Vegetation Mapping Project). Within these forested plant communities, trees are the largest and most dominant plants; therefore, they have a large influence over the composition, structure, patterns, and processes that occur on the Forest. The KNF contains some of the most diverse and productive forests found within the Inland Northwest.

On the KNF, there are fourteen native conifer species[1] as well as four broadleaved species[2]. The conifer species typically dominate the Forest with the broadleaved species being much less prevalent. The forest stands are usually composed of different combinations of tree species with various abundance levels. Often, a mixture of three to five conifer species will occur within an individual forest stand. However, it is not uncommon to find stands that contain six to eight different conifer species as well as one or two broadleaved species. “Pure” stands that contain only one tree species are relatively rare, and it is even somewhat uncommon to find a stand that contains only two tree species.

A classification system was developed based on the most dominant tree species, or mix of common species, that occurs across the forest stands, resulting in eight different Dominance Groups to describe the composition of the forest communities. Figure 7 illustrates how much of the Forest is currently occupied by the various Dominance Groups as well as the desired range. The “grand fir/cedar/western hemlock” mix represents those areas that are dominated by one or more of those three tree species. The “subalpine fir” mix Dominance Group includes areas dominated by one or more of the following species: subalpine fir, Englemann spruce, whitebark pine, mountain hemlock or subalpine larch. The remaining Dominance Groups shown in figure 7 are named for the most single abundant species in the stand.

[1] Grand fir, subalpine fir, subalpine larch, western larch, Engelmann spruce, whitebark pine, lodgepole pine, western white pine, ponderosa pine, Douglas-fir, Pacific yew, western red cedar, western hemlock and mountain hemlock

[2] Water birch, paper birch, quaking aspen, and black cottonwood



PP = ponderosa pine; DF = Douglas-fir; LP = lodgepole pine; WL = western larch; GF/C/WH mix = grand fir/cedar/ western hemlock mix; WP = white pine; and SF mix = subalpine fir mix

Figure 7. Desired and Current Forest Composition by Dominance Group at the Forestwide Scale

For the KNF, the most abundant Dominance Groups are the Douglas-fir and the subalpine fir mix and each of those groups occupy over 24 percent of the forested acres. Intermediate in abundance levels are the grand fir/cedar/hemlock mix, lodgepole pine and the western larch, with each of these groups occupying between approximately 11 and 17 percent. The ponderosa pine and western white pine are the rarest groups depicted in the figure with each occupying approximately 3 percent or less.

In addition to depicting the current condition, figure 7 illustrates the desired amount for each of the Dominance Groups. The desired ranges that are illustrated in the figure represent an approximation of the historic range of conditions for forest composition. The desired condition is for management actions to move species composition towards the desired ranges. The long-term goal (taking several decades or even centuries) is to shift the forest composition from its current condition, to approximately the middle of the desired ranges that are depicted in the figure for each of the Dominance Groups.

In a comparison of the current and desired conditions, it is apparent that the desire is to increase the amount of western larch, ponderosa pine, and western white pine across the Forest, and to decrease the amount of Douglas-fir, grand fir/hemlock/cedar mix, and subalpine fir mix. The desire for lodgepole pine is to keep it at current levels. The species desired to increase are drought and fire-tolerant, with good resistance to insects and disease. The species desired to decrease are drought and fire-intolerant with greater susceptibility to various insects and disease. Changing vegetation composition towards desired ranges will increase resistance and resiliency, reducing effects from drought, fire, insects, disease, and climate change (McKenzie et al. 2009).

Broadleaved Species

In addition to conifers, there is a small amount of area (approximately 0.7 percent) of the Forest comprised of broadleaved species. These species typically occupy relatively small stands, often located in riparian areas or on moist upland sites. Of the four species that occur on the KNF, paper birch, quaking aspen, and black cottonwood are the most prevalent with water birch being fairly rare. Although these species are not shown in figure 7 above, the desire is to see an increase in their abundance on the Forest.

Whitebark Pine

Whitebark pine is a tree species that was grouped together with some other species (subalpine fir, Englemann spruce, mountain hemlock, subalpine larch) to form the subalpine fir mix Dominance Group that is presented in figure 7. Whitebark pine trees occur on some of the higher ridges and mountain tops on the KNF. When they occur at the lower elevations within their range, they typically serve as a minor early seral species in mixed conifer stands. At the other extreme, where they are found at the uppermost elevations in rather pure stands, they can serve as a major climax species. This tree is considered a “keystone” and “foundation” species because of its significant role in subalpine ecosystems (Keane and Parsons 2010, Tomback and Kendall 2001, Tomback et al. 2001).

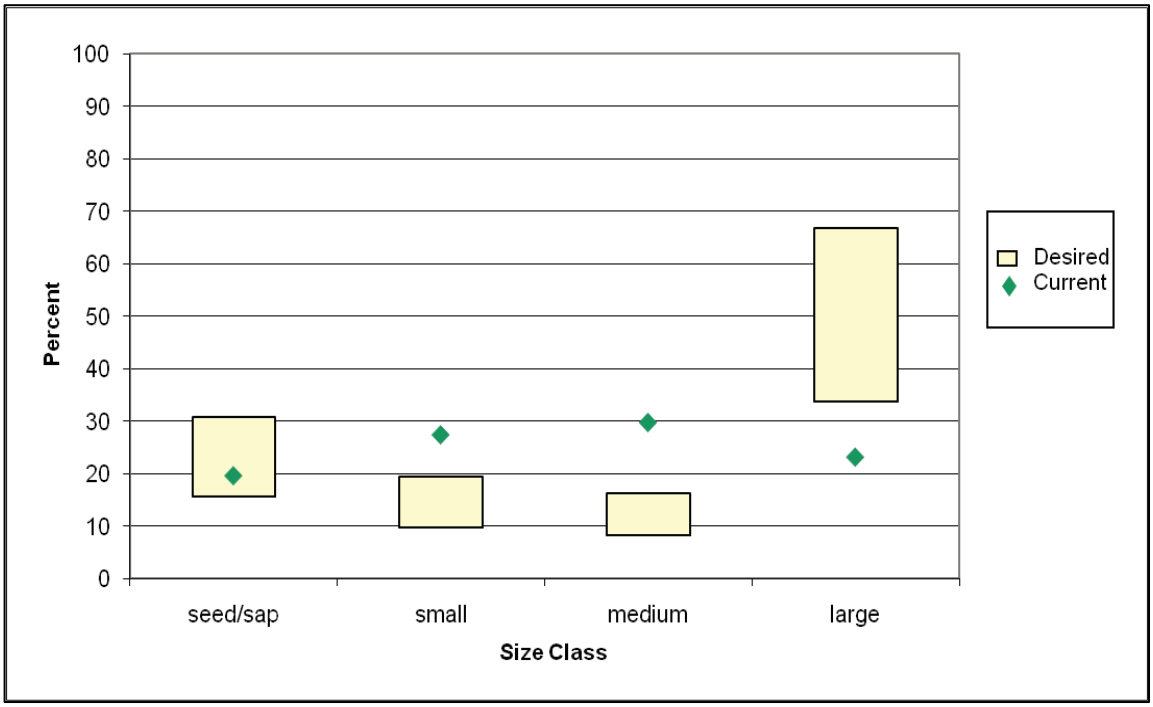
The most recent inventory information indicates that some live whitebark pine trees occur over approximately two percent of the forested area of the KNF (USDA 2010). Recently, the U.S. Fish and Wildlife Service completed a status review of whitebark pine for potential listing as a threatened or endangered species. They concluded that the species warranted listing but was precluded because of the need to address higher priority species. Whitebark pine is now designated as a Candidate species. In addition to the U.S. Fish and Wildlife Service’s review of the species, the regional forester has placed whitebark pine on the sensitive species list for Region One. The principal reasons for the concern over this tree species stems from the fact that mountain pine beetles, fire exclusion policies, and the introduced white pine blister rust disease have been found to be responsible for the significant decline of this species across its range in western North America (Keane and Parsons 2010, Schwandt 2006). In northern Idaho and northwestern Montana, white pine blister rust has killed a quarter to half of all whitebark pine trees, and since the late 1990s, mountain pine beetle-caused mortality has increased (USDA 2010). In addition, climate change could detrimentally affect this tree species; either directly or indirectly through interactions of bark beetles, blister rust, wildfires or a combination (Keane and Parsons 2010, USDA 2010, USDI 2010).

The desired condition for whitebark pine is to increase the abundance of this species on the KNF, and in stands that contain this tree, to increase the resistance and resiliency of them to disturbances. Active restoration efforts, such as those that are described in Keane and Arno 2001 and Schwandt 2006, are believed to be necessary in order to achieve these objectives. Without management intervention, losses of this tree across its range could have major consequences for biodiversity (Tomback 2007).

Forest Structure

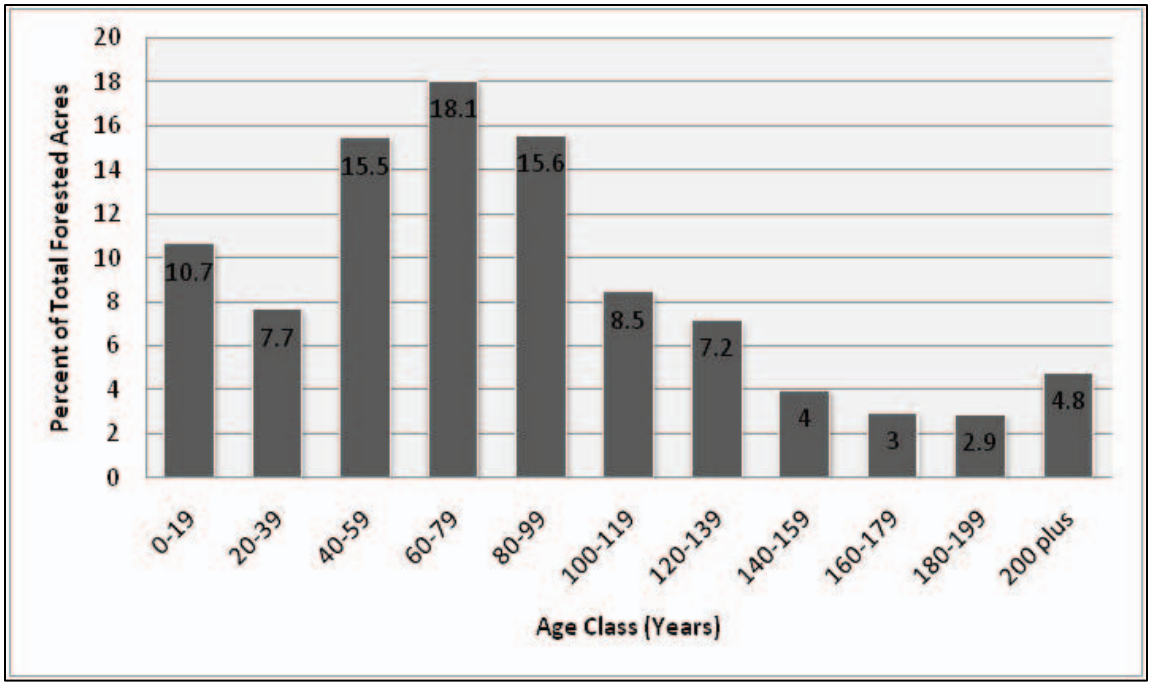
Size Class

Four size classes were developed to broadly describe and quantify stand structure across the Forest. Figure 8 illustrates how much forested land is currently occupied by each of the four size classes. The medium and small size classes occupy the greatest amount of the forested area on the KNF, at approximately 30 and 27 percent, respectively. The large and seed/sap size classes occupy lower amounts of the forested lands, approximately 23 percent and 20 percent, respectively. In general, stands in the seed/sap size class range from 0 to 40 years old. The stands in the small and medium size classes range in age from 40 to 70 and 70 to 100 years old, respectively. Stands in the large size class are generally 100 years old or older. Figure 9 presents a more detailed distribution of age classes for the KNF.



(seed/sap = 0-5” DBH trees, small=5-10” DBH trees, medium =10-15” DBH trees, and large =>15” DBH trees)

Figure 8. Desired and Current Forest Structure by Size Classes at the Forestwide scale



NOTE: The age-class information present in this figure cannot be used in determining old growth amounts on the Forest. See the project record for details on the data and methodology used in this figure.

Figure 9. Age class Distribution of Forested Acres over the entire KNF

In addition to depicting the current distribution of size classes on the KNF, figure 8 also illustrates the desired amount. The desired ranges that are illustrated in the figure also represent an approximation of the historic range of size classes. In a comparison of the current and desired conditions, it is apparent that the goal is to increase the amount of the large size class, and reduce the amount of the small and medium size classes. The goal is for management actions to move size classes towards the desired ranges. The long-term goal (taking several decades or even centuries) is to shift the forest structure, or size classes, from the current condition, to approximately the middle of the desired ranges that are depicted in the figure. As illustrated in the figure, the existing amount of the seed/sap size class is slightly below the middle of the desired range; therefore, the goal is to increase that amount slightly for many of the ecological reasons that are articulated in Swanson et al. (2011).

Old Growth

Old growth is generally a subset of those areas within the large size class that are depicted above in figure 8. The KNF has adopted the definitions of old growth developed by the Regional Old Growth Task Force and documented in Green et al. 1992 (errata corrected 10/08). The rationale for using those definitions, and a summary of the current science and understanding of forest practices intended to create, maintain, and restore resilient old growth stands, is presented in a Region One report titled "*USFS Northern Region Old Growth Management Considerations*" (Bollenbacher and Hann 2008). The adopted old growth definitions cited above are specific to forest type (the dominant tree species) and habitat type group, and are defined by a minimum number of trees, of a minimum age and diameter, in stands with a minimum density. The most common old growth types require at least ten trees per acre, at least 150 years in age, 21 inches in diameter, and have a minimum stand density of 80 square feet of basal area.

The KNF utilizes two different inventory and analysis "tools" to monitor and manage the old growth resource. One method uses inventory information from the National Forest FIA program[1], and the other method is a stand level, GIS map layer, used for project-level delineation and old growth management.

The FIA data was used in analyzing the amount of old growth found on the KNF forestwide. This analysis was documented in Bush et al. (2007). Results indicate the estimated percentage of old growth (lands that meet the old growth definition at the time they were inventoried) on the KNF is 9.0 percent (with a 90 percent confidence interval of 7.2 to 10. 9 percent).

The KNF stand-level GIS map layers of old growth represent a spatial depiction of stands that either currently meet the definition of old growth, or are being managed with an objective of meeting the definition sometime in the future, as the trees age and/or grow larger in size (KNF Forest Monitoring Report Fiscal Year 2010) (USDA 2011). Stand-level information from the 2010 Forest Plan Monitoring and Evaluation Report indicates that 10.8 percent of the forested lands are occupied by stands meeting the old growth criteria and an additional 5.2 percent is being managed with the objective that they meet the old growth criteria in the future.

Snags

Snags (standing dead trees) are ecologically important for a number of reasons. They are important habitat structures (for nesting, feeding, perching, and/or roosting) for a wide variety of wildlife species. They provide substrate for some mosses and lichens and also serve to improve environmental conditions on harsh sites. Once they fall, snags become down wood that provides habitat structures (including den sites) for a different and very wide suite of wildlife and some plant species. Down wood is also critical for nutrient cycling, moisture retention, providing effective microsites for tree regeneration, diversity of soil micro-organisms, and hydrologic function. Snags are short-term and vary greatly throughout the life cycle of a forest stand. If a stand originates following a fire, the resulting young stand may begin under a high number of snags. Most snags only remain standing for a few years, but can remain standing up to a few decades. How long these snags remain standing is a function of the structure, species composition, and age of the previous stand; the fire severity; snag size; and site factors like soil characteristics, slope position, and landscape position. An insect or disease outbreak may rapidly increase the number of snags. A severe windstorm may rapidly reduce the number of snags (while increasing the amount of down wood). Root pathogens may provide a gradual creation of snags until all the trees are killed; depending on the particular pathogen, these snags may not remain standing for very long. Various severe weather conditions may serve either to increase or decrease snag numbers.

In order to quantify and otherwise describe the existing snags on the KNF, an analysis was recently completed using FIA information collected on the Forest (Bollenbacher et al. 2009). Table 8 provides a summary of the estimated average number and size distribution of snags per acre that occur across the forested areas of the KNF. The information is separated by Dominance Group, Habitat Type Group and three snag sizes. The three Habitat Type Groups correspond very closely to the Biophysical Settings (warm/dry, warm/moist and subalpine) presented earlier. The Lodgepole Pine Dominance Group was separated from the other Dominance Groups in the

[1] This analysis process is documented in Region One Vegetation Classification, Mapping, Inventory and Analysis Report (Bush et al. 2007 and Report # 06-07, dated April 11, 2006). Information on the validity of using Forest Inventory and Analysis data for old growth and snag estimates is available in Czaplewski (2004).

analysis since lodgepole pine trees do not grow as large as the other common tree species because of their growth form and high stocking levels, and typically do not contain as many large snags.

Snag numbers decrease substantially in the larger size classes across all Habitat Type Groups and Dominance Groups (table 8). The Low-Mid Elevation-Moist group has the highest average snag densities across all snag classes. This is likely due to the presence of higher productivity sites and because of the specific fire regime typical on these sites compared to the other Habitat Type Groups. That is, a longer interval between stand-replacing fires while mixed-severity fires occur in-between the stand-replacing events.

To determine historic snag densities, the snag analysis (Bollenbacher et al. 2009) separated the forest inventory data into two categories; areas that occurred in wilderness or roadless areas, and the rest of the Forest. The assumption was that snag levels and distribution patterns in the wilderness/roadless areas provide a better "picture" of historic snag conditions, and represent the best available information as to the historic range and distribution of snags. This information was then used to establish desired future conditions and forest plan guidance. Although fire suppression activities may have influenced snag conditions in the wilderness/roadless areas in a number of ways, the effects are difficult to predict (Bollenbacher et al. 2009, Harris 1999). In a recent snag study (Harris 1999) that took place in western Montana, Harris considered how fire suppression activities may have influenced snag levels in areas that had no harvest history. Harris stated that predicting the likely effects was complex and uncertain. However, he did conclude that existing snag densities in his study area may be about 10 percent higher than historical levels.

Table 8. Average Snags per Acre for the entire KNF by Dominance Group, Habitat Type Group, and Snag Sizes Classes

Dominance Group	Habitat Type Group	Snags per Acre 10"+	Snags per Acre 15"+	Snags per Acre 20"+
All except Lodgepole pine	Dry	6.8	2.2	0.7
	Low Mid Elev-Moist	11.7	4.1	1.5
	Subalpine	14.4	3.2	0.9
Lodgepole Pine	All Settings	9.6	1.4	0.3

Data in this table is a summary of the more detailed information within table 5 of appendix C in Bollenbacher et al. 2009. Confidence intervals and the number of plots per strata are available in that document.

Average snag densities for wilderness/roadless areas and the other forested lands are displayed in table 9. As this table indicates, the average snag densities in the wilderness/roadless areas are greater than those outside of those areas. However, when one compares the confidence intervals surrounding those averages, the differences are only statistically significant for the 15 inches + snag class.[1]

[1] This is illustrated in table 2 of Bollenbacher et al. 2009

Table 9. Average Snags per Acre on the KNF for Areas within Wilderness/Roadless Areas and for the Areas outside of those Designations

Area	Snags per Acre 10"+	Snags per Acre 15"+	Snags per Acre 20"+
In Wilderness/Roadless Areas	12.6	3.9	1.1
Outside of Wilderness/Roadless Areas	9.8	2.4	0.8

Data in this table is a summary of the more detailed information within table 2 in Bollenbacher et al. 2009 Confidence intervals and the number of plots per strata are available in that document.

Table 10 below displays the range and average number of snags that occur in the wilderness/roadless areas on the KNF, by Habitat Type and Dominance Groups. These snag densities are the desired amounts in the draft Forest Plan.

Table 10. Snag Density Ranges and Averages for Wilderness/Roadless Areas on the KNF by Habitat Type and Dominance Groups (average snags are displaced in parentheses)

Dominance Group	Habitat Type Group	Ranges of Snags per Acre by Diameter Class		
		10”+	15”+	20”+
All except Lodgepole pine	Dry	3.3-15.9 (6.8)	1.0-6.1 (2.2)	0.3-2.2 (0.7)
	Low Mid Elev-Moist	6.3-17.1 (11.7)	2.4-7.2 (4.1)	0.5-2.6 (1.5)
	Subalpine	11.1-25.1 (14.4)	2.9-6.5 (3.2)	0.5-2.1 (0.9)
Lodgepole Pine	All Settings	3.6-14.0 (9.1)	0.5-4.3 (1.2)	0.1-1.1 (0.3)

Data in this table is from the KNF portion of table 11 in Bollenbacher et al. (2009)

As found in both Bollenbacher et al. (2009) and Harris (1999), the distribution of snags across the landscapes in both northern Idaho and western Montana is very clumpy, or uneven. For example, when analyzing snag distributions on several national forests in western Montana (Kootenai, Flathead, Lolo and Bitterroot National Forests), Bollenbacher et al. (2009) found that the percent of FIA plots having any snags occurring on them, varied from approximately 2 to 32 percent, depending upon the habitat type, Dominance groups and snag class.[1] The conclusion is that over a lot of area, there are no snags, while other areas have numerous snags. The primary reason for this uneven distribution of snags across the landscape is simply that many snags are created as a result of periodic, broad and fine scale disturbances such as fire, insects and diseases, and these disturbances do not occur evenly across space.

Bollenbacher et al. (2009) also looked at how snags, and live tree densities, varied across different seral stages of forest development. This analysis was used to determine the appropriate levels for retention of snags and live snag recruitment for vegetative treatments. In the analysis, size class was used to approximate seral stages. Areas that were dominated by trees that were 0.0-9.9 inches in diameter (up to 30 years old) were considered early-seral, while areas dominated by 10.0 -19.9 inch diameter trees were considered to be in a mid-seral stage. Finally,

[1] See table 9 in Bollenbacher et al. (2009) for more details

areas dominated by trees 20.0 inches and greater were considered to be in the late-seral stage (generally 130 or more years old).

Table 11 illustrates the ranges and average number of snags and live trees that occur within each of the three seral stages by Habitat Type and Dominance Groups. Information in that table is for wilderness/roadless areas across all of the western Montana National Forests. This information was used to develop the snag guideline in the draft Forest Plan that indicates how many snags and live trees (for future snag recruitment) should generally be left in areas that have vegetation management activities conducted in them.

The desired snag quantities and sizes are provided in the draft Forest Plan by biophysical setting, Dominance Group and size class. The desired condition over the Forest approximates the conditions in table 11 that currently occur in the roadless/unroaded areas.

Table 11. Snags and Live Trees per Acre Ranges by Seral Stage and Diameter Class

Dominance Group	Habitat Type Group	Ranges per acre in Early-seral Conditions		
		Snags > 15”+ DBH	**Snags > 20.0” DBH**	**Live trees > 15.0” DBH**
All Other Groups	Dry	1.6 - 3.6 (2.5)	0.5 - 1.2 (0.8)	1.7 - 3.8 (2.7)
	Low and Mid Elevation Moist	3.7 - 8.3 (5.9)	0.9 - 2.8 (1.8)	1.5 - 4.7 (3.0)
	Subalpine	3.8 - 5.3 (4.6)	1.0 - 1.6 (1.3)	1.7 - 2.6 (2.2)
Lodgepole Pine	All	0.6 – 1.5 (1.0)	0.1 - 0.4 (0.2)	0.5 - 1.2 (0.8)
Dominance Group	Habitat Type Group	Ranges per acre in Mid-seral Conditions		
		Snags > 15”+ DBH	Snags > 20.0” DBH	Live trees > 15.0” DBH
All Other Groups	Dry	0.7-2.5 (1.6)	0.1-0.8 (0.4)	9.6-16.3 (12.8)
	Low and Mid Elevation Moist	2.8 - 7.6 (5.0)	0.3 - 1.8 (1.0)	10.0 - 20.7 (15.2)
	Subalpine	3.0 - 4.7 (3.8)	0.7-1.4 (1.0)	9.9 – 13.0 (11.4)
Lodgepole Pine	All	0.6 - 1.5 (1.0)	0.1 - 0.4 (0.2)	3.8 - 6.8 (5.2)
Dominance Group	Habitat Type Group	Ranges per acre in Late-seral Conditions		
		Snags > 15”+ DBH	Snags > 20.0” DBH	Live trees > 15.0” DBH
All Other Groups	Dry	1.8 – 5.0 (3.2)	0.6 - 1.7 (1.1)	22.2 - 30.3 (26.1)
	Low and Mid Elevation Moist	3.3 - 13.1 (7.7)	1.2 – 5.9 (3.4)	31.2 – 54.0 (42.3)
	Subalpine	5.4 - 8.8 (7.0)	1.6 - 2.8 (2.2)	29.3 – 36.3 (32.8)
Lodgepole Pine	All			

Estimated mean for each range is displayed in parentheses. Seral stage is based on Stand Size as derived by basal area weighted average diameter: early-seral = 0.0 – 4.9” average diameter; mid-seral = 5.0” – 14.9” average diameter; late-seral = 15.0” + average diameter

Information in this table was taken from table 11 in Bollenbacher et al. 2009.

Forest Density

The density of forest vegetation can influence everything from the health and vigor of individual trees in a forest stand to the composition of plant species in the community, which affects whether or not the stand is suitable habitat for certain wildlife species. Tree density also affects the susceptibility of the trees to drought, insects and diseases, wildfires, and other disturbance events, as well as influencing the rate of plant succession. While it is difficult to quantify historical forest densities, general inferences can be made based on the knowledge of historical disturbance regimes and forest succession.

As discussed in the "Wildfire" disturbance section, the success of fire suppression has had a large influence on the structure and composition of forest conditions. Research has shown that fire suppression for the last several decades has led to increased density of stands (Keane et al. 2002). Fire exclusion has led to stands that are much denser than occurred historically.

There are a number of key ecological concerns with the trend of increasing forest density. In general, the denser the forest the greater the likelihood that fuel characteristics could support a fast moving intense crown fire. This is not only a result of greater fuel quantities in a dense forest, but also of the vertical and horizontal continuity of fuels. On most of the sites where fire suppression and other factors have led to increased forest densities, not only has the number of trees per area increased, but so has the number of canopy layers in a given stand and this has increased the continuity of vertical fuels. The lower tree and tall shrub canopies serve as ladder fuels to increase the likelihood of a surface fire moving upwards to become a crown fire.

The susceptibility of a forest to insects and diseases is heavily influenced by density and its impact on tree vigor. As the density increases, a deficit of soil moisture develops and trees lose their ability to withstand attacks by insects, pathogens and parasites (Powell 1999, Safranyik et al. 1998). Density-related tree mortality from insects, diseases, and competition leads to increased dead fuel quantities and higher fuel hazards.

Another concern regarding the trend of increasing forest density is its influence on the more desirable tree species that are intolerant of shade. Western larch and ponderosa pine are very intolerant of shade. In a stand with mixed species, as the density of more shade-tolerant species (e.g., Douglas-fir, grand fir, hemlock, and cedar) increase, the larch and ponderosa pine will likely die out (unless a disturbance reduces the competition from the shade-tolerant species).

Climate change may compound the effect of dense forests on the soil water balance. In general, the soil water balance (especially in the summer drought period) determines which tree species can ultimately survive on a specific site. Seral tree species (e.g., ponderosa pine and western larch) have the unique ability to establish on bare soil surfaces where high surface temperatures exclude other species. One of the adaptations of these seral species are deep rooting characteristics that allows the tree to find an adequate water supply and avoid extensive competition with shallow and fibrous rooted grasses and forbs. As the shade from these seral tree species limits grasses and forbs, shade-tolerant tree species can become established in understories. These shade-tolerant species have shallower rooting characteristics that allow them to gather soil water from near the soil surface. The overall rooting structure on the site becomes much more competitive for water resources as succession progresses. As the density of the stand and the amount of leaf area increases, water transpiration increases and this can deplete the water that is stored in the soil throughout the summer. The additional forest canopy interception of rain and snow further compounds the reduction in soil water recharge. This results in a water-

stressed forest that not only becomes more susceptible to insect and disease, but also more prone to supporting severe wildfires because live fuel moisture is relatively low.

Landscape Patterns of Forest Conditions and Disturbance Implications

To understand how forest ecosystems function and how management activities could affect them, it is important to consider the pattern of forests on the landscape. The pattern of a forest can affect numerous ecological processes, including: watershed functioning; wildlife habitat and dispersal; plant habitat and dispersal; disturbance (fire, insects, and pathogens) risk, spread and size; ecosystem response to disturbance; and human esthetic values.

The historic and current forest pattern of size classes on the KNF was analyzed through the use of a spatial pattern analysis model called FRAGSTATS. This model was used to quantify the extent and spatial configuration of forest "patches" within a landscape. Patches were identified and then classified into tree size classes. The model then calculated a number of spatial metrics. The methods used for the analysis are described in appendix B of this EIS.

Relative to the historical conditions, the following conclusions were made regarding how the spatial pattern of structural conditions has changed over representative landscapes on the KNF. Forest stands in the smallest size class as well as those in the largest size class, changed in similar ways. The area covered by both of these size classes declined from historical levels (see figure 8 above). The FRAGSTATS analysis also indicated that the average patch size of stands in these size classes decreased substantially. The smaller-sized patches have an increase in edge and decrease in interior habitat and, therefore, these types of patches have become more fragmented. In addition, the size of these patches became less variable. Although the average patch size for both the smallest size class as well as the largest size class showed similar trends, the magnitude of the changes were generally greater for the largest size class.

Changes that have occurred to the medium size class have generally been in the opposite direction to those described above. The medium size class became a larger percent of the landscape and the average patch size generally became much bigger. In addition, the patch sizes became more variable.

The FRAGSTATS analysis concluded that overall, there has been a homogenization and simplification of landscape patterns for forest structure. Landscapes have increasingly become dominated by large patches of medium size trees and there is less variability in internal structure or composition of these medium size patches. Meanwhile, the patches of the smallest and largest size classes are fragmented into smaller patches with more edge and less interior area.

Other assessments have been conducted to investigate how the pattern of other forest characteristics (e.g., forest cover types, crown cover, snags, tree density, etc.) has changed over time, and how those changes may have influenced the susceptibility of the forests to insect and disease disturbances. For example, as part of the ICBEMP effort, a midscale assessment was conducted to determine how the cumulative changes in forest composition, structure, and pattern have affected the vulnerability of the forest to insects, diseases, and wildfires (Hessburg et al. 1999, Hessburg et al. 2000). As part of that assessment, several subwatersheds that occur on the KNF (Yaak) were analyzed. Conclusions made that are applicable to those watersheds regarding how the landscape pattern has changed regarding insect susceptibility include:

- Areas dominated by lodgepole pine forests have aged and become more synchronous in their vulnerability to mountain pine beetles and fires;

- The lodgepole pine exhibited larger tree size, poorer crown differentiation, higher crown cover and greater contiguity of those characteristics;
- There are greater areas vulnerable to fir engraver bark beetles and;
- The area and connectivity of forests that is vulnerable to western spruce beetles has increased.

For root diseases, the changes in the forest has generally increased the vulnerability to armillaria, annosum and laminated root diseases (as well tomentosus and butt rots). With regard to wildfires and smoke production, changes to forest conditions were such that a larger percentage of the landscapes would burn with greater intensities and produce more smoke than historically. The fuel loading, predicted fuel consumption, and expected smoke production estimates generally increased as did the intensity, flame length and crown fire potential. However, Hessburg et al. (2000) concludes that management activities have not made entire landscapes prone to uncharacteristic wildfires, but rather, they have removed the spatial isolation that patches of forests prone to stand replacement fires once exhibited.

Changes to the landscape pattern have occurred largely as a result of a cool phase of the pacific decadal oscillation between 1940 to 1980 (which helped make fire suppression effective until the warm phase of the pacific decadal oscillation became dominate in the late 1980s through 2007), the introduction of the non-native blister rust disease, and the historical timber harvest patterns and types. There is a growing body of evidence that the types of changes to landscape patterns and conditions discussed above have increased the susceptibility of the forests to larger and/or different kinds of disturbances, especially when considered in light of the potential climate change affects.

Bark beetle outbreaks generally occur in areas where there is a large expanse of forest with fairly homogenous conditions of host tree species of a susceptible age/condition (Fettig et al. 2007, Samman and Logan 2000). On portions of the KNF, the hazard of significant mortality from either mountain pine beetle or Douglas-fir beetle is fairly high as a result of having these conditions. For these bark beetles (as well as other species), the severity of outbreaks and tree mortality can be reduced in extent by increasing the diversity of stand ages, size classes, and tree species in landscapes that are homogenous (Bentz et al. 2010, Bollenbacher 2010, Fettig et al. 2007).

As the fuels and forest structures have homogenized over the landscapes, the potential for large, high intensity wildfires has increased, and climate change effects will likely exasperate this trend (USDA 2010). Research has shown that the spread of wildfires and the potential for large fire growth across a landscape can be limited by reducing fuel continuity (Ager, Finney, & Vaillant 2010, Collins et al. 2009, Finney and Cohen 2003, Finney 2007, Hessburg et al. 2007, Safford et al. 2009, Stephens et al. 2009). In addition, large landscapes (e.g., wilderness areas) where wildfires have been allowed to burn can develop fuel heterogeneity; therefore, future fires could be limited in size relative to other landscapes that have more homogeneity in fuel conditions (Bollenbacher 2010, Collins et al. 2009, Rollins et al. 2002, and van Wagtendonk 2004). In addition, patterns of old burns can delay and detour the spread of new fires.

Promoting Resistance and Resiliency to Disturbance and Stress Agents

Numerous changes have occurred to the forest on the KNF relative to historical conditions. To various degrees and in different ways, these changes have affected the composition, structure, landscape pattern, and ecological processes. These altered conditions have predisposed the Forest to new levels and types of disturbances (e.g., uncharacteristic fires as well as both native

and non-native insects and diseases). From the perspective of maintaining biodiversity and healthy forest ecosystems, these trends are not desirable. In addition, future climate change will add to the list of existing forest "stressors."

Forest ecologists and other scientists are increasingly noting that "resistance" and "resilience" are important concepts as they relate to sustainability, biodiversity, and climate change (Blate et. al. 2009, Drever et. al. 2006, Folke et. al. 2004, Hansen et. al. 2003, Joyce et. al. 2008, Millar et. al. 2007, Noss 2001, Stephens et. al. 2010, Thompson et. al. 2009, Unnasch et. al. 2009, Walker et. al. 2004, Walker and Salt 2006). Resistance refers to the capacity of ecosystems to tolerate disturbances without exhibiting significant change in structure and composition, while resilience refers to the ability of a system to recover from disturbance in the event that the disturbance exceeds the capacity of the system to resist changing (Holling 1973). To improve adaptation of forest vegetation to the likely effects of climate change, these same researchers suggest promoting resistance and resiliency. Reducing the impact of current stressors has been called a "…no regrets adaptation strategy that could be taken now to help enhance ecosystem resilience to climate change, at least in the near term" (Joyce et al. 2008). Joyce goes on to explain that "[e]fforts to address the existing stressors would address current management needs, allow an incremental approach that begins to incorporate climate into management and planning, and potentially reduce the future interactions of these stressors with climate change."

Adaptations options are presented in the KIPZ Climate Change Report (USDA Forest Service 2010), "….emphasize management actions that address existing stressors, contribute to multiple land management objectives regardless of climate change (win-win), and are likely to be effective at achieving or maintaining desired conditions across a wide range of future climates. Their application in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity of the KNF to meet the needs of present and future generations." One of these options is to:

> Increase the resilience of forest vegetation by reducing the potential severity of wildfire and insect outbreaks. Managing the density of trees can improve forest resiliency by reducing water stress, decreasing susceptibility to insect and disease mortality, and decreasing the likelihood of stand-replacing wildfires. Management actions that increase the diversity of stand ages, size classes, and tree species in currently homogenous landscapes can reduce the extent and severity of bark beetle outbreaks and wildland fires. Mechanical treatments, prescribed fire, and managing wildland fires for resource benefits are all potential tools for increasing the resiliency of forest vegetation to climate and other stressors. In addition, existing programs to reduce the vulnerability of whitebark pine and western white pine to white pine blister rust will also improve the resistance of these species to the added stresses associated with climate change.

When developing the goals, desired future conditions, objectives and standards in the Forest Plan that pertain to forest vegetation, the concepts and management approaches discussed above regarding forest resistance and resiliency were utilized with the overall objective of maintaining and restoring the Forest biodiversity and sustainability.

Carbon Sequestration

Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (trunks, branches, foliage,

and roots) and soils. Forests also release carbon dioxide to the atmosphere as a result of respiration and decay of dead wood, litter, and organic matter in soils. In addition, forest fires release some stored carbon into the atmosphere in the combustion process, and insect outbreaks, fires, pathogens, drought stress, and wind storms kill trees and increase the amount of biomass available for decomposition by microorganisms. Timber harvesting removes carbon from the forest, although some of it is stored in wood products or used to produce energy – displacing fossil fuel use.

Sequestering carbon in forest ecosystems can help to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions. Interest in carbon sequestration has increased in an effort to explore opportunities for climate change mitigation. The KIPZ Climate Change Report provides a substantial amount of information on how terrestrial vegetation and disturbance processes can affect carbon cycles as well as forest productivity. The KNF and IPNF contribute approximately six tenths to eight tenths of one percent of the total U.S. forest carbon "reservoir." Estimated carbon stocks on forested areas of the KNF are approximately 171 million metric tons. In addition, preliminary estimates indicate that the forests on the KNF and IPNF currently serve as a net carbon sink, removing approximately 27 to 31 metric tons of carbon per acre per year. Harvested wood products increase the net sequestration on those forests by an undetermined amount. See the KIPZ Climate Change Report, for more detailed information on carbon sequestration.

On the KNF, carbon stocks will vary over coming decades in response to complex and uncertain interactions between climate variability and change, age structure, disturbance-recovery processes, and possible effects of carbon dioxide concentrations on forest productivity. High severity fires or large scale tree mortality from bark beetles will affect the amount of carbon sequestered by the KNF. An increase in root disease, with its associated limitation on the growth of stands, could lead to a reduction in the ability of the Forest to store carbon. In addition, timber harvesting will affect amount of carbon stored and the short-term net flux of carbon with the atmosphere.

Desired and Current Vegetation Conditions for Each Biophysical Setting

As described earlier, the KNF is comprised of three major biophysical settings: Warm/Dry; Warm/Moist; and Subalpine. Following is a description of the vegetation condition for each biophysical setting. The desired condition is first described in a narrative format for each setting and then the current forest composition and structure is compared to the desired condition using Dominance Groups and size class figures.

Warm/Dry Composition, Structure, and Pattern

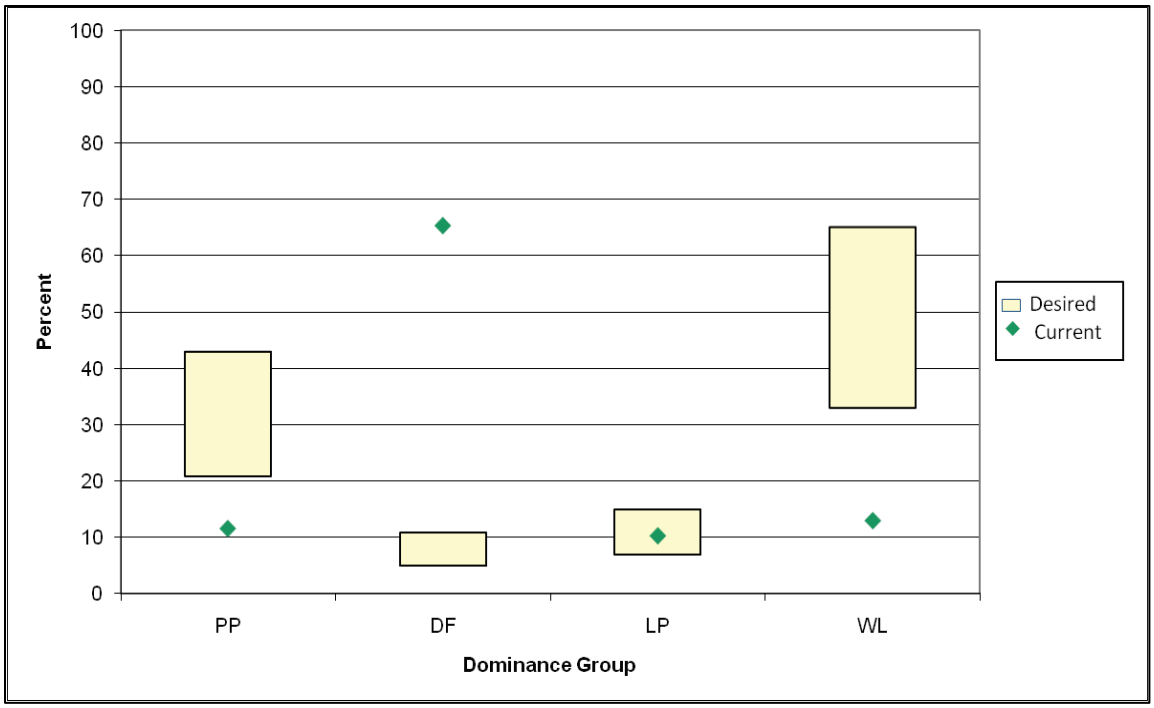
This biophysical setting includes the warmest and driest forest sites that support forest vegetation. These sites cover approximately 22 percent of the KNF forested lands and occur either at low elevations, at mid-elevations on southerly aspects, and/or on droughty soils (figure 6).

On the driest sites in this setting (vegetation response units 1 and the south and west aspects of unit 2), the stands are generally open-grown and park-like, containing abundant large-diameter ponderosa pine and lesser amounts of large-diameter Douglas-fir. Openings are generally less than five acres and occur within 20 to 200 acre patches. Stands are usually multi-aged and have a low tree density of 5 to 30 large mature trees per acre that are irregularly spaced in the stand.

On the moister sites within this setting (vegetation response units 3 and north and east aspects of unit 2), species composition varies with mixed Douglas-fir-western larch-ponderosa pine stands more prevalent on the moist end, and mixed ponderosa pine-Douglas-fir stands occurring on drier sites. At maturity, densities of trees generally vary from 15 to 60 trees per acre. However, on the moister sites, the tree density can exceed 100 trees per acre. The pattern for these landscapes is a mosaic with small to moderate size openings (less than 5 acres up to 10 acres) within larger patches (50 to 200 acres).

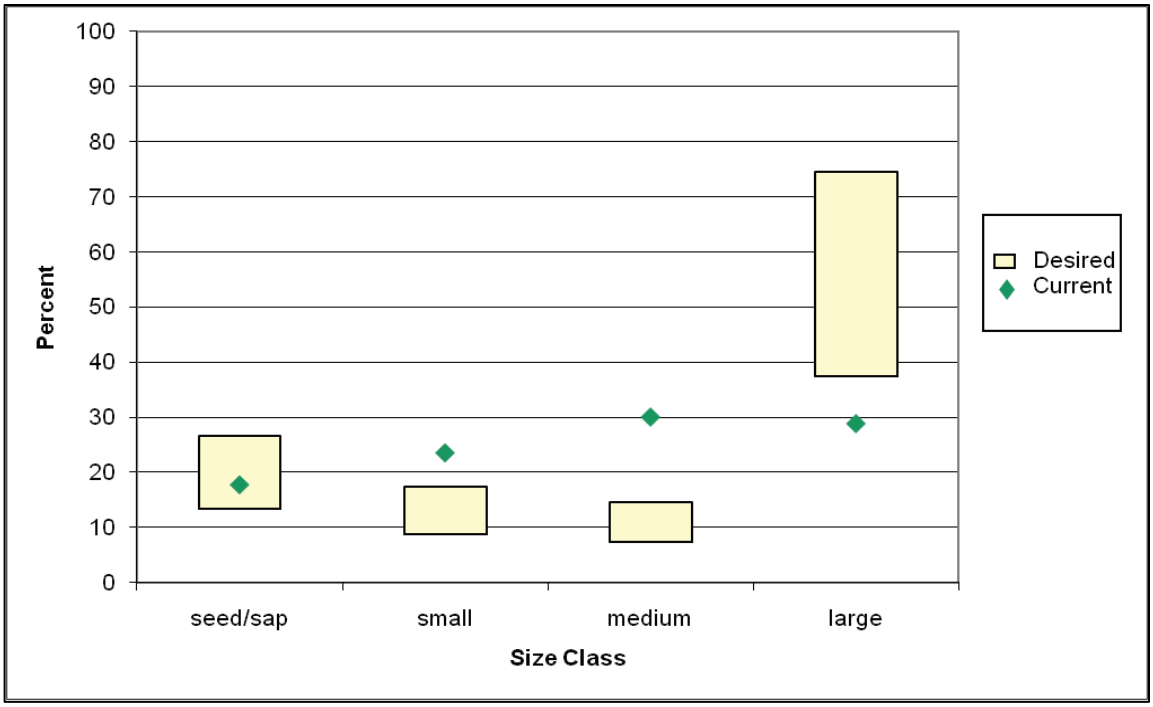
The pattern of successional stages in this warm/dry setting is such that fire or insects and diseases do not dominate the landscape at any one time. As the Forest trends towards the desired conditions, uncharacteristic levels of bark beetles, root disease, and fire intensity, decrease over time.

Figure 10 shows current species composition and desired ranges for the dominance groups found in this biophysical setting. As indicated in figure 10, ponderosa pine and western larch are well below desired conditions, while Douglas-fir is well above. The desire is to increase the amount of ponderosa pine and western larch while decreasing Douglas-fir.



PP = ponderosa pine; DF = Douglas-fir; LP = lodgepole pine; and WL = western larch

Figure 10. Desired and Current Forest Composition by Dominance Group for the warm/dry Biophysical Setting



(seed/sap= 0-5" DBH trees, small=5-10" DBH trees, medium=10-15" DBH trees, and large=>15" DBH trees.)

Figure 11. Vegetation Desired Condition and Current Vegetation for Size Class for the warm/dry Biophysical Setting

Figure 11 shows current amounts and desired ranges of size classes for this biophysical setting. As indicated in figure 11, the large size class is below desired conditions, while small and medium size classes are above. Seedling/saplings are at the low end of their desired range. The desire is to increase the amount of large and seedling/sapling size classes while reducing the amount of small and medium size classes.

Warm/Moist Composition, Structure and Pattern

This biophysical setting includes moist forest sites that are relatively warm. Approximately 37 percent of KNF forested lands are within this biophysical setting. This setting includes low-elevation upland sites with deeper soils on north and east aspects, extensive mid-elevation moist upland sites, and most low and mid-elevation wet stream bottoms and riparian benches and toe-slopes.

On the drier aspects, early-seral tree species such as western larch and western white pine, and in some cases Douglas-fir (where root disease risk is low), dominate throughout all successional structural stages. Other tree species occur in smaller quantities, including grand fir, and in colder locations, Engelmann spruce and lodgepole pine. On the dry end on warm exposures and/or well drained soils, ponderosa pine is a seral component. Stands generally have either a single age-class or have two age-classes. Stands having two-aged classes resemble mixed-severity fire conditions, usually with fire-tolerant western larch and Douglas-fir in the overstory. At maturity, stands have approximately 100 trees per acre and have canopy coverage of 60 percent or more. Stands dominated by western larch have a lower density, with 40 to 70 trees per acre and canopy coverage of 30 to 40 percent.

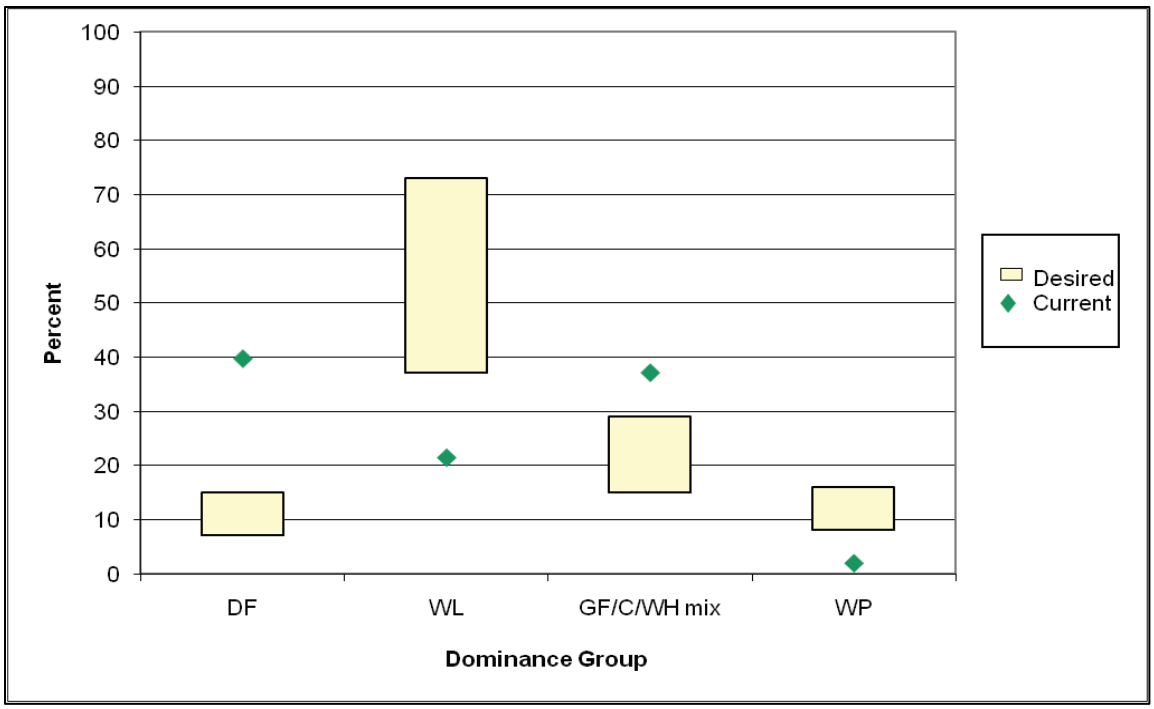
In the moderately cool and moist uplands, forests include a mixture dominated by early-seral shade intolerants (e.g., western larch, western white pine, lodgepole pine, Douglas-fir), with

seral shade tolerant species (e.g., grand fir, Engelmann spruce) and climax species forming a smaller proportion of the Forest. Single and two-age class forests are desirable during early, middle, and late-successional structural stages. Multi-storied forests increase in desirability when forests reach maturity. Desired stand density and canopy coverage are similar to desired conditions described above for the drier sites in the setting.

On wet sites, an abundance of large, old, mature forests occur and are often dominated by the climax western hemlock and western red cedar. High tree densities and canopy coverage of 70 percent or more exist through most successional structural stages. Mature stands support very large trees (often 30 to 50 inches in diameter), are open-grown and occasionally park-like in appearance, and are generally two- or multi-storied.

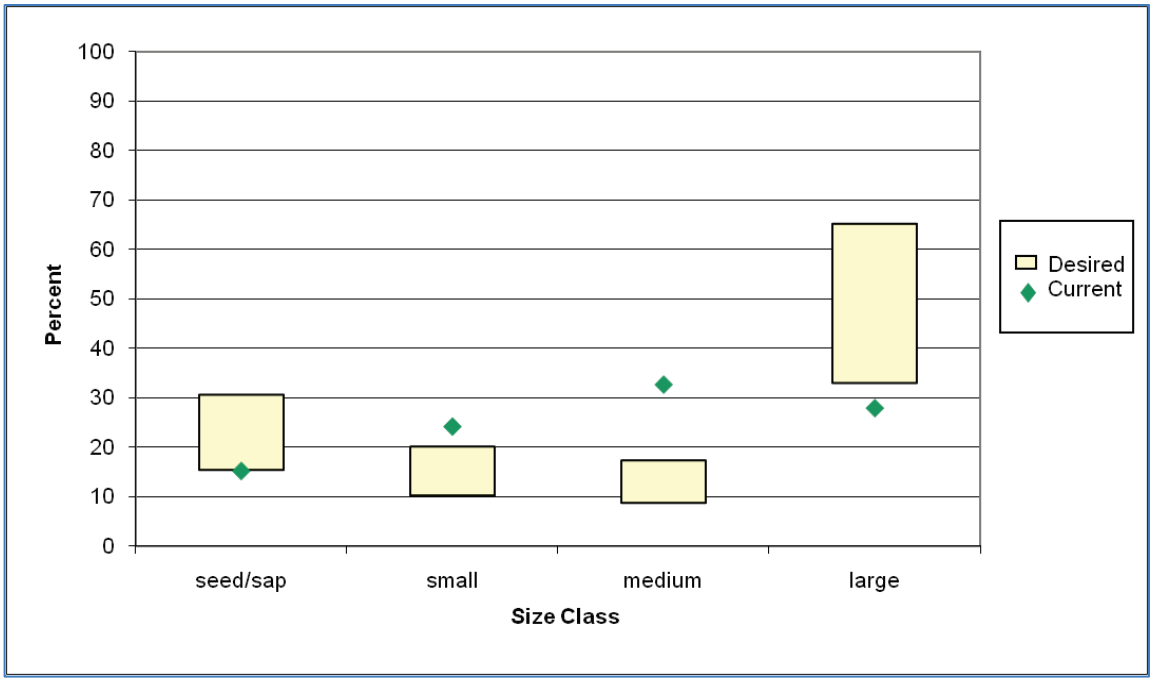
The resulting pattern for these landscapes is coarse and includes large, distinguishable patches, with residual structural diversity and heterogeneity both within and between patches. The pattern of successional stages is such that fire or insects and diseases do not dominate the landscape at any one time. As the Forest trends towards the desired conditions for this biophysical setting, uncharacteristic levels of root disease, bark beetles and fire intensity, would decrease over time.

Figure 12 shows current species composition and desired ranges for the dominance groups found in this biophysical setting. As indicated in figure 12, western larch and white pine are under-represented while Douglas-fir and grand fir/cedar/hemlock are over-represented. The desire is to increase the amount of western larch and white pine while decreasing Douglas-fir and grand fir/cedar/hemlock.



DF = Douglas-fir; WL = western larch; GF/C/WH mix = grand fir/cedar/western hemlock mix; WP = white pine

Figure 12. Desired and Current Forest Composition by Dominance Type for the warm/moist Biophysical Setting



(seed/sap = 0-5" DBH trees, small =5-10" DBH trees, medium =10-15" DBH trees, and large =>15" DBH trees.)

Figure 13. Desired and Current Forest Structures by Size Classes for the warm/moist Biophysical Setting

Figure 13 shows current amounts and desired ranges of size classes for this biophysical setting. As indicated in figure 13, the large and seedling/sapling size classes are below desired conditions, while small and medium size classes are above. The desire is to increase the amount of seedling/saplings and large size classes while reducing the amount of small and medium size classes.

Subalpine Composition, Structure and Pattern

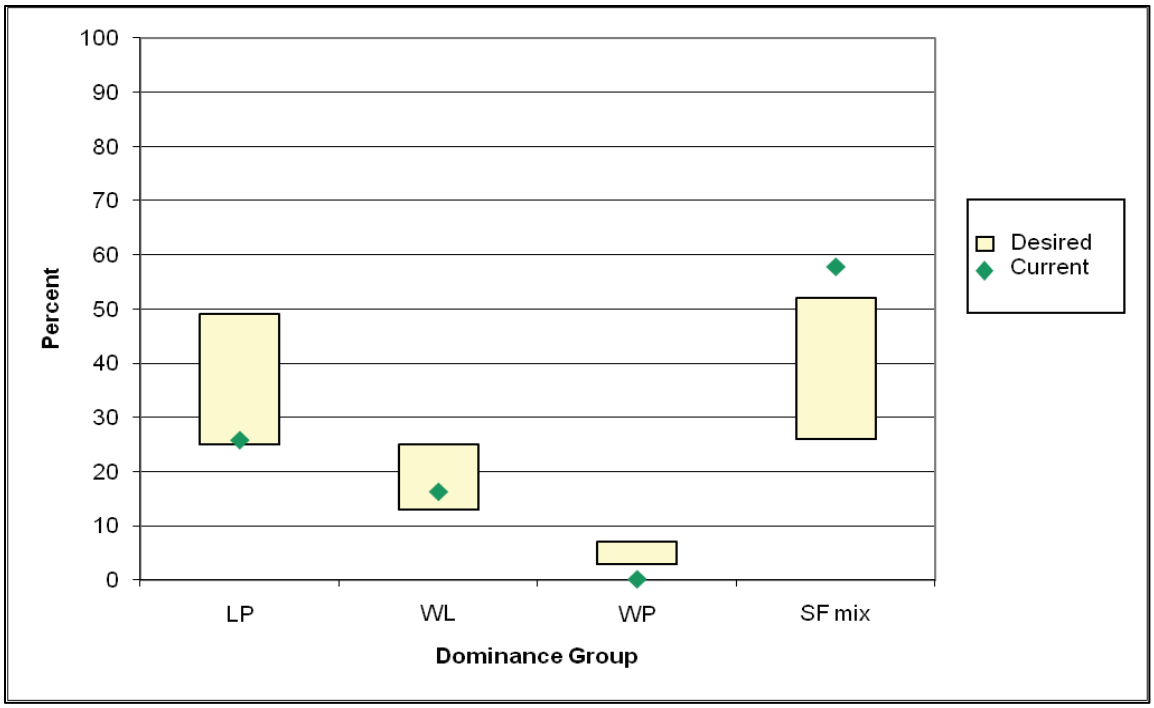
This biophysical setting occurs over approximately 41 percent of the KNF forested lands and occupies the higher elevations of the Forest. This setting ranges from the cool and moist lower subalpine sites, up to the cold and dry high elevation sites that have more open forests. Western larch, western white pine, Engelmann spruce, and Douglas-fir are seral dominants, while lodgepole pine dominates areas less often in colder locations. Grand fir occurs on the warmer sites. Climax species, subalpine fir, and mountain hemlock also occur on colder sites where fire-free intervals exceed the life span of lodgepole pine. Forests consists of two-aged forests (usually western larch/Douglas-fir in the overstory), and single-aged forests (seral mixed conifers, lodgepole or spruce-dominated stands). Multi-aged stands are less common, but do exist with discrete age groups in older forests where several canopy layers exist. There are approximately 80 to 120 trees per acre at maturity and canopy coverage is 60 percent or more.

On high elevation sites in this biophysical setting, whitebark pine restoration efforts have increased the abundance of this species. Forests are low to moderate in density, and have conditions that would have been supported by mixed-severity fires. Other species include lodgepole pine, mountain hemlock, subalpine fir, and Engelmann spruce. Canopy coverage is generally less than 80 percent at maturity, much less at timberline sites. Forest conditions include numerous small openings (one-half to three acres in size) that are available for whitebark pine regeneration. Multi-aged stands are desirable, predominately occurring in discrete age-class

groups. At the seedling stage, the desirable numbers include at least 100 trees per acre of whitebark pine that have some blister rust resistance, with 30 to 80 trees per acre at maturity. At the extreme timberline sites, trees grow in clusters.

The resulting pattern for these landscapes includes a variety of patch sizes, with residual structural diversity and heterogeneity both within and between patches. In some locations in this subalpine setting, there are existing homogenous patches of extensive lodgepole pine dominated forests in the medium and large size classes. These forests are very susceptible to large bark beetle outbreaks and/or wildfires. The desired condition is that the pattern of these areas be diversified. The pattern of successional stages is such that fire, insect or diseases do not dominate the landscape at any one time.

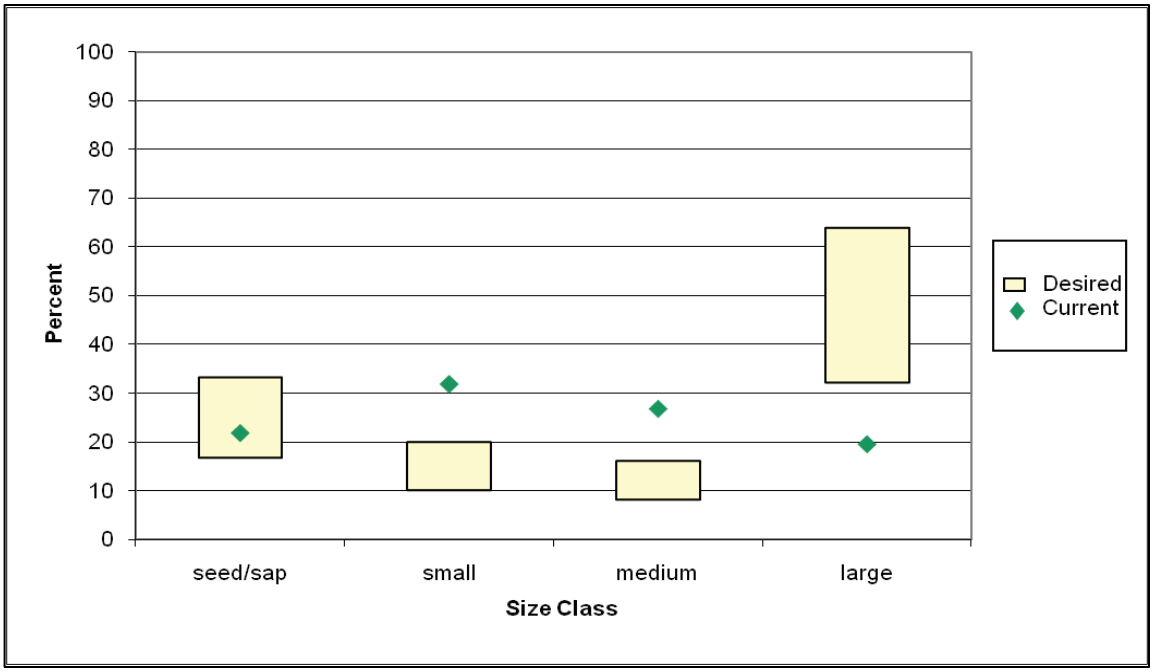
Figure 14 shows current species composition and desired ranges for the dominance groups found in this biophysical setting. As indicated in figure 14, white pine is below and western larch and lodgepole pine are at the bottom of their desired ranges while spruce/fir is above their desired range. The desire is to increase the amount of lodgepole pine, western larch and white pine while decreasing spruce/fir.



LP = lodgepole pine; WL = western larch; WP = white pine; SF mix = subalpine fir mix

Figure 14. Desired and Current Forest Composition by Dominance Group for the Subalpine Biophysical Setting

Figure 15 shows current amounts and desired ranges of size classes for this biophysical setting. As indicated in figure 15, the large size class is below desired conditions, while small and medium size classes are above. Seedling/saplings are at the low end of their desired range. The desire is to increase the amount of seedling/saplings and large size classes while reducing the amount of small and medium size classes.



(seed/sap = 0-5" DBH trees, small=5-10" DBH trees, medium =10-15" DBH trees, and large =>15" DBH trees.)

Figure 15. Desired and Current Forest Structure by Size Classes for the Subalpine Biophysical Group

Environmental Consequences

Forest Vegetation

The following discussion focuses on describing how forest vegetation would be affected by implementing the different alternatives. More specifically, the effects to forest composition, structure, landscape pattern, resistance and resiliency to disturbances and stress agents, and carbon sequestration will be addressed. For each topic and alternative, the relevant management direction is first summarized followed by the effects.

Forest Composition and Structure

Management Direction

Alternative A – No-action Alternative

Alternative A would retain all of the 1987 Forest Plan direction regarding the management of forest vegetation. With regard to forest composition, the existing Forest Plan contains very little direction on the desired conditions for vegetation and management approaches to achieve them. Some direction is specifically targeted towards lodgepole pine (e.g., forestwide goal #16, timber objective #4, and a protection objective, p. II-10) with the intent to reduce the amount of stands on the KNF that are dominated by this species and that are in a susceptible condition to attacks by mountain pine beetle attacks.

The 1987 Forest Plan contains direction that addresses items related to forest structure. Some of these components are associated with the desire to have diverse age classes of forest stands for the purpose of maintaining the viability of all species (e.g., forestwide goal #7) or sufficient snags and replacement snags for snag-dependent species (e.g., forestwide goal #8 and wildlife

and fish objective, p. II-7). There is some forestwide direction related to old growth (e.g., forestwide wildlife and fish objective p. II-7, forestwide standard, p. II-22) as well as an entire MA13 assigned to old growth. The old growth related MA contains a goal of maintaining a minimum of 10 percent of each of the drainages in old growth, with the type of old growth representing the major habitat types and species. Lastly, that MA contains numerous standards for old growth that relate to what kind of activities may or may not occur in old growth stands and what kind of fire suppression activities and strategies should be taken.

As described in a number of the 1987 Forest Plan components as well as the final EIS for that Plan, activities related to timber management (e.g., timber harvesting, tree planting, pre-commercial tree thinning) were envisioned as the primary means that would be used to manage the Forest. For forest lands identified as suitable for timber production (approximately 56 percent of the total forested lands on the KNF) the objective was to manage those timber stands (with the exception of some old growth stands) with a "rotation age" of 80 to 120 years (i.e., the stands would be regenerated by a harvest at an interval of between 80 and 120 years). Although some of the MA prescriptions in the Plan allowed the use of unplanned natural wildfire ignitions to help achieve Forest Plan goals and objectives, that tool has seldom been used since the Plan was adopted.

In addition to the direction described above that is only applicable to Alternative A, the following Plan direction is common to all alternatives and could potentially affect forest composition and structure. The "retained existing Forest Plan direction" (see chapter 1 and appendix C in the draft Plan for more information on this direction) in the draft Plan that could potentially affect the forest composition and structure includes the INFISH (USDA Forest Service 1995), Northern Rockies Lynx Management Direction (NRLMD) (USDA Forest Service 2007), and the Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (FSEIS). All of this direction influences where vegetation management treatments can occur and/or what kind of treatments can be used, including prescribed fires and wildfires being managed for multiple resource benefits.

Action Alternatives B, C, and D

Alternatives B, C, and D contain forestwide goals (Goal-01) and desired conditions for both forest composition (FW-DC-VEG-01) and structure (FW-DC-VEG-02, 03, 04, 07 and 08). Desired forest composition and structure conditions are also provided for each of the three biophysical settings. Additional desired conditions for forest composition and structure are provided at the geographic area scale to address unique condition for individual GAs.

These alternatives also have forestwide objectives (FW-OBJ-VEG-01), standards (FW-STD-VEG-01, 02) and guidelines (FW-GDL-VEG-01, 02, 03, 04, 05 and 06) designed to move vegetation towards desired conditions.

These alternatives contain direction as to the desired role that fire (both prescribed fire and wildfire) would have in affecting the forest composition and structure. For example, at the forestwide scale, a desired condition (FW-DC-FIRE-03) and two objectives (FW-OBJ-FIRE-01, 02) emphasize the desire to have fire play an increased role in trending the vegetation towards the desired conditions. In addition, many of the individual MAs contain similar direction on the role of fire.

As discussed above under the no-action alternative, the applicable "Retained Existing Forest Plan Direction" contains direction that will influence management of forest composition and structure.

General Effects

Vegetation management activities for each alternative were formulated by considering the MAs, land suitability, multiple-use objectives, and the management requirements set forth in NFMA. The type and amount of vegetation management and the effect on vegetation composition and size classes was modeled using Spectrum. See appendix B of this EIS for a description of this model. A specific model was developed for each alternative, with management actions and objective functions varying based on the theme of the alternative. Alternative A was run with an objective to maximize timber production while Alternatives B and C had objectives to move towards the desired forest composition (Dominance Groups) and structure (size classes) as quickly as possible, while meeting other resource constraints. Alternative D had an objective function to maximize timber and then to move towards vegetation desired condition. All solutions were finally run with an objective to maximize present net value to ensure economic efficiency in vegetation treatments.

The models included management actions for timber harvest and prescribed burning (except in Alternative A). Prescribed burning was not included in Alternative A because it had no objective to move towards vegetation desired conditions. The models also included a predetermined amount of stand-replacing wildfire – approximately 2500 acres per decade (see appendix B for the analysis process in developing this number). For all of the forested areas, including where timber harvest or prescribed burning occurred as well as where those activities did not occur, the models simulated general tree growth and mortality processes.

Several outputs were tracked by the models including dominance groups, size classes, snag density, fire and insect hazard, and carbon sequestration. Dominance groups and size classes were included as objectives for management, while the other outputs were merely reported by the models.

The model for each alternative was run twice. First it was run with a budget constraint, limiting timber harvest activities to what could be funded under current budget levels. The model was then run without a budget constraint to determine the amount of active management activities that could take place, given unlimited funds while meeting other resource constraints.

Several constraints were included in the model to provide for other resource management concerns, operational limits, and NFMA requirements. See appendix B for a complete discussion of the model components.

Throughout this section, Spectrum results are shown for each alternative. It is important to note there are several limitations with the model. The model shows predicted changes given a set of assumptions, including the amount of stand-replacing wildfire and the effect of root disease on tree growth and mortality. The actual amount of stand-replacing wildfire and the amount and impact of root disease may be different from that modeled. Other natural disturbance, such as bark beetle infestations, blowdown, and drought were not included in the model. The model results are useful for understanding differences in alternatives and general trends in vegetation. Model results are not objectives for plan implementation but merely indicators of how vegetation may change over time based on management activities, a limited amount of disturbances (e.g., wildfire), and general forest successional processes. Results vary by alternative based on MA

allocation, the theme of the alternative, and management intensity. For the remainder of the discussions regarding the Spectrum modeling results, the phrases “active management” or “actively managed” are used to denote acres that were simulated by the models to have either timber harvest or prescribed burning activities conducted on them.

The objective function to move towards vegetation desired condition was modeled using penalty points. In each decade of the model every acre short of the desired condition minimum or in excess of the desired condition maximum is assigned a penalty point. Vegetation desired conditions were treated equally; no one condition had a higher priority than another condition. For example, the model simulations did not place more or less emphasis on achieving the desired dominance groups than on the desired size class. The objective was to minimize total penalty points. Thus, alternatives with lower overall penalty points do a better job of moving vegetation towards desired conditions than those alternatives with higher penalty points. Table 12 displays the total penalty points over the planning horizon (250 years) by alternative, both with and without a budget constraint. In addition, the table displays the number of acres and percent of the total forested area that is predicted to be actively managed in the first decade as well as over the entire planning horizon (250 years).

Table 12. Movement towards Desired Condition and Acres Actively Managed by Alternative

Alternative	Desired Condition Penalty Points	Acres Vegetation Management Decade 1	Percent of Forest with Vegetation Mgmt Decade 1	Total Acres Vegetation Management 1	Percent of Forest with Vegetation Management 1
A – without budget constraint		55,266	2.5%	828,015	37%
A – with budget constraint		52,937	2.4%	331,949	15%
B – without budget constraint	28,388,006	161,480	7.3%	956,063	43%
B – with budget constraint	34,947,172	156,888	7.1%	546,119	25%
C – without budget constraint	28,828,886	159,866	7.2%	925,245	42%
C – with budget constraint	33,902,576	157,405	7.1%	547,227	25%
D – without budget constraint	29,178,710	142,142	6.4%	963,319	43%
D – with budget constraint	38,514,160	148,331	6.7%	534,220	24%

1 These are the total acres actively managed over the 250 year planning horizon for the model.

Table 12 shows Alternative B has the lowest penalty points when there is no budget and, thus, does the best job of moving towards vegetation desired conditions. Alternatives B and C have

similar results for moving towards vegetation desired condition with a constrained budget. Alternative D is not as effective at moving towards vegetation desired condition as B and C. Alternative A does not have a measurement for desired condition penalty points as there was no objective function for this alternative to move towards vegetation desired condition.

Table 12 also shows that all of the action alternatives would do more vegetation treatments than would Alternative A when there is no budget, but Alternatives B and C have the most acres of vegetation management when budget is limited. Alternative A does the least amount of vegetation management. The model for Alternative A did not include prescribed burning as a vegetation management activity, since the model had no objective to move towards vegetation desired condition.

Over the entire 250 year planning horizon that was modeled, table 12 indicates that the alternatives actively manage vegetation on 37 to 43 percent of the total acres for the unconstrained budget scenario, and between 15 and 25 for the constrained budget.

Table 13 illustrates the change to forest composition (indicated by the distribution of dominance groups) by alternative over the next five decades. The table includes the change needed from current conditions in order to be within the range for desired conditions. Acres by alternative include changes for all forested acres; both those that had timber harvest or prescribed burning activities, and those that did not.

Table 13 indicates some of the dominance groups are moving towards desired conditions while others are not. Those that are generally moving towards the desired conditions under both budget scenarios include ponderosa pine, western larch (with the exception of Alternative A), white pine, and Douglas-fir. Those that are moving away from desired conditions under both budget scenarios include subalpine fir mix and lodgepole pine. The consequences to the grand fir/cedar/western hemlock mix dominance group vary substantially by alternative and budget scenario.

Table 13. Change in Acres by Dominance Group by Alternative over the next 50 Years

Dominance Group	Minimum Change needed to be within Desired Condition Range	Alt A 1	Alt B	Alt C	Alt D
Results with Unconstrained Budget					
Ponderosa Pine	+37,000	+31,929	+78,038	+77,093	+48,433
Douglas-fir	-437,700	-225,273	-362,453	-363,229	-318,022
Lodgepole Pine	Within 2	-215,315	-198,183	-200,219	-211,973
Western Larch	+252,800	-8,413	+286,446	+288,402	+274,497
Grand fir/Cedar/ Western Hemlock mix	-6,100	+210,853	-1,265	-714	+4,708
White Pine	+67,800	+14,145	+4,565	+4,114	+16,677
Subalpine Fir mix	-73,900	+192,074	+192,853	+194,552	+185,680
Results with Constrained Budget					
Ponderosa Pine	+37,000	+12,762	+32,606	+66,561	+30,422
Douglas-fir	-437,700	-198,873	-298,947	-338,395	-300,818
Lodgepole Pine	Within 2	-217,102	-212,707	-220,583	-234,381

Dominance Group	Minimum Change needed to be within Desired Condition Range	Alt A 1	Alt B	Alt C	Alt D
Western Larch	+252,800	-37,117	+285,797	+279,641	+280,614
Grand fir/Cedar/ Western Hemlock mix	-6,100	+203,748	-17,321	+2,204	-20,300
White Pine	+67,800	+26,777	+19,421	+32,850	+30,388
Subalpine fir mix	-73,900	+209,805	+201,151	+210,572	+214,075

1 Alternative A does not have an objective to manage for vegetation desired condition. Numbers reported are results only, and not a desired outcome from the model.

2 Lodgepole pine is currently within the desired condition range. To stay within the range, there should be no more than a 94,500 acre reduction or no more than a 131,600 acre increase in Lodgepole pine.

As shown by the constrained budget scenario, Alternative C generally (with the exception of western larch) has the most beneficial consequences on the forest composition. Under Alternative C, the dominance groups that are trending toward desired conditions generally do so to a greater degree than the other alternatives. Also, with one exception (Alternative B), for those dominance groups that are generally trending away from desired conditions, they generally do so to a lesser degree under Alternative C than the other alternatives. Under this constrained budget scenario, compared to Alternative A, all of the action alternatives are predicted to make much more progress towards the desired conditions. In comparing the action alternatives to one another and generally ranking them from best to worst, Alternative C would be the best, Alternative B second best (very close to Alternative C), Alternative D third, and Alternative A the worst.

Two dominance groups are not moving towards vegetation desired condition: lodgepole pine and the subalpine fir mix. There are several factors influencing the movement away from desired condition. A large percentage of stands in the subalpine fir mix dominance group occur in areas that are not suitable for timber production and, therefore, are less actively managed with timber harvest. For lodgepole pine, it is an early successional species. With natural succession, the amount of this species is reduced over time, with it moving into the spruce/fir mix. Natural succession also increases the amount of spruce/fir mix as the lodgepole pine and western larch are outcompeted by the shade-tolerant subalpine fir in the absence of disturbances.

The amount of the Forest without active management has a large affect on movement towards desired condition. As shown in table 12 above, only 15 to 43 percent (depending upon budget scenario and alternative) of the Forest is predicted to have active vegetation management over the model's planning horizon (250 years). The remaining 57-85 percent would continue to change slowly over time (barring large wildfires, insect outbreaks or other disturbances) but most of the changes in species composition would be in the opposite direction from what is desired. In general, the desired trend is to obtain more forests dominated by early seral, shade-intolerant species (e.g., western larch, ponderosa pine, white pine, and white bark pine); yet without either active management (harvest and/or prescribe burning) or wildfires, the portion of the Forest with no active management will continue the current trend of becoming dominated by more and more shade-tolerant, mid to late seral tree species (e.g., Douglas-fir, grand fir, western hemlock, cedar, and subalpine fir). If more wildfire were to actually occur than was simulated in the models, then it is likely that it would improve the trajectory toward desired condition by converting some areas currently dominated by grand fir/cedar/hemlock mix or subalpine mix dominance groups to stands of white pine, western larch, and ponderosa pine.

Broadleaved tree species (e.g., water birch, paper birch, quaking aspen, and black cottonwood) dominate relatively few forest stands on the KNF (approximately 0.7 percent). These species were not included in the modeling and thus no quantitative estimates are provided as to how they may increase or decrease in abundance under the different alternatives. However, some general qualitative trends can be predicted based on the knowledge of the silvics[1] of these trees along with an understanding of how the predicted amounts of active management and wildfires may impact the species. All of these broadleaved species can be characterized as being intolerant or very intolerant of shade, and of being early seral or pioneer species (Burns and Honkala 1990). With one exception (black cottonwood) these species live relatively short lives. All of these species are dependent upon disturbances to regenerate themselves. It could be wildfire, prescribed burning, timber harvesting, riparian flooding, or another type of disturbance that provides growing space and suitable conditions for the establishment and growth of these trees. Historically, wildfire was probably the most important disturbance agent in perpetuating these species on upland sites, while a combination of wildfires, blowdown and flooding were likely the most important in the riparian areas. Without active management, it is expected that these broadleaved species will continue to decrease in abundance. Alternative C has the most acres of active and passive management (vegetation treatments plus wildfire) and would result in the greatest increase in acres of these species. Alternative A would have the least acres for management or wildfire and would result in the least amount of acres in these species.

As described in the “Affected Environment” section, whitebark pine occurs over a small percentage of the Forest (approximately two percent) and this species has been declining in abundance due to bark beetles, blister rust, and fire exclusion. Alternative C would provide the most acres of vegetation management, including prescribed fire, timber harvest, and wildfire and would result in the most acres of whitebark pine. Alternative A would have the least acres for management or wildfire and would result in the least amount of acres of whitebark pine.

Table 14 illustrates the change to forest size class by alternative over the next five decades. The table includes the change needed from current conditions in order to be within the range for desired conditions. Acres by alternative include changes for all acres, including lands that are actively managed and those that are not.

[1] Silvics is known as the study of the life history and general characteristics of forest trees and stands, with particular reference to environmental factors.

Table 14. Change in Acres by Size Class by Alternative over the next 50 Years

Size Class	Minimum Change needed to be within Desired Condition Range	Alt A 1	Alt B	Alt C	Alt D
Results with Unconstrained Budget					
Seedling/sapling	Within 2	-226,946	-197,185	-198,771	-189,481
Small	-172,600	-157,936	-122,510	-121,839	-137,942
Medium	-281,500	-215,632	-280,972	-285,204	-229,677
Large/Very large	+221,900	+600,513	+600,666	+605,814	+557,099
Results with Constrained Budget					
Seedling/sapling	Within 2	-262,748	-235,968	-229,090	-221,358
Small	-172,600	-159,369	-113,687	-144,036	-68,559
Medium	-281,500	-267,552	-350,628	-308,010	-393,877
Large/Very large	+221,900	+689,668	+700,283	+681,137	+683,795

1 Alternative A does not have an objective to manage for vegetation desired condition. Numbers reported are results only, and not a desired outcome from the model.

2 The seedling/sapling size class is within the desired range. If more than 76,000 acres are lost or more than 232,300 acres added, this size class will no longer be within the desired range.

Table 14 indicates the seedling/sapling size class is moving out of the desired range under all alternatives and in both budget scenarios. The amount of seedling/sapling size class decreases substantially by the 5th decade. This is because of the small amount of stand-replacing wildfire included in the model coupled with the relatively small amount of regeneration harvest that is predicted to occur. Under both budget scenarios, Alternative D has the least reduction and Alternative A the greatest reduction in this size class. If more stand-replacing wildfire occurs than what was included in the model simulations, then the amount of the seedling/sapling size class would increase and improve the movement towards desired condition.

For the small size class, table 14 indicates that after 50 years the amount of the small size class would decrease substantially (as desired) for all alternatives and both budget scenarios, but levels would still be higher than desired. For this size class, Alternative A would make the most progress in reducing the amount of the small size class.

The medium size class is greatly reduced (as desired) after 50 years under all alternatives and both budget scenarios. In the unconstrained budget scenario, Alternatives B and C get close or actually achieve the desired condition, while Alternatives A and D fall short. Under the constrained budget, all the alternatives except Alternative A move into the desired condition.

Table 14 shows the large/very large size class is greatly increasing under all alternatives and moves into the desired range. This is because of relatively small amount of acres that are regenerated through active management or the small amount of wildfire that is simulated. The medium size class grows into the large/very large size class. Regeneration harvest and stand-replacing wildfire are the activities that move vegetation out of the large/very large size class and into seedling/sapling/small size class. As the seeding/sapling, small and medium size classes grow in size; more acres develop into the large/very large size class.

Along with an increasing amount of the large/very large size class, there is an expected increase in old growth (estimated using the very large size class) under all alternatives. All action

alternatives show an increase in the very large size class by 7 to 9 percent over the next five decades.

As previously noted, if more stand-replacing wildfire occurs than was modeled there may be a more desirable overall improvement in the movement of size classes towards desired conditions. With a small amount of forested vegetation actively managed, with either regeneration harvest or simulated wildfires, only a small portion of the Forest is converted to the seedling/sapling size class. This in turn affects the amount of acres in small and medium size classes, resulting in levels below desired condition while the large and very large size classes see great increases.

In addition to using size classes to describe how forest structure may change over time as a result of implementing the various alternatives, the snag component of forest structure was also analyzed using the Spectrum model. A forest growth simulation model called Forest Vegetation Simulator was used to predict tree growth, mortality, and yield attributes for the Spectrum model (see appendix B). Snags were one of the many items estimated by Forest Vegetation Simulator and incorporated into the Spectrum model. The amount of snags by density class was reported by the Spectrum model. Amounts of snags were a result of management (or no management) actions. There were no constraints or objectives to manage for certain levels of snags in the model.

The “Affected Environment” section provides detailed information about the existing and desired snag quantities and sizes. Table 15 contains information on predicted changes during the next five decades to snag densities and sizes as a result of implementing the various alternatives. All alternatives show an increase in the percentage of acres that have the highest number of snags per acre (both the 10-20 inch diameter snags as well as the 20 inch+ diameter snags). All action alternatives would meet or exceed the standards and guidelines for snags.

Table 15. Percent of the Total Forested Acres that occur in each Snag Density and Size Class at Decade 1 and 5, and the Percent Change during that Period for each Alternative

Snag Size Class	Snag Density Class- # snags/ acre	Alternative A			Alternative B			Alternative C			Alternative D		
		Percent of Total Forested Acres		Percent Change	Percent of Total Forested Acres		Percent Change	Percent of Total Forested Acres		Percent Change	Percent of Total Forested Acres		Percent Change
		Decade 1	Decade 5		Decade 1	Decade 5		Decade 1	Decade 5		Decade 1	Decade 5	
Unconstrained Budget													
Snags 10-20" DBH	0-5.9	20	8	-12	20	7	-13	20	7	-13	20	8	-12
	6-9.9	6	11	5	7	11	5	7	11	5	7	12	5
	10+	73	81	8	73	82	9	73	82	9	73	79	6
Snags 20"+ DBH	0-0.9	29	25	-4	29	25	-4	29	25	-4	29	25	-4
	1-3.9	60	36	-24	60	36	-24	60	36	-24	60	37	-23
	4+	12	39	27	11	39	28	11	39	28	11	38	27
Constrained Budget													
Snags 10-20" DBH	0-5.9	20	5	-15	20	5	-15	20	5	-15	21	5	-16
	6-9.9	6	12	6	6	10	4	6	10	4	6	11	5
	10+	73	83	10	74	85	11	74	85	11	73	84	11
Snags 20"+ DBH	0-0.9	29	25	-4	29	25	-4	29	25	-4	29	25	-4
	1-3.9	60	36	-24	59	34	-25	60	34	-26	60	35	-25
	4+	11	39	28	12	41	29	12	41	29	11	40	29

Landscape Pattern

Management Direction

Alternative A – No-action Alternative

The existing Forest Plan contains minimal direction on the desired landscape pattern for forest vegetation. One forestwide wildlife standard (p. II-23) indicates that openings created by timber harvest would generally be 40 acres or less. For one specific MA (MA14) there is some direction that is specific to grizzly bear habitat regarding the desire to maintain corridors between harvest units and to maximize edge effects.

In addition to the direction described above that is only applicable to Alternative A, the following Plan direction is common to all alternatives and could potentially affect the landscape pattern of forest conditions. The "retained existing Forest Plan direction" in the draft Forest Plan (see chapter 1 and appendix C in the draft Forest Plan for more information on this direction) that could potentially affect landscape pattern includes the INFISH (USDA Forest Service 1995), NRLMD (USDA Forest Service 2007), and the Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones. When describing the effects that the alternatives would have on landscape patterns, the direction mentioned above was considered.

Action Alternatives B, C, and D

Alternatives B, C and D contain a forestwide goal (Goal-01) and a desired condition (FW-DC-VEG-05) on the desired pattern relative to the existing pattern for forest structure and composition. In addition, the desired pattern for forest structure and composition is provided for each of the three biophysical settings (FW-DC-VEG-11). The desired pattern for hazardous fuels is provided in FW-DC-FIRE-02 and the desired pattern for snags is described in FW-DC-VEG-07. At the smaller scale (GAs), additional direction is provided on certain aspects of landscape pattern (i.e., GADC-WL-FSH-01 and GADC-WL-LIB-01). There is also Forest Plan direction related to fire that affects landscape pattern.

General Effects

As discussed previously, past wildfire suppression efforts and timber harvest patterns have largely been responsible for creating a pattern of forest conditions (e.g., size class, species composition, stand structure, and density) different from historical patterns. The current pattern is more susceptible to some insects, diseases, and wildfire disturbances. Forest patches dominated by the smallest sized trees, as well as patches dominated by the largest trees, have decreased substantially in size relative to historical conditions. On the other hand, patches of forest dominated by trees of moderate size have become much larger. Across all size classes, fuel conditions and the continuity of stand structures has increased and become more homogenized at the landscape scale.

Alternative A does not contain direction to provide for improved landscape pattern. Under the direction of the current Forest Plan it is assumed that regeneration harvest treatments will continue to be relatively small in size, that commercial thinning treatments would only occur over small to moderate size areas, and that almost all wildfires would be suppressed and burned areas would be fairly small.

Alternative A would likely have the least beneficial effect on the pattern of size classes on the landscape (relative to the desired conditions). The patch size of the seed/sap size class would not

increase and the patch size of the small/medium size classes would not decrease. Although there are exceptions, a relatively high percentage of the large patches of forest that are dominated by stands in the small/medium size classes are located in MAs that either exclude the use of commercial timber harvesting or de-emphasize it. Therefore, without the use of prescribed burning at a large scale, or the use of wildfires in those areas to break up the continuity of fuels and stand structures, these large patches of forest dominated by medium size trees will not be reduced as desired. As discussed in more detail in the section about resistance and resiliency to disturbances, the ramifications of the predicted trends for landscape pattern include a greater likelihood that some disturbances, such as wildfires and bark beetles, may become larger and/or more intense in the future due to some of the connectivity of some of these forest conditions.

Under the action alternatives, management direction for landscape pattern is anticipated to lead to improvements in the pattern of forest vegetation on the landscape. The amount of improvement in landscape pattern is directly related to the amount of active or passive vegetation management that will occur.

Alternative C has the most acres of active and passive management (timber harvest, prescribed burning, and wildfire) and will improve landscape pattern the most. Alternative B would have the second most acres of passive and active management and Alternative D the least. As stated previously, Alternative A has the least direction as well as the least acres of passive and active management and would have the least affect on improving landscape pattern.

Resistance and Resiliency to Disturbances and Stress Agents

Management Direction

Alternative A – No-action Alternative

The 1987 Forest Plan does not contain any explicit direction regarding the management of the Forest for a goal or objective of maintaining or improving the resistance and/or the resiliency of the forest vegetation to disturbances and other forest stressors. However, through several Plan components, the Plan does portray the intent to protect the timber resource from insect, disease, and/or wildfire caused damage. The 1987 Plan contains a protection standard (#14, p. II-26) that indicates that integrated pest management strategies and treatments would be used to reduce losses from insects and diseases to acceptable levels. In addition, there are two objectives (Protection objective p. II-10 and Fire objective p. II-11) that express the desire to minimize the number of acres lost to damaging wildfires and to attempt to harvest as much of the lodgepole pine susceptible to mountain pine beetle as possible before it is killed. Finally, there is one forestwide goal (Goal #17) that expresses a desire to use prescribed fire to simulate natural ecological processes, prevent excessive natural and activity fuel buildups, create habitat diversity for wildlife, reduce suppression costs, and maintain ecosystems.

For Alternative A (as well as the other alternatives) the “retained existing Forest Plan direction” that has been previously discussed could affect this issue and, therefore, it was considered in the following analysis. As was done with other topics, some of the effects of this direction could be predicted with modeling, while other effects were addressed qualitatively.

Action Alternatives B, C, and D

These alternatives contain numerous Forest Plan components that provided direction regarding the need and desire to increase the resistance and resiliency of the forest conditions to disturbances and stressors. For example, forestwide vegetation and fire goals (Goal-01) and

desired conditions (FW-DC-VEG-01, 03, 04, 05, 06, 11, FW-DC-FIRE-02, 03) articulate the need and vision for managing the Forest towards that overall goal. In addition, forestwide vegetation and fire objectives (FW-OBJ-VEG-01, FW-OBJ-FIRE-01) and guidelines (FW-GDL-VEG-01, 02) contain additional direction and guidance on this topic.

As discussed above in the "Management Direction" section for Alternative A, some of the "retained existing Forest Plan direction" was considered for these alternatives as well.

General Effects

Forest conditions on the KNF are currently quite different from the range of historical conditions with regard to composition, structure, landscape pattern, and ecological processes. Consequently, the Forest is predisposed to new levels and types of stress agents and disturbances. Combined with the possible effects of climate change (discussed in more detail in the "Cumulative Effects" section), the current conditions are not desirable.

The resistance and resiliency of a forest to stress agents and disturbances is largely a function of the composition, structure (including density) and landscape pattern of forest conditions, and how those elements interact together. Both quantitative and qualitative information is utilized to assess how susceptible the forest may be to the various key stress agents.

The Forest Vegetation Simulator was used to model bark beetles, defoliating insects, and wildfire risk. These attributes were included in the growth and yield tables in the Spectrum model and reported for each run (see appendix B and Vandendriesche (2005) for more information on the Forest Vegetation Simulator and Spectrum modeling). Other important disturbances or stressors that could potentially affect the alternatives, such as root diseases, white pine blister rust and weather (e.g., drought, wind, and snow/ice) were addressed qualitatively.

Table 16 displays the Spectrum results for fire, bark beetle, and budworm hazard ratings for each alternative. The table shows current percent of the Forest by hazard rating and percent change in ratings from decade 1 to decade 5.

Fire hazard – As illustrated in table 16, a large percentage of the total forested acres on the KNF were rated as having a high, very high, or extreme fire hazard. This is decreased somewhat over the first five decades. Timber harvest and prescribed burning reduces the fire hazard in stands. However, even though the results in table 16 show a reduction in the percentage of the Forest in the combined high, very high and extreme hazard classes, the amount of Forest in the extreme class goes up substantially over time. This is a result of the acres in the high and very high categories, having a tendency to move into the extreme category. Alternatives with the most passive and active management will have the greatest impact on reducing the trend of increasing the amount of the Forest in the extreme category. Alternatives B and C reduce fire hazard the most and Alternative A the least. This is because Alternatives B and C have the most acres of active and passive management while Alternative A has the least amount of active management and does not include prescribed burning. Relative to the constrained budget scenario, the unconstrained budget scenario would result in a greater reduction in the higher hazard levels for all alternatives.

As presented in the "Forest Composition and Structure" section, the predicted trend for composition is an increase in subalpine fir mix dominance groups in the future, as well as the grand fir/cedar/western hemlock mix (under some alternatives). Relative to other tree species (e.g., ponderosa pine, western larch, white pine, and whitebark pine), these species tend to be very intolerant of fire (i.e., they have fewer traits to survive fires and are generally not as well

suited to regenerate after fires). Alternatives that reduce fire hazard the most (Alternatives B and C) will improve conditions for these fire intolerant species.

Table 16. Percent of Total Forested Acres of Fire, Bark Beetle and Defoliator Hazard Rating at Decade 1, and the Change between Decade 1 and Decade 5, by Alternative

Hazard Type	Hazard Rating	Decade 1- % of Total Acres	Percent Increase or Decrease of Total Acres from Decade 1 to Decade 5			
			Alt. A	Alt. B	Alt. C	Alt. D
Results with Unconstrained Budget						
Fire	Low/Moderate	7%	5%	21%	21%	18%
	High/Very High/Extreme	93%	-5%	-21%	-21%	-18%
Bark Beetles	Low	5%	-1%	-2%	-2%	0%
	Moderate	84%	-2%	0%	0%	-3%
	High	11%	3%	2%	2%	3%
Defoliators	Low	10%	-4%	-4%	-4%	-3%
	Moderate	49%	-15%	-6%	-6%	-6%
	High	41%	19%	10%	10%	9%
Results with Current Budget Level						
Fire	Low/Moderate	7%	3%	13%	15%	15%
	High/Very High/Extreme	93%	-3%	-13%	-15%	-15%
Bark Beetles	Low	5%	-3%	-2%	-2%	-3%
	Moderate	84%	-1%	-1%	1%	-1%
	High	11%	4%	3%	2%	3%
Defoliators	Low	10%	-8%	-8%	-6%	-8%
	Moderate	49%	-14%	-5%	-6%	-6%
	High	41%	22%	13%	12%	14%

Bark Beetle Hazard – The bark beetle hazard rating is a hazard rating of tree mortality from the spruce beetle, mountain pine beetle, and the Douglas-fir beetle (Vandendriesche 2005). The low, moderate and high hazard rating system was based on risk factors such as tree diameter, stand density (basal area) and the percentage of the stand that was a host species. As shown in table 16, most of the forested acres (84 percent) have a hazard rating of moderate at the beginning of decade one. Under both of the budget scenarios, all of the alternatives show a slight increase in the high rating over the first five decades. The amount of change is reflective of the amount of active and passive management.

Defoliator Hazard – The defoliator hazard rating is a hazard rating of tree mortality from the western spruce budworm and Douglas-fir tussock moth (Vandendriesche 2005). The primary host trees for these insects are Douglas-fir, grand fir, subalpine fir, and Englemann spruce. As illustrated in table 16, most of the forested acres have a hazard rating of moderate (49 percent) or high (41 percent) at the beginning of decade 1, while approximately 10 percent is in the low category. Under all alternatives, the proportion of acres with a high rating increases by the 5th decade while the amount in moderate and low categories decreases. The increase in the high rating is largely a function of an increase in tree species that serve as primary hosts to these

defoliating insects (the more shade tolerant grand fir, subalpine fir, Englemann spruce, and Douglas-fir) as well as the stand structures becoming more conducive to these insects (i.e., denser with more canopy layers). Both passive and active management activities reduce the amount of high rating. Compared to Alternative A, the action alternatives all have smaller increases in the high hazard category. In addition, the unconstrained budget scenario results in a smaller increase in the high hazard for all alternatives compared to the constrained budget.

Root Diseases – Affects of the alternatives on root disease was qualitatively assessed based on the anticipated changes to forest composition. Armillaria root disease and annosus and laminated root rots are three of the more important root pathogens on the KNF. Grand fir, Douglas-fir, subalpine fir, and the hemlocks (western and mountain) are generally the most susceptible tree species, while the more tolerant or resistant are generally ponderosa pine, western larch, western white pine, western redcedar, and lodgepole pine.

The change to tree composition over the next 50 years is described above (see table 16 and subsequent discussion). The increases predicted in ponderosa pine, larch, and white pine with the associated decrease in Douglas-fir and grand fir/cedar/western hemlock mix (under the action alternatives) will improve conditions and serve to otherwise reduce root disease impacts. However, the predicted increases in the subalpine fir mix and grand fir/cedar/western hemlock mix (under Alternative A only) will increase susceptibility to root disease. Those alternatives that do the best job moving vegetation towards desired condition (Alternatives B, C, and D) will also reduce the amount of acres susceptible to root disease.

White Pine Blister Rust – Management activities to reduce the effects of white pine blister rust include; planting of rust resistant western white pine and vegetation management activities in whitebark pine stands (thinning, prescribed burning). As described above for tree composition (see table 16 and subsequent discussion), Alternative A and D under the unconstrained budget scenario, and Alternatives C and D under the constrained budget scenario, provide the greatest increase in white pine. However, Alternative C would provide the most passive and active management to aide in restoration of whitebark pine stands.

Weather, Moisture Stress and Forest Density – Forest composition, structure, and landscape pattern can influence the susceptibility of forest stands to weather related disturbances or stressors. Therefore, to the degree that the alternatives influence those forest conditions, they also influence the potential stress caused by weather related disturbances.

Droughts are a weather event that often occur on a decadal basis and serve to stress trees, especially those that are drought-intolerant. This in turn can predispose the trees to bark beetle attacks and/or root diseases (Hagle 2000, Bentz et al. 2010). Under Alternative A (both budget scenarios) the drought-intolerant species of grand fir, hemlock, cedar, and subalpine fir are expected to increase in abundance. Therefore, in the future, when droughts do occur the Forest is likely to exhibit increased signs and symptoms of this stress. Alternatives B and C provide the most active and passive management to reduce the amount of these species and replace them with more drought-tolerant species, such as ponderosa pine, larch, and white pine. As discussed in the “Affected Environment” section, the density of a forest affects the moisture stress that trees are under and influences their susceptibility to mortality from a number of insect and diseases. Through both active and passive management, Alternatives B and C would reduce the forest density more towards the desired conditions than would the other alternatives.

Snow and/or ice accumulations and wind are other weather events to which certain species and forest structures are susceptible. A substantial amount of blowdown and/or stem breakage can

precipitate bark beetle outbreaks, increase surface fuel loadings, and elevate fire hazards. In general, the most susceptible species and stand structures are predicted to increase under Alternative A. Alternatives B and C provide the most active and passive management and increase the species that are less susceptible to windthrow.

Carbon Sequestration

Management Direction

All Alternatives

The effect of management activities on the ability of forest vegetation to sequester carbon was not an issue or analysis item that was included in the 1987 Forest Plan; therefore, Alternative A does not include any management direction on this item. Alternatives B, C, and D indirectly give carbon sequestration direction by addressing disturbance processes that affect sequestration. Management activities can affect the ability of forests to sequester carbon when they address relevant disturbance processes. The Forest Plan components of Alternatives B, C, and D presented above in the “Management Direction” section of the “Resistance and Resiliency to Disturbances and Stress Agents” topic, are relevant to carbon sequestration.

General Effects

Carbon sequestration is a measurement of how much carbon is stored on the Forest. Carbon sequestration was modeled in Spectrum in three different pools: forest inventory or growing stock volume; harvested forest products; and dead forest inventory volume resulting from stand replacing wildfires. For the inventory pool, both non-soil carbon and soil organic carbon were taken into account. The harvested forest product is the amount of carbon stored in wood products harvested and removed from the forest. This amount diminishes over time. The dead forest inventory is the amount of carbon stored in dead timber following a stand-replacing wildfire. This amount also decreases over time. See appendix B for more information. Table 17 summarizes the total metric tons of carbon sequestered fifty years from now (in the 5th decade of the model).

At the unconstrained budget level, Alternative D has the least carbon sequestered because it has the highest number of acres with regeneration harvest. Carbon sequestration is higher under the constrained budget level because fewer acres are regeneration harvested. It should be noted the amount of carbon sequestered is very similar for all alternatives. This is because of the large inventory (standing trees) on the Forest sequestering carbon. This inventory doesn’t change much by alternative.

Currently, the KNF stores approximately 160 million metric tons. For all alternatives, the KNF acts as a carbon sink, sequestering more carbon over time than is lost through natural and human disturbance. Alternative A at the constrained budget level has the largest addition in carbon sequestration, storing an additional 26.4 million metric tons over the next 50 years. Alternative D at the unconstrained budget level has the smallest addition in carbon sequestration, storing an additional 20.4 million metric tons over the next 50 years.

Table 17. Thousand Metric Tons of Carbon Sequestered in the 5th Decade by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D
Results with Unconstrained Budget				
Carbon sequestered in inventory of forested acres	182,059	180,268	180,418	178,611
Carbon sequestered in wood products	1,479	1,462	1,430	1,689
Carbon sequestered in acres burned by wildfire	82	79	78	81
Total Carbon	183,619	181,808	181,925	180,381
Results with Current Budget Level				
Carbon sequestered in inventory of forested acres	185,380	182,814	183,259	182,721
Carbon sequestered in wood products	981	930	874	960
Carbon sequestered in acres burned by wildfire	81	80	82	80
Total Carbon	186,442	183,824	184,216	183,761

Consequences to Forest Vegetation from Forest Plan Components Associated with other Resource Programs or Revision Topics

The general effects that the alternatives would have on forest vegetation have been described above. That discussion focused on the consequences that would result from implementing the Forest Plan components related to forest vegetation. The emphasis in the following discussion is on how other (i.e., those not directly related to forest vegetation) Forest Plan components may influence forest vegetation and the attainment of the desired conditions.

Effects from Access and Recreation Management

Forest Plan direction for scenery management in the action alternatives (i.e., FW-GDL-AR-01) would restrict the type of vegetation treatments that could occur in some areas across the Forest. For example, some regeneration methods or other silvicultural practices (e.g., the use of prescribed fire or natural wildfire) may not be compatible with the scenic integrity objectives of High or Very High that are established along scenic travel routes; therefore, those components could have a small effect on the ability to reach the desired conditions for forest vegetation. The consequences that would result from the no-action alternative as a result of Plan components in the 1987 Forest Plan are fairly similar to the action alternatives.

Forest Plan direction for management of transportation systems in the action alternatives (i.e., FW-DC-AR-07, FW-OBJ-AR-03) may limit vegetation management opportunities. Placing roads into intermittent storage or decommissioning roads could increase future costs associated with vegetation treatments and, therefore, could have an impact on the economic feasibility of these treatments. However, because only a relatively small amount of road storage/decommissioning activities are anticipated across the Forest, the effects are minimal.

Public safety issues in developed and undeveloped recreation sites may limit the ability to maintain the desired snag levels that are indicated under the action alternatives (i.e., FW-DC-VEG-07 and FW-GDL-VEG-04). However, because these recreation areas are generally very small in size, the effect of not having snags or the ability to meet the forestwide desired conditions is negligible.

Winter recreation trails (primarily the groomed snowmobile routes) and associated Forest Plan direction (i.e., FW-OBJ-AR-04) may affect the ability to implement some winter season

vegetation treatments because of a conflicting resource issue, such as grizzly bear security or soil disturbance type concerns. However, these effects are likely small and do not vary by alternative.

Effects from Wildlife Management

Measures to protect certain wildlife species limit treatments to move vegetation towards desired conditions. Management direction for grizzly bear, lynx, and big game winter range result in limitations on the timing, type, and amount of vegetation treatments.

Forest Plan direction limits management in grizzly bear management units (BMUs), especially within core areas. Timing, frequency, and size of treatments must be considered, minimizing the amount of acres that can be actively managed. Grizzly bear core areas are not suitable for timber production and timber harvest is limited in these areas. This results in fewer acres that can be treated to move vegetation towards desired condition. The effect is similar for all alternatives, reducing acres treated to improve vegetation.

For lynx, all of the alternatives contain the NRLMD (USDA Forest Service 2007). One substantial impact this direction has on the forest vegetation is to limit the ability to pre-commercial thin (and other similar treatments) young forest stands. The effect is that in mixed stands, shade intolerant tree species such as western larch, typically will be outcompeted by shade tolerant species. Since western larch is a desirable species due to its relative resistance to insects, disease, fire and drought, and because of its long-lived nature, this effect is substantial.

Another effect on vegetation from draft Forest Plan direction related to wildlife is the desire to maintain or provide old growth or stands with old forest structures for terrestrial species associated with these habitats. To accomplish this, there may be a need to prevent these stands from being lost to stand-replacing wildfires. These stands currently tend to be distributed over most of the landscapes on the KNF, and it may be necessary to consider the level of risk to stands managed for old growth. By minimizing the loss of these types of stands, one effect to vegetation may be that wildfires are suppressed more often, which could reduce the ability to achieve other aspects of the vegetation desired condition (such as increasing early-successional forests and shade intolerant tree species). The 1987 Forest Plan contains a MA for old growth (MA13), with a standard that indicates that unplanned ignitions “will not be used in this MA.” Therefore, natural unplanned ignitions would be suppressed if there was a risk of losing old growth stands. The action alternatives do not contain this direction. Therefore, wildfires would likely be suppressed more often under Alternative A than they would under the other alternatives.

Management for big game winter range limits the amount of openings in these areas. When conducting timber harvest in winter range, the timing, silvicultural prescription, and size of openings must be consistent with objectives for winter range. This causes some limitation on the amount of acres that may be treated with timber harvest, reducing the ability to move towards vegetation desired condition. These effects are similar for all alternatives.

Effects from Fire Management

Fire management using prescribed burning and wildland fire for resource benefit generally has a positive effect on vegetation condition. Management direction in the draft Forest Plan emphasizes increased use of both prescribed and wild fire to improve vegetative conditions. As discussed in the “General Effects” section, fire is beneficial to vegetation and is an important tool in moving vegetation towards desired condition. Alternative C provides the best direction for increasing the use of fire and improving vegetation condition.

As described earlier in this document, fire suppression has a large affect on vegetation. In areas where wildland fire is suppressed, there will be less movement towards vegetation desired condition. In lands within the WUI and near communities, fire suppression may prevent the attainment of vegetation desired condition, resulting in reduced stand resiliency and resistance. This effect is common to all alternatives.

Effects from Watershed, Soil, Riparian and Aquatic Habitat Management

The effects of watershed, soil, riparian and aquatic habitat management on upland forest vegetation are generally similar for all alternatives. All alternatives incorporate the direction from INFISH (USDA Forest Service 1995). They also contain direction to protect watershed integrity and soil productivity which places limitations on vegetation treatment activities. Often, in order to conduct commercial vegetation treatments or conducting mechanical fuel treatments, some road construction, reconstruction, or maintenance activities are needed. Due to concerns such as stream sedimentation or water yield effects from forest openings, vegetation treatments are constrained and/or would be made economically infeasible. Although it is difficult to quantify the effects, the result is a limitation on the amount of activities that can be undertaken to trend the forest vegetation towards desired condition.

Effects from Air Quality Management

The consequences to forest vegetation from air quality related Forest Plan direction are the same for all alternatives. All alternatives have direction to meet air quality standards established by Federal and State agencies and meet the requirements of state implementation plans and smoke management plans. The direction limits the use of prescribed fire to manage forest vegetation by limiting how much can be burned and when and where it can occur. The costs of conducting prescribed fires increases as a result of the burning regulations, which affect how much is burned. Limited use of prescribed fire affects the ability to move vegetation towards desired condition under all alternatives.

Cumulative Effects

The effects that past activities have had on all of the components of forest vegetation (e.g., forest composition and structure, landscape pattern, etc) were discussed in the “Affected Environment” section and are reflected in the current condition of the forest vegetation. Therefore, unless otherwise noted, past activities are not carried forward into the following cumulative effects analysis. Present and foreseeable future activities that could affect forest vegetation are summarized below:

- **National Fire Plan, Healthy Forest Initiative and Healthy Forest Restoration Act**: Since they were developed, these national level plans, initiatives and acts (these are called "other plans" for the rest of this discussion) have influenced the vegetation and fuel management programs on the KNF. Therefore, they have had some effects on forest vegetation and it is anticipated that they will continue to do so for the foreseeable future. In general, these "other plans" have resulted in more hazardous fuel vegetation treatments in the vicinity of WUI areas and fewer vegetation treatments in areas located away from communities. In addition, the types of fuel treatments that are being done in response to these other plans are often more expensive, and the social issues (i.e., effects of treatments on scenery, air quality, noise, wildlife viewing, etc) can be more contentious. Therefore, higher public involvement, planning and implementation expenses are likely to lead to fewer acres being treated within a given budget level.

- **Northern Region Integrated Restoration and Protection Strategy:** The Northern Region of the Forest Service has been working on a strategy and decision support model to help identify opportunities and priorities for integrated restoration and protection activities throughout Region. This strategy is a component of the larger regional climate change adaptation strategy. In the future, this strategy has the potential to influence program level decisions on the KNF by affecting where, when, and how forest vegetation treatments and protection activities occur. However, it is premature to speculate what the more specific effects may be once this strategy is being implemented.
- **Conservation Efforts for Whitebark Pine:** As discussed in the "Affected Environment" section, the U.S. Fish and Wildlife Service recently determined that this tree species warranted listing as a threatened or endangered species but that it was precluded due to higher priority species. The species is now designated as a federal Candidate species and Region One has placed the species on the Sensitive Species list. As described in USDA 2010, the forests in the region (including the KNF), have been implementing various restoration efforts for this species and these activities will likely continue or intensify (contingent upon funding). If the tree species is eventually listed as a federal threatened or endangered species, there could be effects to the vegetation and fire management programs on the KNF. Alternatives B, C, and D contain Forest Plan components that stress the desire to increase the abundance and resiliency of this species to disturbances and stressors. If listed, there could be additional emphasis placed on restoration actions.
- **Climate Change:** Of all of the ongoing and foreseeable future actions that have the potential to affect forest vegetation on the KNF, climate change is likely to be the single most important factor. The effects of climate change will likely combine with some of the effects that result from implementing the alternatives, to produce cumulative impacts.

  The potential effects (and uncertainties) that climate change may have on forest vegetation on the KNF are summarized in the KIPZ Climate Change Report (USDA Forest Service 2010). In general, given the existing condition of the forest vegetation on the KNF, the potential effects of climate change can be summarized as:

  - Increase mountain pine beetle outbreaks in lodgepole pine and whitebark pine in relatively high elevation forests and a decrease at low-mid elevation;
  - Increase in western pine beetle/mountain pine beetle mortality in ponderosa pine during droughts or otherwise under moisture stress;
  - More root disease mortality and mortality from other insect/diseases during times of moisture stress;
  - Longer fire seasons with more frequent large fires and more annual area burned; and
  - Increase in the water balance deficit.

  At the forestwide scale, the alternatives analyzed in this draft EIS would generally add to the potential effects from climate change noted above. Alternative A would be the most affected and Alternatives B and C the least affected by climate change. For all alternatives, the effects from climate change would be offset in those areas where vegetative treatments occur.

  Climate change predictions for the Northern Rockies generally forecast warmer temperatures and longer, drier summers. If those predictions are correct, the effect of dense forests on the soil water balance could be compounded. In general, the soil water balance (especially in the summer droughty period) determines which tree species can ultimately survive on a specific site. Early seral tree species (e.g., ponderosa pine and western larch) have the unique ability

to establish on bare soil surfaces where high surface temperatures exclude other species. One adaptation of these seral species is the deep rooting characteristic that allows the tree to find an adequate water supply and avoid extensive competition with shallow and fibrous rooted grasses and forbs. As the shade from these species limits shade intolerant grasses and forbs, shade tolerant tree species can become established in the understory. These species usually have shallower rooting characteristics that allow them to gather water from near the soil surface. The overall rooting structure on the site becomes much more competitive for water resources as succession progresses. As the density of the stand and the amount of leaf area increases, water transpiration increases, which in turn can deplete the water that is stored in the soil throughout the summer. The additional forest canopy interception of rain and snow which directly evaporates back into the atmosphere (snow sublimation) further compounds this effect and reduces soil water recharge. The end result is a water stressed forest, that not only becomes more susceptible to insect and disease, but also more prone to supporting severe wildfires because live fuel moisture is relatively low.

Whether it is invasive species (e.g., white pine blister rust), drought, uncharacteristic wildfires, elevated native insects and disease levels, unusually high forest densities, or some other agent or combination of agents that serves to stress trees and forest ecosystems; recent research suggests that climate change will likely exacerbate those stressors and “stress complexes” will continue to manifest themselves (Littell et al. 2010, McKenzie et al. 2009).

- **Human Population Increases and/or Shifts towards Wildland-Urban Interface:** For the last several decades, there has been more human development around the "edges" of lands administered by the KNF. This trend is expected to continue in the future and is likely to have effects on the forest vegetation that are similar to those discussed above under the item titled "National Fire Plan, Healthy Forest Initiative and Healthy Forest Restoration Act.” In addition, with a greater number of people living and recreating in these wildland-urban interface areas, there is a greater probability of more human-caused wildfire ignitions that could have effects on the forest vegetation.
- **Increased Regulation and Concern over Smoke Emissions:** The ability to implement the vegetation treatments that would occur as a result of the alternatives is highly dependent upon prescribed burning (both associated with timber harvesting and without it) as well as using wildfires for resource benefits. Therefore, to the extent that air quality regulations may become more stringent in regards to the quantity and timing of smoke emissions, there could be substantial effects in limiting vegetation treatments using prescribed burning.
- **Timber Product Manufacturing Infrastructure and Economics:** The ability of the KNF to positively affect the forest vegetation is partially dependent upon the ability to sell forest products to manufacturing companies and to use the harvesting processes, including residual slash disposal activities. If the forest products industry declines in areas surrounding the KNF to the degree that it is difficult to sell forest products, or if "stumpage prices" decrease significantly, it would affect how many acres could be treated. While some treatments could be accomplished by using prescribed burn only treatments, it is generally too risky in the WUI and too expensive elsewhere.

Rare Plants

Introduction

The Forest Service has a legal requirement to maintain or improve habitat conditions for threatened, endangered, proposed, or candidate species under the Endangered Species Act (ESA). Species covered under ESA are those listed by the USDI, U.S. Fish and Wildlife Service. Sensitive species are protected under the Regional Forester's Sensitive Species Program. The KNF is required to identify and mitigate potential effects to these species from federal land-disturbing actions. In order to comply with the ESA and the Sensitive Species Program, forest botanists conduct inventories during project planning to locate and protect any threatened, endangered, proposed, candidate, and sensitive plant species.

Legal and Administrative Framework

Law and Executive Orders

- **The Forest and Rangelands Renewable Resources Planning Act of 1974:** Provides for maintenance of land productivity and the need to protect and improve the soil and water resources.
- **The National Forest Management Act (NFMA) of 1976:** "It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth and conditions of stand designed to secure the maximum benefits of multiple use sustained yield. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objective."
- **The Endangered Species Act (ESA) of 1973:** Requires federal agencies to conserve threatened and endangered species.

Key Indicator

- Potential for adverse effects on rare plants from ground-disturbing activities or other applicable threats or stressors.

Methodology and Analysis Process

The geographic scope of the analysis for effects to rare plants is the lands administered by the Forest. This area represents the NFS lands where changes may occur to rare plants or habitats from activities that result from the various alternatives. The rare plant species included in the analysis are those that are either listed under the ESA or are on the Regional Forester's Sensitive Species list. The known threats and/or stressors that have the potential to negatively affect the plant species were reviewed for each of seven plant habitat guilds. Potential adverse effects were considered based upon the likelihood and intensity to which the various alternatives may affect the threats/stressors.

Affected Environment (Existing Condition)

No threatened, endangered, proposed, or candidate plant species are known to occur on the KNF. However, two threatened plant species, *Howellia aquatillis* (water howellia), and *Silene spaldingii* (spalding's catchfly), are "suspected" on the Forest. Suspected species are those that are believed to have potential to occur on the Forest, but to date, have not been found.

Spalding's Catchfly (Silene spaldingii)

In 2001, the US Fish & Wildlife Service (USFWS) listed *Silene spaldingii* as a threatened species (*Federal Register,* Vol. 66, No. 196, 2001). According to USFWS, the Spalding's catchfly is suspected to occur on the KNF but to date, no populations of have been found.

Habitat

Spalding's catchfly, a perennial herb of the carnation family, is a Pacific Northwest regional endemic plant. The plant is typically found in mesic perennial grasslands and is known to occur in 52 populations in west-central Idaho, eastern Oregon, eastern Washington, northwest Montana, and British Columbia. Populations are often small and isolated. Its habitat is primarily dry grassland habitats and grassland inclusions in ponderosa pine and Douglas-fir forest. Suitable habitat for this species is typically dominated by fescues (*Festuca* species), blue bunch wheat grass (*Pseudoroegneria spicata*), and other bunchgrasses, but also has a high density of forbs. Some sites may have shrubs such as *Symphoricapos albus*, *Physocarpus malvaceus*, or *Rosa* spp. Soil types on which it has been found include loam, silty loam, granitic, loamy basaltic, and loess (Lorain 1999). Soils in its habitat are characterized as deep to moderately deep.

Threats

Endangered Species Act section 7 guidelines for Spalding's catchfly list seven management activities that potentially threaten habitat or populations. They are grazing, recreation, fire use, exotic species, pollinator impacts, herbicide and pesticide use, and habitat conversion.

Water Howellia (Howellia aqualitis)

The USFWS listed *Howellia aquatilis* (Gray) as a threatened species on July 14, 1994 (*Federal Register* Vol. 59, p. 35860). Critical habitat has not been defined or designated for *H. aquatilis* (*Federal Register* Vol. 59, p. 35860). Populations of this species are currently extant in California, Idaho, Montana, and Washington. These populations are threatened by loss or change of habitat due to natural and human-induced causes. According to the Conservation Strategy for *Howellia aquatilis* (USDA 1994), there are currently 110 known occurrences of the species; most occurrences are in Montana and Washington. Although no known populations occur on the KNF, potential habitat may exist in the oxbows and river meanders on the Forest.

Habitat

Howellia aquatilis lives in shallow vernal freshwater pools of wetlands, edges of larger ponds, or river oxbows that are abandoned or still hydrologically linked to the adjacent river system. Drying of the pools in the fall is necessary for germination, and submergence in the spring is necessary for growth and flowering (Roe and Shelly 1992).

Threats

The following threats were documented in the recovery plan of water howellia (Shelly and Gamon 1996): timber harvest (siltation and hydrologic regime alteration), livestock grazing (trampling and soil compaction), non-native plant and noxious weed invasion, conversion of habitat, road construction and maintenance, military activities (in the Puget lowlands), fire effects, and natural conditions (lack of genetic variation, successional changes).

Sensitive Plant Species

Sensitive plant species that are known or suspected to occur in the KNF are listed in table 18. Currently, there are 47 sensitive plant species that are known, or suspected to occur on the KNF.

Distribution, habitat information, and population data for each species are available from the Idaho Conservation Data Center, Washington Natural Heritage Program, Montana Natural Heritage Program, and NatureServe databases.

The 1987 Forest Plan direction for sensitive and rare species, including plants, is to manage habitat to maintain population viability, to prevent the need for federal listing, and to determine the status and distribution of threatened, endangered, sensitive and other rare plants. Habitat found to be suitable within project areas, and which could be affected by project-related activities, is surveyed to determine the presence of rare plant species. Protection measures are implemented to provide for the diversity of plant and animal communities following the NFMA and Forest Service policy.

Table 18. Rare Plant Species, Status, Occurrence, and Habitat Guilds on the KNF

Scientific Name	Common Nate	Status[1]	Occurrence[2]	Habitat Guild[3]
Amerorchis rotundifolia	Round-leaved orchis	S	K	M
Bidens beckii	Water marigold	S	K	A
Botrychium ascendens	Upswept moonwart	S	K	M
Botrychium crenulatum	Dainty moonwart	S	H	M
Botrychium hesperium	Western moonwort	S	K	M
Botrychium pedunculosum	Stalked moonwart	S	K	M
Brasenia schreberi	Watershield	S	K	A
Carex amplifolia	Big-leaved sedge	S	K	M
Carex chordorrhiza	String-root sedge	S	K	A
Carex prairea	Prairie sedge	S	H	P
Carex rostrata	Beaked sedge	S	K	A
Carex vaginata	Sheathed sedge	S	K	DR
Clarkia rhomboidea	Common clarkia	S	K	D
Collema curtisporum	Short-spored jelly lichen	S	K	DR
Corydalis sempervirens	Pink corydalis	S	K	D
Cypripedium fasciculatum	Clustered lady's slipper	S	K	D
Cypripedium parviflorum	Yellow lady's slipper	S	S	DR
Cypripedium passerinum	Sparrow's egg lady's slipper	S	K	DR
Drosera anglica	English sundew	S	K	P
Drosera linearis	Slender leaf sundew	S	S	P, S
Dryopteris cristata	Crested shield fern	S	K	P
Epipactis gigantean	Giant helleborine	S	S	P
Eriophorum gracile	Slender cotton grass	S	K	P
Eupatorium occidentale	Western joepye weed	S	S	S
Gentianopsis simplex	Hiker's gentian	S	S	A, DR
Grimmia brittoniae	Britton's dry rock moss	S	K	D, M

Scientific Name	Common Nate	Status[1]	Occurrence[2]	Habitat Guild[3]
Grindelia howellii	Howell's gumweed	S	S	D
Heterocodon rariflorum	Western pearl flower	S	K	D
Howellia aquatilis	Water howellia	T	S	A
Lathyrus bijugatus	Tule pea	S	K	D
Lomatium geyeri	Geyer's bisquit root	S	K	P
Lycopodiella inundata	Northern bog clubmoss	S	S	P
Lycopodium dendroideum	Ground pine	S	K	C, DR, M
Lycopodium lagopus	One-cone clubmoss	S	S	M
Meesia triquetra	Meesia moss	S	K	P
Mimulus ampliatus	Stalk-leaved monkey flower	S	K	M
Mimulus breviflorus	Shortflower monkey flower	S	K	M
Nodobryoria subdivergens	Old man's beard	S	K	S
Ophioglossum pusillum	Northern adder's tongue	S	H	P
Phegopteris connectilis	Northern beechfern	S	K	M
Psilocarphus brevissimus	Dwarf wooly heads	S	K	A
Scheuchzeria palustris	Pod grass	S	K	P
Schoenoplectus subterminalis	Water clubrush	S	K	A
Scorpidium scorpioides	Scorpidium moss	S	K	P
Silene spaldingii	Spalding's catchfly	T	S	D
Trichophorum cespitosum	Tufted club rush	S	K	A, DR
Utricularia intermedia	Flat-leaved bladderwort	S	K	A
Viola selkirkii	Selkirk's violet	S	K	M

1 Status: S = Sensitive; T = Threatened; E = Endangered

2 Occurrence: K = Known; S = Suspected; H = Historically Known

3 Habitat Guild: A = Aquatic, P = Peatland, DR = Deciduous Riparian, M = Moist Forest, D = Dry Forest, C = Cold Forest, S = Subalpine

Potential Threats

Threats are defined as activities (Forest Service or otherwise) or natural conditions that currently or potentially have negative effects on the diversity of rare plant communities or their habitat. Threats can be divided into the following three types: direct (e.g., livestock grazing – trampling, herbivory; recreational activities – hiking and associated trampling), alteration of ecological factors (e.g., fire exclusion, insects and disease), and habitat reduction (e.g., oil and gas exploration, road construction and reconstruction). Refer to the specialist report for a more inclusive list of examples for each of these three threats.

Habitat Guilds or Groups

Each of the KNF rare plant species listed in table 18 was placed into appropriate habitat groups, or guilds. The term "guild" is used to mean a group of species that use similar resources in a similar way. These guilds include the following: aquatic, peatland, deciduous riparian, moist forest, dry forest, cold forest, and subalpine. Each of these guilds is briefly discussed below (see Specialist Report for more detailed discussion).

Aquatic Plant Species Guild

The aquatic plant habitat guild contains one federally listed threatened plant species and nine sensitive species.

Several key stressors generally apply to most members of this species group. These include boating activities, lake shore development, aquatic non-native invasive species (especially *Phalaris arundinacea*), use of aquatic herbicides, agricultural practices, grazing and aquatic vegetation succession. Alteration of hydrologic regimes; either directly from drainage, ditching, and dam construction (or beaver dam removal); or indirectly from upland activities or events such as timber harvest, road construction and wildfire, are also potential stressors.

Stressors beyond Forest Service control include short- and long-term climate change (which may increase the risk of desiccation due to increased and prolonged summer temperatures and/or drought conditions), and activities as described above that occur on non-federal lands. These changes or activities could result in altered hydrologic regimes and/or species composition that may affect the persistence of aquatic group plant species.

Peatland Plant Species Guild

This species guild is composed of 12 sensitive plant species and is all nearly or completely restricted to peatland habitats; in numerous cases they co-occur at known peatland sites and the stressors and ecological processes that influence their habitats apply to all of them.

All of the peatlands on the KNF are fens, although there are instances where microsites with bog characteristics occur within the fens; such cases are referred to as mixed mires (Chadde et al. 1998). These fen habitats can be further divided into five distinct sub-guilds that are characterized by different plant communities and species, different substrates, different pH, and different abiotic processes. Although the sub-guilds are distinct, individual peatland complexes often contain a mosaic of sub-guilds that grade into one another (poor fens, ombrotrophic bog, intermediate and rich fens, paludified forests, and shrub-carr). The sub-guilds are described in more detail in the Specialist Report in the project record.

Deciduous Riparian Plant Species Guild

This species guild contains six sensitive species.

The following stressors may have direct or indirect effects on plant species in deciduous riparian habitats:

- Management actions that alter hydrologic regimes;
- Alterations to riparian plant community succession through vegetation manipulation;
- Changes to natural disturbance regimes such as flooding;
- Management activities that affect water quality, such as road construction, reconstruction and maintenance activities that result in runoff; livestock use; fertilizer application; and sedimentation from timber harvest activities;
- Invasive plant species;
- Off highway vehicle (OHV) use around wet margins of riparian areas; and
- Recreation use in and adjacent to riparian areas.

One stressor beyond Forest Service control includes long- and short-term climate change, which may increase the risk of desiccation due to increased and prolonged summer temperatures and/or

drought conditions, and may alter the hydrologic regimes and floodplain dynamics that are important in the habitat of these species.

Wet and Moist Forest Plant Species Guild

This species guild contains thirteen sensitive species.

Key stressors affecting this species guild include timber harvest (especially regeneration of late seral and old growth cedar and hemlock forests), prescribed fire, road and trail construction, and other activities that could impact populations either directly through loss of individuals or indirectly through canopy removal or ground disturbance that disrupts soil mycorrhizae. Air pollution and removal of large old trees may negatively affect lichens in this species group.

Stressors beyond Forest Service control include short- and long-term climate change (which may increase the risk of desiccation due to increased and prolonged summer temperatures and/or drought conditions), and activities as described above that occur or originate on other ownership lands.

Dry Forest Plant Species Guild

This species guild consists of one federally listed threatened plant species and seven sensitive species. The federally listed species (*Silene spaldingii*) is not currently known to occur on the KNF, but suitable habitat is present, and there is known occurrences near NFS lands.

Key stressors that affect this species guild include timber harvest, prescribed fire, severe wildfire, fire suppression efforts, grazing and OHV use; all of which may directly or indirectly impact populations through ground disturbance, canopy removal, destruction of soil mycorrhizae, or increased risk of noxious weed invasion. Dry forest and open forest-grassland habitats are relatively rare vegetation types on the KNF, and the effects of these various stressors may be exacerbated in some areas as a result. Long-term fire exclusion and grazing exclusion may have detrimental effects on *Silene spaldingii* (Spalding's campion); the one federally listed threatened plant species in this group.

One stressor beyond Forest Service control includes short- and long-term climate change, which may increase the risk of desiccation due to increased and prolonged summer temperatures and/or drought conditions.

Cold and Forested Subalpine Plant Species Guild

One sensitive species is assigned to the cold plant guilds.

Key stressors affecting this species guild include timber harvest, prescribed fire, road and trail construction, and other activities that could directly impact populations through vegetation and/or ground disturbance.

Subalpine Grassland Plant Species Guild

This species guild occurs in the non-forested portions of the subalpine zone and includes three sensitive species.

Several management activities and risks may have direct or indirect effects on rare plants in this species guild. These include disturbance associated with recreation use, trail construction (including blasting of rock), maintenance of fire lookouts and other administrative sites, and

harvesting of special forest products. Invasion of exotic plant species may affect some rocky sites, but generally the harshness of these habitats inhibits complete dominance by such species.

One stressor beyond Forest Service control includes climate change, which may result in changes to snow amounts and distribution that affect these habitats. The possibility of desiccation due to increased and prolonged summer temperatures or drought conditions is also a potential stressor resulting from climate change, although the subalpine parks currently occupy areas that are subject to a higher degree of summer soil drying compared to surrounding sites (Roche and Busacca 1987).

Environmental Consequences

Forestwide Direction for all Alternatives

Threatened, endangered, proposed, or candidate species have special management requirements for all Forest Service management activities. The ESA section 7 guidelines and recovery objectives have been followed where potential habitat for the two threatened plant species suspected to occur on the Forest.

For sensitive species, management efforts to ensure the diversity of rare plant communities or their habitat are already in place. The Forest Service management policy (FSH 2609.25, 1.25, 1988 and FSM 2670) ensures that for all the rare plant species, the following measures will be taken:

> (1) Biological evaluations will be written for all activities that may affect sensitive species and their habitat;
>
> (2) “Effects” of activities will be determined as similar to those for threatened, endangered, or proposed species; and
>
> (3) Special management emphasis will be included in all management activities to ensure the viability of the sensitive species and to preclude trends toward endangerment that would result in the need for federal listing. This Forest Service management policy will be employed at a species level in all alternatives to ensure its mandates are achieved and that sensitive species are conserved.

All of the alternatives implement the protection measures noted above for law, regulation, and policy. In addition, all of the alternatives (including Alternative A) retain INFISH (USDA Forest Service 1995) as Forest Plan direction (revised Plan FW-STD-RIP-03). INFISH contains riparian management objectives for habitat conservation areas and a comprehensive set of standards and guidelines related to what kind of activities may or may not occur within the riparian areas. Although they were not specifically designed to do so, many of the standards and guidelines of INFISH serve as protection measures for rare plants that are associated with aquatic and/or riparian habitats, of which there are many. In addition, all action alternatives include management direction to evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for “any plant species listed under the ESA or on the regional sensitive species list. If needed, conduct field review and provide mitigation or protection to maintain high-quality occurrences (those in intact, sustainable habitats) over time (FW-GDL-VEG-07).” This management direction ensures that surveys would be conducted and any protection measures applied, thereby reducing the potential for adverse effects.

Consequences to Rare Plants from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Direction

At the scale of the entire KNF, it is important to realize the difficulties associated with assessing the impacts of broad Forest Plan direction to 47 rare plants. Plant species may be rare due to evolutionary history, basic population ecology, historic or current human activities, or more likely, a complex combination of these factors. Human activities may or may not be responsible for the current distribution and abundance of the rare plant species. However, an important assumption in this analysis is that certain management actions may contribute or detract from the availability or quality of habitats that support rare plant species.

Alternative A retains all of the 1987 Forest Plan direction regarding the management of vegetation, including rare plants. Forestwide goal #6 includes the desire to provide for the environmental needs of sensitive species, as necessary to prevent them from becoming threatened (Plan p.II-1). All of the 1987 Forest Plan direction is required as part of the laws, regulations, and policies previously mentioned.

In Alternatives B, C, and D, MA1a and 1b, MA3 – Botanical Areas, and MA4 – Research Natural Areas would not allow certain management activities (e.g., timber harvest, grazing, wheeled motor vehicles, road construction) which are considered threats to rare plants (see Forest Plan, table 15, Allowable Uses) as well as associated standards and guidelines for each MA. This direction is the same under each action alternative.

Effects from Specific Forest Plan Management Direction for Alternatives B, C, and D

Forest Plan components that are relevant to rare plants are the same for each action alternative. Vegetation forestwide Goal-01 articulates the desire to have plant communities with high ecological integrity and exhibiting resiliency towards natural and man-caused disturbances. In addition, numerous forestwide desired conditions (i.e., FW-DC-VEG-01 through 08, and 11) for vegetation express the desire to trend the forest vegetation towards a more resilient condition with a high degree of ecological integrity. The management direction recognizes the need to maintain and/or improve the populations of the rare plants as well as the ecological roles and functions that they serve.

Action alternatives also contain specific components for rare plants (FW-DC-VEG-09, GDL-VEG-07) that address the need for field review and identification of mitigation and/or protection measures for site specific proposed projects. This last guidance is also part of Forest Service Handbook and Manual direction (FSH 2609.25, FSM 2670).

Action alternatives also contain numerous forestwide goals, desired conditions, objectives, standards, and guidelines with regard to riparian and aquatic resources. Many of those Forest Plan components are designed to maintain or restore riparian conditions and aquatic resources. Many of the rare plants on the KNF are associated with these types of habitats, and would benefit from implementing Forest Plan components related to riparian and aquatic resources (i.e., FW-GDL-RIP-05).

Effects from Fire (Prescribed Fire, Undesirable Wildfires, and the Use of Natural Wildfire for Resource Benefits) Management

All of the alternatives use fire as a tool to accomplish management goals and objectives. The alternatives have different management emphasis areas and as such, the use and emphasis of fire vary by alternative. The biggest difference between the alternatives in this regard, is that of Alternative A compared to the others. The use of fire as a management tool was not emphasized in the 1987 KNF Forest Plan in general, with regard to using natural wildfires for resource benefits. There are a number of barriers that prevented the KNF from using that tool very often. Therefore, compared to the other alternatives, it is assumed that Alternative A would involve much less prescribed burning as well as the use of wildfire for resource benefits. In considering the action alternatives, Alternative D has more emphasis on active management and commodity production than the others, while Alternative C has the least. Therefore, in general, it is assumed that of the action alternatives, Alternative D would involve more prescribed burning, while Alternative C would rely more heavily on the use of natural wildfires as a management tool to help trend the forest vegetation towards the desired condition. In that regard, Alternative B would fall between C and D.

Another factor that is important to some rare plants is the timing of burns. For example, the use of prescribed fire in the spring has potential impacts to some rare plants. In general, these plants are not adapted to fire at this time of year and spring burning can interfere with flowering, fruiting, and other physiological impacts; and could affect life history patterns with pollinators. However, those risks have to be weighed against the trade-offs in the event that prescribed burning could not take place at another time of year and ,therefore, a higher risk occurs that an uncharacteristically intense wildfire occurs. Wild and prescribed fires can pose risks to those rare plants in the wet/moist and dry forest plant groups, particularly when the fires are uncharacteristic. In general, most plant species would benefit by the restoration of more historical fire regimes. For those rare plants that thrive in open areas created by fires using fire to help restore a more natural fire regime, could benefit those species in the long term. There are also impacts to plants associated with wildfire suppression activities, such as fire line construction and other mechanical activities, reforestation following fire, and the increased potential for the spread of noxious weeds.

Effects from Recreational Management

Recreation impacts can include trampling, both by hikers and off road vehicle use. Road building and the development of campgrounds and other facilities used by recreationists also contribute to plant impacts, as these developments make more areas accessible and concentrate use. Dispersed camping and recreation have similar impacts, which are more difficult to monitor. Parking areas, particularly undesignated areas, pose similar impacts to plants. In addition, there can be long-term impacts of bisecting a rare plant population with a road or similar feature and affecting the reproduction and/or plant dispersal. Other recreational impacts include off road vehicle use, which can also disturb soil, affecting both habitat and potential habitat. Roads and trails for recreational use can contribute to the spread of noxious weeds, and increase the accessibility of areas to livestock as well as native ungulates, which in turn can increase the impacts of trampling, herbivory, and congregation. Because some alternatives, for example, Alternative D, includes the potential for a higher level of recreational use, especially associated with motorized recreation, there are differences between alternatives on this factor. Action alternatives also contain specific components for rare plants (FW-DC-VEG-09, GDL-VEG-07) that address the need for field review and identification of mitigation and/or protection measures for site specific proposed projects.

Effects from Vegetation Management

Mechanical activities include vegetation management treatments, whether for restoration or to meet timber production objectives. Activities, such as logging, can have impacts to plants and plant habitat through canopy removal, soil disturbance and erosion, and stream sedimentation. In addition, mechanical activities for vegetation treatment may require road building. Roads increase access to and fragment habitat, thus providing an avenue for invasive plant species. They can be placed on ridgetops, in riparian areas, or through scree slopes, which are important habitats for a number of species. Reconstruction and maintenance of existing roads can directly or indirectly affect plant populations by introducing competitive weeds and altering availability of light, nutrients, and moisture. Sudden changes in seral stage, or an abundance of early seral stages, also reduce the available habitats for those plants that require mid-late seral stages. However, those species that prefer openings, early-seral stages, or some ground disturbance, could benefit from moderate levels of mechanical activities. As discussed above in fire, the restoration of historical fire regimes and restoration of conditions towards HRV with a range of seral stages for different potential vegetation groups may benefit some rare species in the long term. With regard to the various Alternatives, Alternative D is expected to have the greatest amount of mechanical activities, and alternative C the least. Alternative A and B would be fairly similar. The management direction includes a guideline to evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for "any plant species listed under the ESA or on the regional sensitive species list. If needed, conduct field review and provide mitigation or protection to maintain high-quality occurrences (those in intact, sustainable habitats) over time (FW-GDL-VEG-07)."

Effects from Non-native Invasive Plants

Introduced, invasive plant species can displace rare species through competitive displacement. Indirect impacts include herbicide spraying and mechanical ground disturbance to control noxious weeds once they gain a foothold. Competition from invasive non-native species and noxious weeds can result in the loss of habitat, loss of pollinators, and decreased rare plant species viability. Roads, trails, livestock, and canopy reduction can provide ideal pathways for the introduction of exotic and non-native species. Indirectly, herbicide spraying can destroy populations of native pollinators by contaminating nesting materials and pollen resources, further decreasing the viability and reproductive success of rare species. Regarding the risk of weed invasions and/or expansion of populations, the alternatives would vary in some ways. In general, the more emphasis the alternative has on active management, the greater the likelihood of weed spread. All action alternatives contain a forestwide desired condition that states "new invasive plant species are treated and populations are contained or eradicated. Integrated pest management approaches are used, including best management practices that limit introduction, intensification and spread due to management activities. Areas requiring re-vegetation use locally adapted, native plant species where feasible and appropriate. Agreements with cooperative weed MAs assist in noxious weed and invasive plants control across jurisdictional boundaries" (FW-DC-VEG-10). Alternative D, with its emphasis on active management, would be expected to have the greatest impacts on weeds; and at the other end of the spectrum, Alternative C would be expected to have the least impacts. The other alternatives fall between those two extremes.

Effects on Aquatic, Peatland, and Deciduous Riparian Species Guilds

These three habitat guilds will be analyzed together as they generally have similar types of threats for the rare plant that occur within them. Within these three guilds, there are 27 sensitive species, and one threatened species (water howellia). As mentioned earlier, there are no known

locations of water howellia on the KNF but potential habitat exists along river meanders and oxbows. Hydrologic, and/or nutrient alternations are the two most important impacts that could occur to plants within these guilds. Mechanical vegetation treatments, off-road vehicles, roads and trails, grazing and catastrophic wildfires are the most likely causes of Forest Service activities that could affect the hydrologic regimes or nutrient inputs. However, as previously mentioned, the INFISH standards, guidelines and other direction provide a fairly high level of protection for rare plants in these guilds. Those protections are in affect for all the alternatives. The action alternatives have additional protection measures and an increased emphasis on the restoration and maintenance of riparian and aquatic resources. Probably the most substantial risk to the plants in these guilds that has not been mitigated by INFISH or the other aquatic/riparian direction associated with the action alternatives, is the risk of a wildfire burning a large area and affecting either the hydrologic regime or nutrient inputs into these habitats. In comparing the action alternatives, Alternative C would likely pose the largest risk to plants in these guilds. Alternative C would rely heavily on fires to help trend the vegetation towards desired condition; and the use of a high level of prescribed fire or natural wildfires has risks associated with it getting larger and/or more intense than desired. A large fire covering substantial area in these habitat guilds could make substantial changes in above and below ground water flows as well as nutrient inputs.

Effects on Moist Forest Plant Species Guild

On the KNF, 13 sensitive species are assigned to either the wet or moist forest guild. Of the potential threats to plants in these guilds, possible impacts from mechanical activities, fire and noxious weeds are the most important. Many of the plants in these guilds are somewhat sensitive to reductions in tree canopy cover and/or soil disturbance and many are commonly located in older late seral mature or old-growth type forest stands. Because one of the general forest vegetation desired conditions is to increase the amount of old growth in the future, there may be more of this habitat in the future, baring large landscape scale wildfires.

Alternative D, because of the emphasis on an increased level of active management, is likely to have the greatest potential impact on rare plants in these guilds. The plants in the wet guild would likely be protected from impacts from mechanical activities, due to the INFISH and/or aquatic and riparian Forest Plan components discussed earlier. In addition, the required field surveying that is conducted for projects would likely locate many of the populations and mitigation/protection measures would be established on a project specific basis. Relative to Alternative D, the risk of negatively affecting rare plants in these guilds is less for Alternative C, and Alternatives A and B would rank between the other two.

Effects on Dry Forest Plant Species Guild

Seven sensitive species, and one federally listed threatened species (Spalding's catchfly), are grouped together in this dry forest species guild. As noted previously, there are no known populations of the spalding catchfly on the KNF; however, potential habitat does exist. The threats associated with the rare plants in this guild are fire (both from fire suppression efforts as well as prescribed fire or wildfire), mechanical activities, grazing and OHV recreation. Because field surveys are conducted for proposed activities, such as the use of prescribed fire and mechanical activities, the risk of harm from those causes is likely fairly low (FW-GDL-VEG-07). Greater risks likely exist due to wildfires burning under uncharacteristically intense conditions. Regarding the various alternatives, Alternative C, with less active management and its reliance on more fire, probably has a greater chance of causing negative effects to plants in this guild than do the other alternatives.

Effects on Cold Forest Plant Species Guild

Only one sensitive plant species occurs in this guild, the Ground Pine club moss. Threats to this plant are primarily mechanical activities and fire. Forestwide guideline FW-GDL-VEG-07 would be applied under all action alternatives prior to trail construction or maintenance activities. Alternative D, with its greater emphasis on active management, would likely pose more risk to this plant than would the other alternatives.

Effects on Subalpine Grassland Plant Species Guild

Three sensitive plants occur in this subalpine guild, the slender-leaf sundew, Western joepye-weed, and old man's beard. Because these plants are located at high elevations, they tend to occur in IRAs, designated or recommended wilderness areas, or other remote locations. Trail construction or maintenance might affect these species, but probably the greatest threat is climate change. Forestwide guideline FW-GDL-VEG-07 would be applied under all action alternatives prior to trail construction or maintenance activities.

Cumulative Effects

The analysis area for cumulative effects includes all ownerships that comprise the KNF. There are no cumulative effects from the decisions we are making in the draft Forest Plan except for past actions.

Under the influence of changing climate, if droughts, and warmer winters continue, agents such as mountain pine beetle, Douglas-fir beetle, Western balsam bark beetle, and spruce beetle will likely show increased levels of activity. Fires are likely to increase in intensity under climatic influence if droughts continue and weather favorable to high intensity fire develops.

Non-native Invasive Plants

Introduction

Non-native plants are species that do not have their origin in a local area. They have not adapted to or evolved with the local environment, including native plants, animals, and disturbances. Non-native plants include both exotics and noxious weeds. Exotic plants are species that have been introduced to an area, usually from a different continent. They may have been introduced inadvertently or intentionally.

Legal and Administrative Framework

Law and Executive Orders

- **Federal Noxious Weed Act of 1974:** States that each federal agency shall establish and adequately fund an undesirable plants management program, complete and implement cooperative agreements with State agencies regarding the management of undesirable plant species on Federal lands under the agency's jurisdiction; and establish an integrated management system to control or contain undesirable plant species targeted under cooperative agreements.
- **Executive Order 13112:** Directs federal agencies to prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; to monitor invasive species populations accurately and reliably; to provide for restoration of native species and habitat conditions in ecosystems that have been invaded; to conduct research on invasive species and develop technologies to prevent introduction; and to provide for environmentally sound control of invasive species; and promote public education on invasive species and the means to address them. All of these actions are subject to the availability of appropriations.
- **State of Montana County Noxious Weed Management Act:** States that it is unlawful for any person to permit any noxious weed to propagate or go to seed on the person's land, except that any person who adheres to the noxious weed management program of the person's weed management district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section. The KNF has entered into an agreement with Lincoln County.
- **Idaho Noxious Weed Law:** States that it is unlawful for any individual to allow noxious weeds to propagate or go to seed on their land unless they are complying with an approved weed management plan. This law directs the counties to develop weed control districts to plan and implement weed control efforts. The law also directs district (county) weed boards to "make all reasonable efforts to develop and implement a noxious weed program covering all land within the district owned or administered by a Federal agency."

Key Indicator

- Level of ground disturbing activities (e.g., timber harvesting, road and trail construction/reconstruction, fire suppression, grazing) and wildland fire (both prescribed fire and wildfire).

Methodology and Analysis Process

A weed risk assessment was conducted to evaluate the current risk of 20 species of weeds spreading and harming native plant communities. The methodology for that assessment is

documented in project file records. The evaluation of how alternatives may impact the risk of new weed introductions and the spread of existing weeds was based primarily on what the relative opportunities are for ground disturbing activities and wildfire.

Affected Environment (Existing Condition)

The Federal Noxious Weed Act of 1974 defines a federal noxious weed as a "foreign origin as is new to or not widely prevalent within the United States, and can directly or indirectly injure crops… fish and wildlife resources or the public health." Federal noxious weeds are specified as aquatic weeds, parasitic weeds, or terrestrial weeds. For the purpose of weed management on federal lands, a federal and ordinances for the implementation and enforcement of weed management.

Noxious weeds are "Those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease and being native or new to or not common to the United States or parts thereof" (FSM 2080.5).

Most introduced species never became pests as they could not thrive without special care, or they did not compete well with native vegetation and, therefore, they remained confined to gardens or agricultural fields. Some even became valuable crop or landscaping plants. However, in the absence of competitors and natural enemies with which they evolved, a few exotic species spread and dominated to the detriment of native vegetation. For example, knapweed came into the United States from Eurasia in clover and alfalfa seed. Oxeye daisy was spread around the northwest in forage grass and legume seed after its introduction in the late 1800s. Intentional introductions have brought invasive weeds into the area as well. Common St. John's-wort seed was brought with English and German settlers as seed for gardens. Dalmatian toadflax came from Europe as an ornamental, as did orange hawkweed and absinth wormwood.

Noxious weeds are plant species designated by law that can have detrimental effects on agriculture, commerce, or public health. They spread aggressively and are difficult to manage. These species are generally new or not common to the United States. Noxious weeds generally present the most immediate and disruptive threat to ecosystems.

Noxious weeds classified as invaders pose the greatest threat as these plants are capable of becoming established in undisturbed or relatively undisturbed areas and have the ability to spread quickly over large areas. Spotted knapweed, diffuse knapweed, yellow star thistle, leafy spurge, and dyer's woad are examples of invaders. These infestations can substantially change the biological diversity of areas by influencing the amount and distribution of native plants and animals, and negatively affect recreational experiences, forest regeneration, wildlife and livestock forage, soil productivity, fire regimes and riparian and hydrologic function.

Various recreational and management activities that occur on the KNF have the potential to disperse noxious weeds or increase the likelihood that they will become established at a given site. This increase in dispersal and establishment is above what would happen naturally as a result of seed transport by wind, water or wildlife.

Current control efforts are aimed at eradicating new invaders and containing existing infestations. Every known site occupied by a new invader species is treated and monitored. Logging equipment is cleaned before entering a sale area to reduce the potential for the

introduction of weed species not yet present in a sale area. Tactics used to attempt to contain large infestations include spraying roadsides, seeding major disturbances caused by road and skidtrail building and landing piles and treating gravel pits. Biocontrols have been released for spotted knapweed, dalmatian toadflax, St. John's wort, purple loosestrife, and Canada thistle. Infestations in some sites have been reduced by these measures. However, in spite of these control efforts, existing infestations continue to invade disturbed areas and intact plant communities.

On the KNF, it is fairly common to see noxious weeds along many roadsides, railroad and utility rights-of-way and other disturbed areas, such as gravel pits. Spotted knapweed, tansy ragwort, rush skeleton weed, and other weed species have migrated away from the road right-of-way onto undisturbed hillsides, especially within the drier vegetation types. Orange hawkweed has an increased presence on moist habitat types under full canopies and is converging on the edges of the Cabinet Mountain Wilderness. Weeds are also becoming established in harvest units where the seeds have been brought by machinery and other vectors such as wildlife, cattle, railcars, and/or wind. In 2007, the KNF completed an integrated weed management plan for the Forest. Table 19 lists the noxious weeds that are known to occur on the KNF, as well as potential invaders. Plants listed in table19 as a potential invader (noted as PI in the table), are those that have not yet been located on the Forest but are assumed to be potential invaders. The management goal for those potential invaders is to prevent them from becoming established, and if found, eradicate them promptly. For the new invaders that are identified in the table (noted as NI in the table), there is a goal of eradicating any small infestations and reducing the larger ones. Lastly, for those plants that are recognized as widespread weeds (noted as WS in the table), the goal is to contain them inside areas that are already infested and reduce the plant populations.

Table 19. Non-native Invasive Plant Species of Concern on the Kootenai National Forest

Scientific Name	Common Name	PI=Potential Invader, NI=New Invader, WS=Widespread Invader		
		PI	NI	WS
Anchusa officinalis	Bugloss		X	
Arctium minus	Common burdock			X
Artemisia absinthium	Absinth wormwood			X
Bromus tectorum	Cheatgrass			X
Bryonia alba	White briony		X	
Cardaria draba	Whitetop (hoarycress)		X	
Carduus acanthoides	Plumeless thistle	X		
Carduus nutans	Musk thistle		X	
Centaurea diffusa	Diffuse knapweed			X
Centaurea maculosa	Spotted knapweed			X
Centaurea pratenis	Meadow knapweed		X	
Centaurea repens	Russian knapweed		X	
Centaurea solstitialis	Yellow starthistle	X		
Chaenorrhinum minus	Dwarf snapdragon		X	
Chondrilla juncea	Rush skeletonweed		X	
Chrysanthemum leucanthemum	Oxeye daisy			X

Scientific Name	Common Name	PI=Potential Invader, NI=New Invader, WS=Widespread Invader		
		PI	NI	WS
Cichorium intybus	Chicory		X	
Cirsium arvense	Canada thistle			X
Conium maculatum	Poison-hemlock		X	
Convolvulus arvensis	Field bindweed			X
Crupina vulgaris	Common crupina	X		
Cynoglossum officinale	Common hound's-tongue			X
Cytisus scoparius	Scot's broom		X	
Echium vulgare	Blueweed		X	
Euphorbia esula	Leafy spurge		X	
Hieracium aurantiacum	Orange hawkweed			X
Hieracium piloselloides	Meadow hawkweed complex			X
Hieracium pratense	Yellow hawkweed			X
Hypericum perforatum	Common St. John's-wort			X
Hypocharius radicata	Spotted cat's-ear		X	
Isatis tinctoria	Dyer's woad	X		
Kochia scoparia	Kochia		X	
Linaria Dalmatica	Dalmatian toadflax		X	
Linaria vulgaris	Yellow toadflax		X	
Lythrum salicaria	Purple loosestrife	X		
Matricaria maritime agrestis	Scentless chamomile		X	
Myriophyllum spicatum	Eurasian watermilfoil	X		
Onopordum acanthium	Scotch thistle		X	
Polygonum cuspidatum	Japanese knotweed		X	
Potentilla recta	Sulfur cinquefoil			X
Ranunculus acris	Tall buttercup		X	
Senecio jacobaea	Tansy ragwort		X	
Tamarix spp.	Saltcedar	X		
Tanacetum vulgare	Common tansy			X
Verbascum spp.	Mullein			X
Veronica chamaedrys	Germander speedwell			X
Veronica officinalis	Common speedwell			X

The list of noxious weeds in the table above includes the State of Montana and Lincoln and Sanders County lists as well as other weed species that the Forest considers important. The State of Montana and Lincoln County are very concerned about new invaders, especially three relatively new weed invaders: tansy ragwort, rush skeleton weed, and orange hawkweed. There is a strong desire to keep these species from moving east of the Continental Divide into the large farming areas of central and eastern Montana. The State has provided added monies for surveys and spraying to contain the expansion of these species and to eradicate them. Even though strong

emphasis is placed on these species, concern remains for all the other weed species listed. Control is not confined to the three species above. Treatments for all weed species are an Integrated Pest Management approach that includes one, or a combination, of the following:

- Biological – release of bio-agents;
- Mechanical – hand pulling, hoeing, clipping of seed heads, etc.;
- Chemical – application of herbicides; and
- Cultural – establishment of desirable plants as competition.

The 2007 Weeds FEIS and ROD places the emphasis on an integrated aerial and ground weed control operation. Existing weed infestations have expanded greatly in numbers, aerial extent, and diversity over the past 25 years. The most common weed on the KNF is spotted knapweed. In 1995, county weed specialists estimated that knapweed infested over 240,000 acres in Lincoln County and 175,000 acres in Sanders County (Hirsch and Leitch 1996). The current estimate is over 300,000 acres in Lincoln County (2007 Weeds FEIS). Two-thirds of the total infestations are in forestlands and rangelands, with the remaining third in road or railway corridors. Weed risk on the KNF, as documented in the 2007 Weeds FEIS, estimates that with current levels of disturbance, 63 percent of the Forest (1,400,800 acres) is at high risk, with 27 percent (603,800 acres) at moderate risk.

Additional information that was developed from the weed risk assessment that is mentioned above is displayed in table 20.

The weed risk assessment ratings in the table are a composite of 20 noxious weed species. The risk rating was based on individual components including disturbance, weed susceptibility, threat of weeds to native plant communities, and exposure. Methodology used in the assessment is documented in project file records.

Table 20. Acres by Weed Risk Rating for NFS Lands on the KNF

Biophysical Group/ Forestwide	Weed Risk Rating	Acres	Percent of Biophysical Group/ Forestwide
Warm/Dry	High	410,900	83
Warm/Dry	Moderate	81,700	17
Warm/Dry Total		**492,700**	
Warm/Moist	High	573,000	70
Warm/Moist	Moderate	245,600	30
Warm/Moist Total		**818,600**	
Subalpine	High	416,900	46
Subalpine	Moderate	276,400	31
Subalpine	Low	212,100	23
Subalpine Total		**905,400**	
Water	None	2,200	
Water Total		**2,200**	
Forestwide	High	1,400,800	63
Forestwide	Moderate	603,800	27
Forestwide	Low	212,100	10
Forestwide	None	2,200	0
Forest Total		**2,218,900**	

Environmental Consequences

Management Direction for Alternative A

The 1987 Forest Plan contains very little management direction related to the management of non-native invasive plants. However, there is one forestwide goal (#23, pg II-2) for noxious weeds and it expresses the desire to stop the spread of weeds and to suppress the existing weed levels.

Management Direction for Alternatives B, C, and D

Relative to Alternative A, all of these action alternatives contain more management direction related to non-native invasive plants. For example, these alternatives contain forestwide desired condition statements (FW-DC-VEG-10) and objectives (FW-OBJ-VEG-02) that stress the need to treat new invaders and utilize best management practices that limit the introduction and spread from management activities. The integrated pest management approaches and best management practices that are being used in the Region are described in FSM 2081. In addition to the forestwide direction noted above, these alternatives also contain additional direction for some specific MAs. All of the action alternatives contain numerous Forest Plan components (e.g., FW-DC-WTR-01, FW-DC-SOIL-01,02,03, FW-DC-RIP-04, 06, FW-DC-AQH-01, FW-OBJ-SOIL-01, FW-STD-RIP-03, 04, FW-DGL-RIP-03, 05, FW-GDL-ASQ-02) that would serve to protect watershed, soil, riparian and aquatic conditions in ways that would reduce management caused disturbances in these areas that could otherwise increase weed spread or introduction.

Consequences to Non-native Invasive Plants from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Access and Recreation Management

Vehicles can carry noxious weeds when they pass through infestations or along the periphery of invasions where seeds or other plant parts occur (Sheley et al. 1999). Roadsides along major highways, general forest roads, and two-tracked roads are one of the primary mechanisms for the spread of these plants. Motorized, as well as nonmotorized recreation activities, are also a common means for the spread of weeds. Recreational areas and facilities, such as trails, trailheads, and campgrounds receive a high amount of public use and soil disturbance; and this facilitates weed introduction and spread. Recreationists can disperse seeds on their clothing, footwear, camping equipment, and vehicles (Sheley et al. 1999). Lastly, users of horse and pack stock may transport weed seeds in the supplemental feed that they use to feed their animals.

There are numerous weed prevention and control measures required by Forest Service policy (FSM 2081) for the management of roads and recreational activities. However, despite the use of those best measures, there is still a risk that new weeds could be introduced or existing weeds spread as a result of these types of activities. To the extent that the alternatives would affect the access and recreational activities or opportunities noted above, there would be consequences to the risk of weed introduction and spread. As discussed in more detail in the “Access and Recreation” topic, the management direction associated with the alternatives would not vary with regards to potential effects on motorized and nonmotorized access and recreational opportunities on the KNF. Therefore, the risk that weeds would be introduced and/or spread as a result of these activities is similar for all the alternatives.

Effects from Vegetation and Timber Management

Activities associated with timber harvest and mechanical fuels treatments; such as construction and use of roads, landings, and skid trails, disturb the soil and can create a more susceptible environment for the spread of weeds. Noxious weeds can also be introduced into an area by mechanical equipment associated with these activities. In addition, the use of prescribed fire associated with the management of vegetation can increase the likelihood for weed spread.

While there are numerous weed prevention and control measures required by Forest Service policy (FSM 2081) related to timber harvesting and other vegetation treatment activities, there is still a risk that these activities would result in spreading or introducing new weed species. As presented in the discussions for the “Vegetation” and “Timber” topics, the alternatives vary in the estimated amount of vegetation and timber treatments that would occur given the different management direction for each alternative; and under the two different budget scenarios. For the purpose of a general comparison between alternatives on how vegetation and timber related direction may affect the risk of weed introduction and spread, the number of acres of treatment can be used as an indicator.

Under the assumption that budget levels in the future will remain similar to current levels, Alternative A is predicted to result in the smallest number of acres being treated with timber harvest activities or prescribed fire (approximately 2.4 percent of the forested acres during the first decade), while Alternatives B and C would result in the largest number of acres (each is approximately 7.1 percent) being treated during that time period. Alternative D is predicted to treat approximately 6.7 percent. If the budget constraint was removed, most of the alternatives would treat more acres. Compared to the other alternatives, Alternative A would treat the

smallest number of acres (approximately 2.5 percent), followed by Alternative D (6. 4 percent), Alternative C (7.2 percent) and lastly, Alternative B (7.3 percent).

Effects from Fire Management

Non-native invasive plants frequently invade sites following fires and sometimes it can occur on a large scale (Asher et al. 2001). In addition, wildfire suppression efforts often involve constructing control lines and requiring staging areas for fire equipment and fire camps. Control lines are usually dug down to bare mineral soil and can provide sites that are very vulnerable to weed establishment and spread. While there are many weed prevention and control measures that are required by Forest Service policy (FSM 2081) that are associated with the management of wildfires and prescribe fires; there is an increased risk of weed invasions and introductions in burned areas.

The relative risk among alternatives for prescribed fire was addressed above in the vegetation and timber paragraph. Therefore, the following discussion concerns risks associated from wildfires that are managed for multiple resource benefits. As described in more detail in the discussion of the "Fire" topic, the management direction associated with Alternatives B, C, and D would result in an increased level of wildfire being used for multiple objectives compared to Alternative A. While it is difficult to predict the magnitude of the likely consequences, Alternatives B, C, and D would result in higher risks for weed introduction and spread compared to Alternative A due to the increased amount of wildfire managed for multiple resources that is anticipated for the action alternatives.

Effects from Wildlife Management

As previously noted, wildlife species are one of the many mechanisms that serve to spread non-native invasive plants. Weed seeds, or parts of plants, can attach to the fur or feet of wildlife, or in some cases, are eaten and pass through animals, and may be ready to germinate (Sheley et al. 1999). Therefore, to the degree that the various alternatives may affect wildlife populations, there could be some effects on the amount of weed spread that occurs. In addition, when conducting wildlife habitat restoration and improvement projects (for example prescribed burning to improve big game forage) one of the consequences may be that the site conditions are created that are more suitable for weed establishment and/or spread. However, the consequences of the wildlife related management direction on the establishment and spread of non-native invasive plants is likely to be similar for all of the alternatives.

Effects from Watershed, Soil, Riparian, and Aquatic Habitat Management

Noxious weed infestations are fairly common in some riparian areas on the KNF. This is due to the availability of ample moisture, the high potential for weed seed transportation through stream systems, and in some instances, the high levels of public activity due to recreational activities in these areas. Some weed species are adapted to riparian areas.

While all the alternatives include the INFISH (USDA Forest Service 1995) direction that would serve to reduce weed spread/introductions in these areas, the action alternatives contain more protection measures. In addition, there are a number of soil and water related weed prevention and control measures required by Forest Service policy (FSM 2081) that are applicable for all alternatives.

Effects from Livestock Grazing Management

Livestock can transport weed seeds in their fur, wool or manure (Sheley et al. 1999). In areas where livestock congregate, such as around watering sites, trails, corrals and along fence lines, the high level of soil disturbance can create conditions for weed germination and spread. In addition, some weed species do not require bare soil to become established and can compete with native plants in riparian areas or other heavily vegetated areas in allotments.

As discussed in more detail in the "Livestock Grazing" section of the draft EIS, the amount of livestock grazing on the KNF is not anticipated to vary due to the management direction associated with various alternatives. Therefore, the risk that livestock grazing activities would introduce and/or spread non-native invasive plants would be the same across all alternatives. There are numerous weed prevention and control measures required by Forest Service policy (FSM 2081) related to livestock grazing, and they would be utilized under all alternatives to reduce the weed related risks associated with these activities.

Effects from Minerals, Lands and Special Uses Management

Activities associated with locating and removal minerals, issuance of special use permits or the acquisition, disposal or exchange of lands can have consequences to the introduction and spread of noxious weeds. However, the Forest Plan components relating to those activities do not vary by alternative; therefore, the weed risks would be similar with each alternative. There are numerous weed prevention and control measures required by Forest Service policy (FSM 2081) related to lands, special uses and minerals, and they would be utilized under all alternatives to reduce the weed related risks associated with these activities.

Cumulative Effects

The effects that past activities have had on the introduction and spread of non-native invasive plants were discussed in the "Affected Environment" section and are reflected in the current condition. Therefore, past activities are not carried forward into the following cumulative effects discussion. Present and foreseeable future activities that could have consequences are summarized below.

Human Population Increases and Additional Recreational Use of the KNF: The regional population is expected to increase in the area surrounding the KNF. As the human population increases in the region, it is expected that there will be more recreational use of the KNF. It is anticipated that all types of recreational use will increase, but because of the aging demographics, there may be a slight increase in the motorized use versus more strenuous nonmotorized activities. In general, both of these trends may increase the spread of weeds and/or the probability of new weed species being introduced. This effect would cumulatively add to those resulting from the alternatives.

Climate Change: As discussed in more detail in the KIPZ Climate Change Report (USDA Forest Service 2010), climate change may increase the risk in the Northern Region of the spread of non-native invasive plant species, but there is a lot of uncertainty surrounding any predictions. It is likely that some noxious weeds will likely expand as the climate changes, and some may decline. However, if climate change results in more wildfire activity as predicted, more area is likely to burn and the result would be an increase in highly suitable areas for weeds to spread to in the future. As a result, climate change may directly, or indirectly, cumulatively add to the risks resulting from the alternatives.

Fire and Fuels Management

Introduction

Fire is an ecological process as well as a disturbance. In some ways, fire is similar to insects, diseases, wind events, floods, or ice storms. However, unlike other processes and disturbances, fire can also be used as a tool to manage natural resources. Land managers can plan for fire use to achieve management objectives; whether through the use of prescribed fire (i.e., a planned ignition) or natural, unplanned wildfire (i.e., ignited by lightning as opposed to humans).

Fire management programs oversee all aspects of fire suppression as well as the use of fires to meet management objectives. Fire suppression actions include a full range of options, from resource intensive (e.g., large numbers of personnel and equipment) to less intensive activities. The decision to use one or a combination of suppression strategies and tactics depends on management objectives and factors; including such things as threats to life, property, and investments; fuel and weather conditions; natural resource objectives; terrain; and available resources such as personnel and equipment.

Legal and Administrative Framework

Law and Executive Orders

- **Organic Administration Act, of June 4, 1897 (16 U.S.C. 551):** Authorizes the Secretary of Agriculture to make provisions for the protection of the national forests against destruction by fire.
- **Bankhead-Jones Farm Tenant Act, of July 22, 1937 (7 U.S.C. 1010, 1011):** Authorizes and directs the Secretary of Agriculture to develop a program of land conservation and land utilization to protect public lands.
- **Wilderness Act, of September 3, 1964 (16 U.S.C. 1131, 1132):** Authorizes the Secretary of Agriculture to take such measures as may be necessary in the control of fire with designated wilderness.
- **National Forest Management Act (NFMA), of October 22, 1976 (16 U.S.C. 1600 et seq.):** Directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources. Implementing regulations at Title 36, Part 219 of the Code of Federal Regulations (36 CFR 219.27) specify that consistent with the relative resource values involved, management prescriptions in forest plans must minimize serious or long-lasting hazards from wildfire.
- **Clean Air Act, as amended (42 U.S.C. 7401 et seq.):** Provides for the protection and enhancement of the nation's resources and applies to the application and management of prescribed fire.
- **Economy Act of 1932, June 30, 1932 (41 U.S.C. 686):** Provides for procurement of materials, supplies, equipment, work, or services from other federal agencies.
- **Granger-Thye Act, of April 24, 1950 (16 U.S.C. 572):** Authorizes expenditure of Forest Service funds to erect buildings, lookout towers, and other structures on land owned by states. It provides for the procurement and operation of aerial facilities and services for the protection and management of the national forests and other lands administered by the Forest Service.

- **Reciprocal Fire Protection Act, of May 27, 1955 (42 U.S.C. 1856, chapter 15A):** Authorizes reciprocal agreements with federal, state, and other wildland fire protection organizations.
- **Wildfire Suppression Assistance Act, of April 7, 1989 (HR 4936):** Authorizes the Secretary of Agriculture to enter into agreements with fire organizations of foreign countries for assistance in wildfire protection.
- **Healthy Forest Restoration Act, of 2003 (HR 1904):** Expedites the preparation and implementation of hazardous fuels projects on federal land and assisting rural communities, States, and landowners in restoring healthy forest conditions on state and private lands.

Regulation and Policy

- **The National Fire Plan (USDA Forest Service 2000):** Directs reduction of hazardous fuel and restoration of forest and rangeland. Includes a 10-year Comprehensive Strategy (2001) and implementation plan response developed by the Secretaries of Agriculture and the Interior, Western Governors, and other interested parties, for protecting communities and the environment. Coupled with the Federal Wildland Fire Management Policy (2001), the Plan forms a framework for federal agencies, states, tribes, local governments, and communities to reduce the threat of fire, improve the condition of the land, restore forest and rangeland health, and reduce risk to communities.
- **The Healthy Forests Initiative:** Reduces administrative process to facilitate implementation of projects to reduce hazardous fuels and restore healthy ecological conditions on Federal lands. The Healthy Forest Restoration Act, passed in December 2003 provides improved statutory processes for hazardous fuel reduction projects on certain types of at-risk NFS and BLM lands. It also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships. Healthy Forest Restoration Act is intended to be consistent with, and supportive of, the community-based wildfire planning, watershed planning and related ongoing efforts under the National Fire Plan and Comprehensive Strategy.

Key Indicators

- How much, where, and under what conditions on the Forest prescribed fire and wildfire may be used to help achieve desired conditions; and
- How much fuel treatment the alternatives would likely implement and the relative risk reduction that could occur.

Methodology and Analysis Process

The analysis area for fire is all lands on and within the KNF. This area represents NFS lands where fire management activities may take place. Cumulative effects includes other land ownerships within and adjacent to lands administered by the KNF, particularly in areas of wildland-urban interface. This larger area incorporates concerns to and from other landowners with regard to the potential effects on or from these intermingled properties. This approach is consistent with the coordination that occurs between states, counties, other federal agencies, and private landowners under the National Fire Plan and other fire management direction.

Affected Environment – Use of Fire for the Maintenance and Restoration of Fire-Adapted Ecosystems

The affected environment for the "Vegetation" section provides a comprehensive discussion on the historical and current role that fire has had on the KNF, the types of wildfires that historically occurred on the KNF, the ecological effects, as well as the environmental effects from fire suppression. That part of the "Vegetation" section provides a better appreciation for the importance that fire has on the maintenance of the biodiversity and productivity of ecosystems on the KNF, and provides the overall context for understanding the environmental consequences of the alternatives presented in the "Environmental Consequences" section for this topic.

The AMS Technical Report (USDA Forest Service 2003) describes the amount of wildfires that have occurred on the KNF during the last 100 years. Historically, fire has played a significant role in ecosystem processes for vegetation on the Forest. Historical fire levels for the Forest were probably similar to the levels that occurred in the Interior Columbia Basin, which was three percent of the area in an "average" fire year and up to six percent of the area in an "active" fire year (Barrett et al. 1997). Based on wildfire and prescribed fire records for the last ten years, the KNF has averaged approximately five percent of its area. The KNF has used prescribed burning as a tool to treat fuels, improve habitat, and reduce wildland fire risk for the past several decades. During the last 10 years, the KNF has used prescribed burning on approximately 80,000 acres. Over the last three year period (2008 to 2010), the number of wildfires per year that occurred on the KNF ranged from 76 to 176 and the number of acres that burned annually from those fires varied from 88 to 2600 acres (this included one fire that was 2400 acres in size).

Fire use as a tool can have adverse effects under certain conditions, even though it is an important ecosystem process. Current Forest Plan direction is intended to help define those situations where fire use will be limited or not be considered appropriate due to potential adverse resource or social-economic impacts. Part of the decision criteria to determine whether a lightning ignition will be managed for multiple objectives is whether or not the fire would likely benefit, or harm, resources and be consistent with the Forest Plan direction.

Prescribed fire or natural unplanned wildfire use can help achieve certain management objectives. The use of either tool will occur within certain conditions or prescriptions. Prescribed fire and the use of wildfires for resource benefits are likely to be implemented at different times during the burning season and, therefore, have somewhat different effects. Prescribed fires are often conducted in the spring and fall within burning "windows" that are developed to ensure that the effects meet resource management objectives. Conversely, lightning produces the natural unplanned wildfires that may be managed for resource benefits, and most of the lightning storms that ignite wildfires occur in July and August on the KNF. Therefore, wildfire use for resource benefits may more often be implemented under drier conditions than those that would occur within prescribed fire burning windows. Prescribed fires implemented in the spring, or fall, would more likely be of lower intensities and severities than wildfires that are managed for multiple objectives during the summer. In addition, the potential size of the wildfires being managed for resource benefits is likely greater than most fires ignited by planned ignitions.

Environmental Consequences – Use of Fire for the Maintenance and Restoration of Fire-Adapted Ecosystems

Management Direction for Alternative A

The 1987 Forest Plan for the KNF contains some direction regarding the role that fire should have on affecting the ecosystems. Forestwide goal #17 (pg. II-2) states: "Use prescribed fire to simulate natural ecological processes, prevent excessive natural and activity fuel buildups, create habitat diversity for wildlife, reduce suppression costs, and maintain ecosystems." In addition, a forestwide desired condition states: "Where lands are to resemble a near-natural condition fire will be allowed to operate with minimal constraint as an agent of ecological adjustment and maintenance" (vol. 1, pg. II-19). However, as opposed to the action alternatives, Alternative A does not have any specific forestwide direction that provides an emphasis on the need to use fire as a tool to restore and/or maintain ecosystem composition, structure, or function. Most of the direction in the 1987 Forest Plan regarding fire is contained within the individual MA standards and guidelines.

There are 22 individual MAs that are contained in the 1987 Forest Plan that contain direction regarding the use of prescribed fire, the use of natural wildfires (called unplanned prescribed fire in the 1987 Plan), and appropriate suppression strategies and tactics in both critical and non-critical fire seasons.

Prescribed fire (planned ignitions) may be used in all MAs except MA7 (Cabinet Mountains Wilderness Area). However, the use of natural, unplanned ignitions is fairly restrictive in the 1987 Forest Plan and some of the MA standards in the Plan serve as barriers for the use of this tool. For example, twelve MAs (5, 6, 13, 15-21, 23, 24) have standards that do not allow the use of natural, unplanned ignitions and the acres that these MAs occupy is substantial; approximately 25 percent of the total acres on the KNF.

Six MAs (2, 3, 7, 8, 9 and 29) allow the use of natural, unplanned ignitions with some exceptions. These six MAs occupy approximately 24 percent of the total acres on the Forest. For these MAs, natural unplanned ignitions can only be used for resource benefits if the fire is predicted to stay within one of these MAs or adjacent ones that also have been approved for the use of natural unplanned ignitions. Also, natural unplanned ignitions in these MAs may only be managed for resource benefits if the fire effects are such that "…the fire must not adversely affect the goals or standards of this or any other MA."

The remaining four MAs (10, 11, 12 and 14) that contain direction on the use of unplanned ignitions allow its use only if the fire occurs during the non-critical fire season AND meets the other stipulations that were discussed above. This last group of four MAs comprises approximately 45 percent of the total acreage on the KNF.

The AMS identified several impediments to the use of fire in the 1987 Forest Plan. The MAs were numerous and generally small in size. Adjoining MAs often had different or unclear direction on the use of fire; and this resulted in creating a difficult situation for developing subsequent fire management plans and implementing an integrated fire management program. Also, because the 1987 Forest Plan did not contain an emphasis or much analysis on the use of fire (especially natural unplanned wildfire), it was generally believed that the Plan did not adequately authorize the use of wildfires for resource benefits.

Management Direction for Alternatives B, C, and D

Alternative B, C, and D contain more specific forestwide and MA direction regarding the role that fire would have maintaining and/or restoring fire-adapted ecosystems. For example, each action alternative would contain forestwide desired condition FW-DC-FIRE-03 from the Plan; which states, "The use of wildland fire (both prescribed fire and where appropriate, natural, unplanned wildfire) increases in many areas across the Forest. Fire plays an increased role in helping to trend the vegetation towards the desired conditions while serving other important ecosystem functions." In addition, each of the alternatives would contain two forestwide objectives (FW-OBJ-FIRE-01 and 02), which indicate that fire would be used as a tool for both fuel reduction and ecosystem maintenance/restoration functions. The second of these objectives expresses the desire that at least 10 percent of the natural, unplanned ignitions would be managed to improve and/or maintain fire adapted ecosystems. Other forestwide direction (FW-DC-WL-15, FW-OBJ-VEG-01, and FW-GDL-VEG-01) that relates to vegetation or wildlife habitat would allocate fire to play a greater role as a management tool. At the scale of the individual MAs, all the action alternatives would contain desired conditions and guidelines from the Plan that would articulate what role fire should have and whether or not one or both of the principle fire tools (prescribed fire or the use of natural unplanned wildfire ignitions) may be used. In general, many of the MAs express the desire to increase the use of fire as a tool (natural or prescribed) to trend the ecosystems toward the desired conditions. Some of the MAs, typically the ones that occupy small areas and contain resources and/or values that are more susceptible to being harmed by fire, contain limits or restrictions on the use of fire, especially wildfire. These are research natural areas (MA4), primary recreation areas (MA7), and some historical or botanical special areas (MA3).

In summary, the management direction that is contained in all of the action alternatives is generally designed to encourage an increased use of fire (whether it be prescribed fire or using natural wildfire) as a tool to assist in the restoration and maintenance of the various ecosystems on the KNF. However, management direction also recognizes that in certain situations and locations wildfires are undesirable because the risk of harming values is too great and, therefore, suppression action can be taken.

General Effects

The general effects that fire has on vegetation and forest ecosystems are presented in the "Affected Environment" section for vegetation. In addition, the effects of not using fire or suppressing wildfires are also discussed in that section.

Relative to Alternative A, Alternatives B, C, and D would provide more opportunity and direction for the use of fire for the purposes of restoring or maintaining the fire-adapted ecosystems on the KNF. The management direction associated with the action alternatives supports a substantial increase in the use of fire; both the use of prescribed fire as well as the use of unplanned ignitions that are lightning caused.

With regard to the action alternatives, the Forest Plan components that provide direction or otherwise influence the use of fire are similar. However, there are somewhat subtle differences in the mix of fire "tools" that are likely to be used under the various action alternatives. Relative to the other action alternatives, Alternative D has a greater emphasis on the production of timber and the use of other active management techniques to trend the vegetation towards desired conditions. Therefore, the use of fire under Alternative D would likely result in a greater amount of prescribed fire (e.g., underburning and/or pile burning) used as opposed to natural, unplanned ignitions. In contrast, Alternative C would have the greatest emphasis on passive management;

therefore, would likely use natural unplanned ignitions as the primary tool to trend towards desired vegetation conditions, relative to prescribed fire. Finally, the mix of fire tools that would more likely be used for Alternative B would fall between that of Alternatives C and D. Most of the MAs (and the vast majority of the total acres on the KNF) allow the use of natural, unplanned ignitions as a restoration and maintenance tool. The special area MAs (MA3), the research natural areas (MA4) and the primary recreation areas (MA7) generally do not allow the use of unplanned ignitions. For those areas, the risk that a wildfire would harm the values associated with those areas was considered too high.

Affected Environment – Wildland-Urban Interface

The wildland-urban interface (WUI) is the line, area, or zone where structures and other human developments meet or intermingle with wildland or vegetative fuels. Population growth has led to an increase in these interface areas. More and more people are living in small communities adjacent to wildland and throughout the West the number of communities threatened or affected by wildfire has increased. To address this concern, as well as concerns about the effects of wildfires on natural resources, the Secretaries of Agriculture and Interior were directed to develop a strategy to address severe wildland fires, reduce fire impacts on rural communities, and ensure effective firefighting capability in the future. This strategy, which includes national strategic and implementation goals and plans, budget requests and appropriations, and agency action plans, is known as the National Fire Plan.

The presence of the WUI areas affects all fire management decisions in those interface areas. While a wide range of fire management strategies are available to implement, these options are usually narrowed down in these zones due to concerns that fires may move from federal to private lands. Therefore, suppression costs are often higher adjacent to interface areas. In addition to the risk of wildfires moving from federal lands onto private lands, the risk of human-caused wildfires originating on private lands and spreading onto federally protected lands is increasing.

Currently, approximately 30 percent of the lands on the KNF are within this WUI area[1] and the KNF has been collaborating with other landowners and jurisdictions to reduce the risk of wildfires in these areas. Individual community protection plans have been created by the counties and the KNF has been working cooperatively to reduce the fuels and jointly make progress towards reducing risks.

Environmental Consequences – Wildland-Urban Interface

Management Direction for Alternative A

The 1987 Forest Plan does not contain specific Forest Plan components or other direction related to the need to address the fuel and fire hazards associated with the WUI area. However, since the Forest Plan was developed, a number of national policies, initiatives and acts have emphasized the need to address this issue. As described in more detail in the “Cumulative Effects” discussion, national direction has had a large influence over fire management programs on the KNF and in the way the 1987 Forest Plan has been implemented. For about a decade the KNF has focused its fuel reduction programs around the WUI and has collaborated with various counties in implementing their respective fire mitigation plans and programs. Therefore,

[1] There are different definitions for the WUI area. This estimate was based on the areas that were identified in the various community protection plans as being in the WUI.

although the 1987 Forest Plan does not contain direction on this, implementation of the 1987 Plan is heavily influenced by national and local emphasis on the need to reduce fuel hazards in these areas.

Management Direction for Alternatives B, C, and D

All action alternatives would contain similar direction regarding WUI and hazardous fuel reduction. Forestwide desired conditions (FW-DC-FIRE-01, 02, 03) express the need to reduce hazardous fuels within the WUI as well as other areas where values are at risk; while recognizing that the public and firefighter safety is always a priority with all fire management activities. Specifically, FW-DC-FIRE-02 states:

> "Hazardous fuels are reduced within the WUI and other areas where values are at risk. Fire behavior characteristics and fuel conditions exist in these areas that allow for safe and effective fire management, as defined and characterized in county wildland fire mitigation plans. Fire behavior is characterized by low-intensity surface fire with limited crownfire potential. Forest conditions, and the pattern of conditions across the landscape, exist in these areas such that the risk is low for epidemic levels of bark beetles, high levels of root disease, and large scale, stand replacement fires."

In addition, these alternatives would contain forestwide direction regarding the objective of treating fuels (FW-OBJ-FIRE-01) with the highest priority for treatment in the WUI.

General Effects

As described above, relative to the 1987 Forest Plan, the action alternatives would contain more direction and emphasis on the need to treat fuels and lower wildfire risks in the WUI areas. For each of the action alternatives, the forestwide objective (FW-OBJ-FIRE-01) would be to treat fuels on NFS lands over approximately 5,000 to 15,000 acres annually, and do so with an emphasis on placing those activities in WUI areas. As a result of those activities, the hazardous fuels in those WUI areas would likely be reduced. In addition, treatments on NFS lands in the WUI often adjoin other land owners/jurisdictions where additional fuel treatments are occurring. The result is a larger area where hazards would be mitigated.

Consequences to Fire from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Social and Economic Management

As opposed to Alternative A, the action alternatives all contain a forestwide desired condition (FW-DC-SES-04) component that states: "To the extent possible, the Forest contributes to the protection of communities and individuals from wildfire within the limits of firefighter safety and budgets." This desired condition provides additional emphasis (in addition to fire components previously discussed for the action alternatives) on the need for the KNF to help protect communities. As a result, the action alternatives are more responsive to the issue of fire risk in the WUI and the need to reduce hazardous fuels as one of the measures to help protect communities.

Effects from Air Quality Management

The consequences to fire (both the use of fire for the maintenance/restoration of ecosystems, as well as using fire to reduce hazardous fuels in the WUI) from air quality related Forest Plan

components are the same for all alternatives and would be similar to those presented for the vegetation topic. All action alternatives have Plan components (i.e., FW-DC-AQ-01, FW-GDL-AQ-01) that indicate that air quality standards established by Federal and State agencies would be met and that the Forest Service would meet the requirements of state implementation plans and smoke management plans. Through experience implementing these components under the 1987 Forest Plan, it is apparent that the ability to use prescribed fire to manage forest vegetation is impacted. Often, obtaining the required smoke permissions to burn, essentially serves to constrain how much can be burned and when and where it can occur. The costs of conducting prescribed fires increases as a result of the burning regulations, and to some degree, this affects how many acres would be burned. Because the use of fire is so important for the maintenance/restoration of the fire adapted ecosystems on the KNF, as well as a tool for hazardous fuel reduction activities, the consequences of this would be substantial.

Effects from Access and Recreation Management

The consequences to fire from access and recreation Forest Plan components are predicted to be fairly minor and are likely to be similar in nature for all alternatives. As discussed in the "Vegetation" topic, in some circumstances, the use of fire may not be compatible with the scenic integrity objectives of High or Very High that were established along scenic travel routes and other important scenic areas; therefore, those components could have a small effect on the ability to use the fire tool for the maintenance/restoration of ecosystems. The consequences that would result from the no-action alternative as a result of Plan components in the 1987 Forest Plan are fairly similar to the action alternatives.

Effects from Timber Management

Under Alternative A, the 1987 Forest Plan direction was to suppress wildfires in those MAs where timber production was an objective. The action alternatives do not have this emphasis on protecting timber values; therefore, there is a greater opportunity to allow natural wildfires to burn and help maintain/restore the fire adapted ecosystems.

Effects from Watershed, Soil, Riparian, and Aquatic Management

Consequences from watershed, soil, riparian, and aquatic related Forest Plan components on the ability to use fire for ecosystem maintenance/restoration; or on the ability to reduce hazardous fuels in the WUI, would generally be similar for all alternatives. All alternatives incorporate the retained existing decision associated with INFISH (USDA Forest Service 1995) and also contain various components to protect soil productivity. Therefore, in many ways, the Plan direction that could affect the two fire issues is similar. In order to meet the Plan direction associated with these resources there will likely be occasions where prescribed fire, or natural wildfires, cannot be used due to potential negative effects that those activities could have on these other resources. In addition, in order to conduct hazardous fuel treatments in the WUI, there are locations where mechanical fuel treatments, and some road construction, are necessary. Reconstruction or maintenance activities are needed but would not be consistent with INFISH or other Plan direction due to concerns; such as the potential for sedimentation of streams or the creation of forest openings and potential water yield effects. Although it is difficult to quantify the effects, all the alternatives have components that, under certain circumstances, would result in limiting the use of fire as a tool for ecosystem maintenance; or in limiting the amount of fuel treatments that could be undertaken in the WUI.

Effects from Wildlife Management

The ability to use fire as a tool to maintain and/or restore fire adapted ecosystems is largely discussed in the forest "Vegetation" section. To be consistent with some of the wildlife components (i.e., FW-STD-WL-01, 03) for grizzly bear and lynx, the use of fire would be constrained somewhat in certain areas of the KNF. However, all of the alternatives (including the no-action) would be affected in the same way.

One effect on vegetation from draft Forest Plan components related to wildlife, is the desire to maintain or provide old growth or stands with old forest structures for terrestrial species associated with these habitats. To accomplish this, there may be a need to prevent old growth or stands with old forest structures from being lost to stand-replacing wildfires. These stands currently tend to be distributed over most of the landscapes on the KNF, and it may be necessary to consider if there would be some level of risk to stands managed for old growth. In minimizing the loss of these types of stands, one effect to vegetation may be that wildfires are suppressed more often, which could reduce the ability to achieve other aspects of the vegetation desired condition (such as increasing early-successional forests and shade intolerant tree species).

Cumulative Effects

The effects that past activities have had on the two issues that are addressed above, were discussed in the "Affected Environment" sections above, and are reflected in the existing condition. Therefore, unless otherwise noted, past activities are not carried forward into the following cumulative effects analysis. Present and foreseeable future activities that could have affects on either the ability to use fire as a tool to maintain/restore fire-adapted ecosystems, or the fire risks in the WUI, are summarized below.

- **National Fire Plan, Healthy Forest Initiative, and Healthy Forest Restoration Act:** Since they were developed, these national level plans, initiatives, and acts (these are called "other plans" for the rest of this discussion) have influenced the vegetation and fuel management programs on the KNF. Therefore, they have had some effects on hazardous fuels and it is anticipated that they will continue to do so for the foreseeable future. In general, these plans have resulted in more vegetation treatments being implemented in the vicinity of WUI areas with the objective of reducing hazardous fuels, and fewer vegetation treatments being conducted in areas located away from communities. In addition, the types of fuel treatments that are being used in response to these other plans are often more expensive, and the social issues (i.e., effects of treatments on scenery, air quality, noise, wildlife viewing, etc) can be more contentious. Therefore, higher public involvement, planning and implementation expenses are likely to lead to fewer acres being treated within a given budget level. Not only do these other plans emphasize the need to reduce hazardous fuels in the WUI, but they also stress the need to restore the natural fire regimes and forest conditions to the larger national forest lands. These plans encourage the development of more resistant and resilient forest vegetation that would be less susceptible to large undesirable wildfires and/or insect outbreaks.
- **Northern Region Integrated Restoration and Protection Strategy:** The Northern Region of the Forest Service has been working on a strategy and decision support model to help identify opportunities and priorities for integrated restoration and protection activities throughout the Region. This strategy is a component of the larger regional climate change adaptation strategy. In the future, this strategy has the potential to influence program level decisions on the KNF by affecting where, when, and how forest vegetation treatments and protection activities occur. One of the components of this strategy is focused on reducing

hazardous fuels in the WUI, and another component emphasizes the need to develop more resistant and resilient forest conditions. It is premature to speculate what the more specific effects may be once this strategy is implemented, but in all likelihood, the integrated restoration and protection strategy will result in an emphasis and provide some planning tools towards improving conditions in the WUI and greater forest areas.

- **Status Review of Whitebark Pine:** Recently, the U.S. Fish and Wildlife Service completed a status review of whitebark pine for potential listing as a threatened or endangered species. They concluded that the species warranted listing but was precluded because of the need to address higher priority species. Whitebark pine is now designated as a Candidate species. If it is listed at a later date, there could be effects to the fire management programs on the KNF. In addition to the U.S. Fish and Wildlife Service's review of the species, the regional forester has placed whitebark pine on the sensitive species list for Region One. While it may be too early to determine how these actions may influence the fire programs, one restoration strategy for this tree species may be to conduct more prescribed fire activities; or use more wildland fire for resource benefits to create conditions for the maintenance and restoration of forest stands that either currently contain or are suitable for whitebark pine.
- **The Federal Land Assistance, Management, and Enhancement Act of 2009:** This act requires the Secretaries of the Interior and Agriculture to submit to Congress a report that contains a "cohesive wildfire management strategy." The Wildland Fire Leadership Council, therefore, directed the development of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). The Cohesive Strategy utilizes a collaborative, "from-the-ground-up" approach built through active involvement of all levels of government and non-governmental organizations, as well as the public, to seek national, all-lands solutions to wildland fire management issues. The National Cohesive Wildland Fire Management Strategy is an ongoing project that is being planned in three phases. Thus far, only the first phase has been completed and it is too early in the planning process of this national strategy to know with much detail or certainty how the strategy may influence programs and activities that occur on the KNF. However, many of the elements and emphasis items in the Federal Land Assistance, Management, and Enhancement Act, as well as the cohesive strategy report, have already been considered and incorporated into the Forest Plan components of the action alternatives and/or the effects analysis. For example, the three key wildfire problem areas that were noted in the strategy report (i.e., Restore and Maintain Landscapes, Fire Adapted Communities and Response to Fire) are very similar to a number of the Forest Plan revision topics that were identified and used to revise the Forest Plan direction. In addition, a number of the other elements in the Federal Land Assistance, Management, and Enhancement Act (i.e., using a full range of management responses to wildfires, allocating hazardous fuel reduction funds based on priorities, assessing impacts of climate change on wildfires) were considered in the Forest Plan revision process. Because of these reasons, when the national strategy is complete, it is likely that the draft Forest Plan direction (which is contained in all the action alternatives) will be consistent with that national strategy. For this reason, no cumulative effects are anticipated as a result of this national strategy.
- **Climate Change:** Of all of the ongoing and foreseeable future actions that have the potential to affect fire, especially unwanted wildfire, climate change is likely to be the single most important factor. The effects of climate change will likely combine with some of the effects that result from implementing the alternatives, to produce cumulative impacts. The potential effects (and uncertainties) that climate change may have on the fire issues are summarized in the KIPZ Climate Change Report (USDA Forest Service 2010). In general, the fire seasons are expected to become longer, large wildfires are expected to occur more often, and total

area burned is expected to increase. By increasing the amount of prescribed fire use, as well as the amount of wildfire use for multiple objectives, the action alternatives would be expected to partially offset predicted effects from the climate change. The more fire use (and mechanical treatments) that occurs as a result of the action alternatives, the greater the fuels will be reduced and the forest vegetation restored to more resistant and resilient conditions, which would mitigate climate change effects.

- **Human Population Increases and/or Shifts towards Wildland-Urban Interface:** For the last several decades there has been more human development occurring around the "edges" of lands administered by the KNF. This trend is expected to continue in the future and is likely to have effects on the forest vegetation that are similar to those discussed above under the item titled "National Fire Plan, Healthy Forest Initiative, and Healthy Forest Restoration Act." In addition, with a greater number of people living and recreating in these wildland-urban interface areas, there is a greater probability of more human-caused wildfire ignitions that could have affects on the forest vegetation.
- **Increased Regulation and Concern over Smoke Emissions:** The ability to use fire to maintain and/or restore the fire adapted ecosystems on the KNF, or to use fire to reduce hazardous fuels in the WUI, is highly dependent upon air quality regulations. Therefore, to the extent that air quality regulations may become more stringent in regards to the quantity and timing of smoke emissions, there could be substantial effects on the ability of the KNF fire management program to utilize these fire tools. If past trends of increasing regulations and decreasing burn opportunities continue, the effects could be substantial and would likely result in not being able to use fire enough to make meaningful improvements to forest and fuel conditions and meet objectives.
- **Timber Product Manufacturing Infrastructure and Economics:** The ability of the KNF to positively affect the forest vegetation is partially dependent upon the ability to sell forest products to manufacturing companies; and to use the harvesting process (including the residual slash disposal activities) as a means to positively affect the forest vegetation and reduce hazardous fuels. If the forest products industry declines in areas surrounding the KNF to the degree that it is difficult to sell forest products or "stumpage prices" decrease significantly, it would affect how many acres could be treated and fuels reduced. While some treatments could be accomplished by using prescribed burn only treatments, it is generally too risky in the WUI and very expensive elsewhere.

Watersheds, Soils, Riparian and Aquatic Habitat/Species

Introduction

The revision topic "Watershed, Soil, Riparian, and Aquatic Resources" considers numerous physical and biological resources such as: soil productivity, water quality, native and non-native desirable species, and aquatic habitats.

Legacy effects from past timber harvest, mining, and other human-caused disturbances continue to effect watershed condition and health. As amended by INFISH (USDA 1995a and USDA 1995b), the 1987 Forest Plan direction reduces the risk to watersheds and aquatic biota from new and ongoing activities. For some resources, INFISH standards and guidelines contain general direction for repairing past damage from land management associated with roads, grazing, and recreation activities, although it is lacking for other resources (e.g., grazing and mining). Generally, under the direction of the 1987 Forest Plan, the intensity and the risks associated with new and ongoing developments and human-induced disturbances has been, and will be, greatly reduced as compared to the last several decades. However, they are likely to continue to accumulate, and the press-nature of those disturbances still exists.

There will continue to be localized improvements to watershed, soil, and riparian conditions, as projects are implemented, but wholesale watershed-scale improvements will occur more slowly. With the direction and emphasis in the Forest Plan, watershed restoration may tend to be prioritized and directed by more commodity-based resource decisions, such as restoration associated with timber harvest activities.

Current condition and trends show that native aquatic species are in decline. Land management practices, particularly historic practices, while not the only cause (introduction of non-native species, influence of hatchery fish, and harvest are other contributing causes), have had major influences. Under the current direction, some areas will likely see a slow improving trend, others will continue to chronically degrade, and the viability of native species will continue to be at risk.

Legal and Administrative Framework

Law and Executive Orders

- **Clean Water Act:** The Federal Water Pollution Control Act, or Clean Water Act, is the principal law concerned with polluting activity in the nation's streams, lakes, and estuaries. Originally enacted in 1948, it has been revised by amendments in 1972 (P.L. 92-500) that gave the Act its current form and spelled out ambitious programs for water quality improvements that are now being put in place by industries and cities. Congress refined these amendments in 1977 (P.L. 95-217) and 1981 (P.L. 97-117). The 1987 amendments added:
    - A new Section 319 to the Act, under which States were required to develop and implement programs to control nonpoint sources of pollution, or rainfall runoff from farm and urban areas, as well as construction, forestry, and mining sites.
    - Section 303(d) of the Clean Water Act requires states to identify pollutant-impaired water segments and develop "total maximum daily loads" that set the maximum amount of pollution that a water body can receive without violating water quality standards.
    - A water quality classification of streams and lakes to show support of beneficial uses.

  - Anti-degradation policies that protect water quality and stream conditions in systems where existing conditions exceed standards.
- **Organic Administration Act:** States that the mission of national forests is to "…provide favorable conditions of water flow…"
- **Multiple-Use Sustained-Yield Act of 1960:** Congress has affirmed the application of sustainability to the broad range of resources over which the USDA Forest Service has responsibility. The Multiple Use Standard Yield Act confirms the USDA Forest Service's authority to manage the national forests and grasslands, "for outdoor recreation, range, timber, watershed, and wildlife and fish purposes," (16 U.S.C. § 528), and does so without limiting the USDA Forest Service's broad discretion in determining the appropriate resource emphasis or levels of use of the lands of each national forest and grassland.
- **National Forest Management Act (NFMA) of 1976:** Requires resource sustainability and monitoring.
- **Executive Order 11988:** Directs federal agencies to provide leadership and take action on federal lands to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to avoid the direct or indirect support of development on floodplains whenever there are reasonable alternatives and evaluate the potential effects of any proposed action on floodplains.
- **Executive Order 11990, as amended:** Requires federal agencies exercising statutory authority and leadership over federal lands to avoid to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands.
- **The Endangered Species Act (1973) as amended:** Section 7(a) (1) supports biotic sustainability by requiring that, "All…federal agencies shall …utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species…" Section 7(a) (2) of ESA includes direction that Federal agencies, in consultation with the United States Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.
- **National Forest Management Act (NFMA) (1976):** Directs the Forest Service to manage for a diversity of habitat to support viable populations (36CFR219.19). Regulations further state that the effects on these species and the reason for their choice as management indicator species need to be documented (36CFR219.19 (a) (1).
- **The 1969 National Environmental Policy Act (NEPA):** Requires analysis of projects to insure the anticipated effects upon all resources within the project area are considered prior to project implementation (40CFR1502.16). − To preserve and restore the natural and beneficial values of floodplains and wetlands. Section 7(a) (2) of ESA includes direction that Federal agencies, in consultation with the United States Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.
- **Executive Order 12962 (June 7, 1995):** Acknowledges the recreational value of aquatic biota by stating the objectives "to improve the quantity, function, sustainable productivity,

and distribution of U.S. aquatic resources for increased recreational fishing opportunities by: (h) evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order". (Recreational fisheries are discussed in the "Recreation" and the "Social and Economic" sections.)

Regulation and Policy

- **Forest Service Manual Direction (Policy):** Forest Service manuals within the 2500 file code designation contain direction for watershed management.

  Forest Service manuals within the 2600 file code designation contain direction on species and habitat management that supports recovery of listed species and maintenance of viable populations on NFS lands.

- **Forest Service Strategic Plan:** Goals of the Forest Service Strategic Plan (USDA 2000a) as it relates to aquatic sustainability include:
  - Goal 1 "Ecosystem Health" states: "Promote ecosystem health and conservation using a collaborative approach to sustain the nation's forests, grasslands, and watersheds."
    - Objective 1.a) states: Improve and protect watershed conditions to provide the water quality to support ecological functions and intended beneficial water uses.
    - Objective 1.b) states: Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for management indicator species/focal species.
  - Goal 2 "Multiple Benefits to People" states: "Provide a variety of uses, values, products, and services for present and future generations by managing within the capability of sustainable ecosystems."

Key Indicators

- Trend in watershed condition rating; and
- Trend in native aquatic species status.

Methodology and Analysis Process

See appendix E in this EIS.

Analysis Area

The analysis area for the watershed, soils, and aquatic species in the KNF, includes all lands within the outside boundary of the KNF (figure 16). This includes the 2.2 million acres that are under direct NFS lands management, as well as large blocks of corporate timberland and private properties. A significant piece of this contiguous area is under the management of the Plum Creek Timber Company and has been actively managed for resource production in the past. The analysis conducted for this assessment, particularly the existing condition, includes several assumptions relating to activities on the private lands, especially the large blocks of corporate forestry lands.

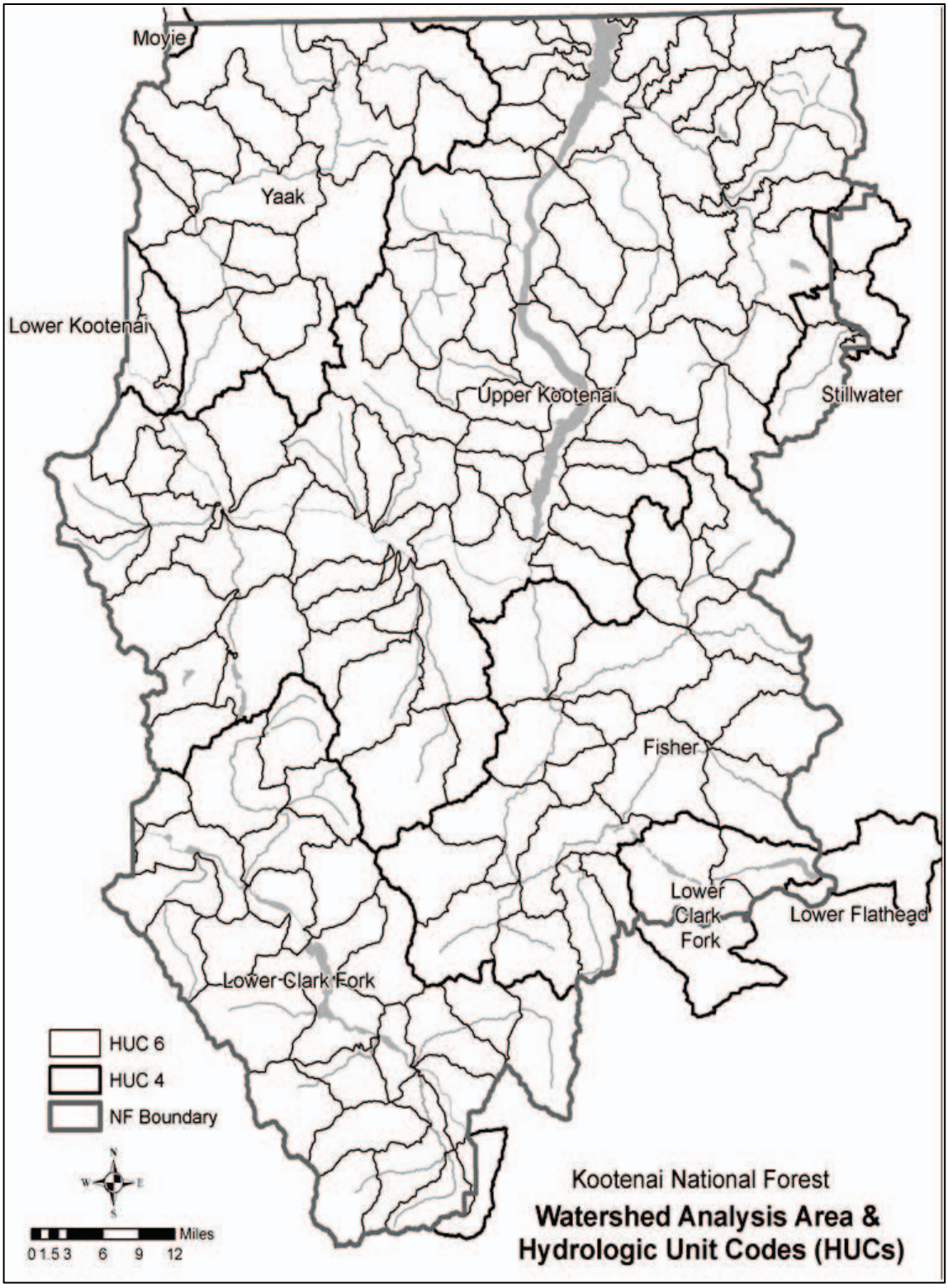


Figure 16. The Analysis Area and the Hierarchy of the Watersheds and the Hydrologic Unit Codes (HUC). A sub-basin is a HUC4, and a subwatershed is a HUC6

Affected Environment (Existing Condition)

The aquatic systems in the inland northwest evolved over millions of years under the influence of many geologic forces and processes. The present character and resiliency of the systems, climate, and geological processes have evolved following the last ice age, approximately 10,000 years ago. Since then the aquatic systems have been subject to a wide array of disturbances and events. These disturbances have often been intense and cyclic in nature and may appear to recur somewhat randomly, but with predictable frequency. The watersheds and their dependent resources have evolved under this "pulse" disturbance regime so that they can effectively respond to those natural disturbances over time while sustaining their long-term functions, processes, and condition.

Around the beginning of the 20th century, the influx of human populations began in the inland northwest along with the development of the land and resources to support those populations. This has resulted in many new human caused disturbances to the watershed systems, and the pattern of many of those disturbances has tended to be a more sustained or "press" disturbance regime. A press disturbance forces an ecosystem to a different domain or set of conditions (Reeves et al. 1995). Many of those disturbances tend to mimic historic "natural" processes, but the frequency and intensity has been greatly amplified. In some cases, the watershed systems have begun to adjust to those press disturbances; or have become altered by them, resulting in an inability to support aquatic dependent resources.

Human activities have altered stream channels by direct modification; such as channelization, mining, removal of large woody debris, dams and diversions, log drives; and building infrastructure such as roads, railways, bridges, and culverts that have encroached on riparian areas and stream channels. Humans have also indirectly affected the incidence, frequency, and magnitude of disturbance events. This has affected inputs and outputs of sediment, water, and vegetation. These factors have combined to cause changes in channel conditions throughout many parts of the Forest, resulting in aquatic and riparian habitat conditions measurably different from those that existed prior to human development. Natural (primarily wildfire) and human-caused (timber harvest, fire suppression, road construction, mining, dams, introduction of non-native species, recreation, and grazing) disturbances over the last century have led to changes in the physical watersheds, and in the fish and amphibians dependent on them (Lee et al. 1997).

Roads can have some of the greatest effects to watersheds and aquatic biota. Roads can change the runoff characteristics of watersheds, increase erosion and sediment delivery to streams, and alter channel morphology (Furniss et al. 1991). These direct effects lead to changes in habitats for fish and amphibians. Roads also often fragment the habitat of these animals, and may be a cause of death for migrating amphibians. Although current best management practices for road construction are designed to minimize the effects to watersheds, many miles of road existing on the landscape were not built to these standards or are no longer maintained. As a result, these roads either continue to affect watersheds through chronic erosion, or are at risk for mass failure from crossings or locations on sensitive land types.

Watersheds

The primary hydrologic unit upon which watershed condition has been assessed is the 6th-level hydrologic unit (subwatershed). To evaluate baseline watershed conditions across the analysis area, a watershed condition rating was determined for each subwatershed. This characterization estimated the existing condition based on physical characteristics (e.g., hydrologic, geomorphic,

landscape, topographic, vegetative cover, and aquatic habitat) and human caused disturbances (e.g., road construction and vegetative treatments).

Two primary factors were used in the watershed characterization process: 1) inherent watershed sensitivity and 2) watershed disturbances from land management activities (see appendix E). Table 23 shows the distribution of watershed ratings across the entire Forest.

Watershed Condition Ratings serve to identify landscape function based on inherent watershed sensitivity and riparian and watershed disturbances from current and past land management activities, such as road construction and vegetation treatments. These ratings represent an indicator of overall watershed health at a large scale, and provide a reference point to evaluate the past, current, and future trends of soil and aquatic resource conditions. They also contribute to the identification of priority areas for restoration and recovery that may help to reduce the effects of past management activities. These ratings are not independent from other components of the draft Forest Plan, but provide a baseline to understand current and desired conditions for soil and aquatic resources. These ratings are intended to provide a consistent framework to assist specialists and decision makers in evaluating management actions and that those actions will not limit or prevent attainment of desired conditions for soil and aquatic resources.

1) Watershed sensitivity provides an indication of a drainages inherent sensitivity with regards to both human and natural disturbances, as well as potential for recovery, following disturbance. To measure inherent sensitivity of each subwatershed, two factors were used; mean annual precipitation and percent of streams that have a gradient of less than two percent. These factors were combined to determine an overall Watershed Sensitivity Rating. Subwatersheds across the planning unit appear to have a relatively moderate sensitivity to natural or human caused disturbances (see table 21), when considering climatic and land type variables, with a majority of these subwatersheds located in the Kootenai River drainage, which should be considered in the context of the distribution of subwatersheds on the Forest, as 56 percent are located in that drainage (see figures 17 and 18). Additionally, it appears that there are a relatively high number of drainages in the Stillwater River area rated as “High,” although that basin only makes up two percent of the entire planning area.

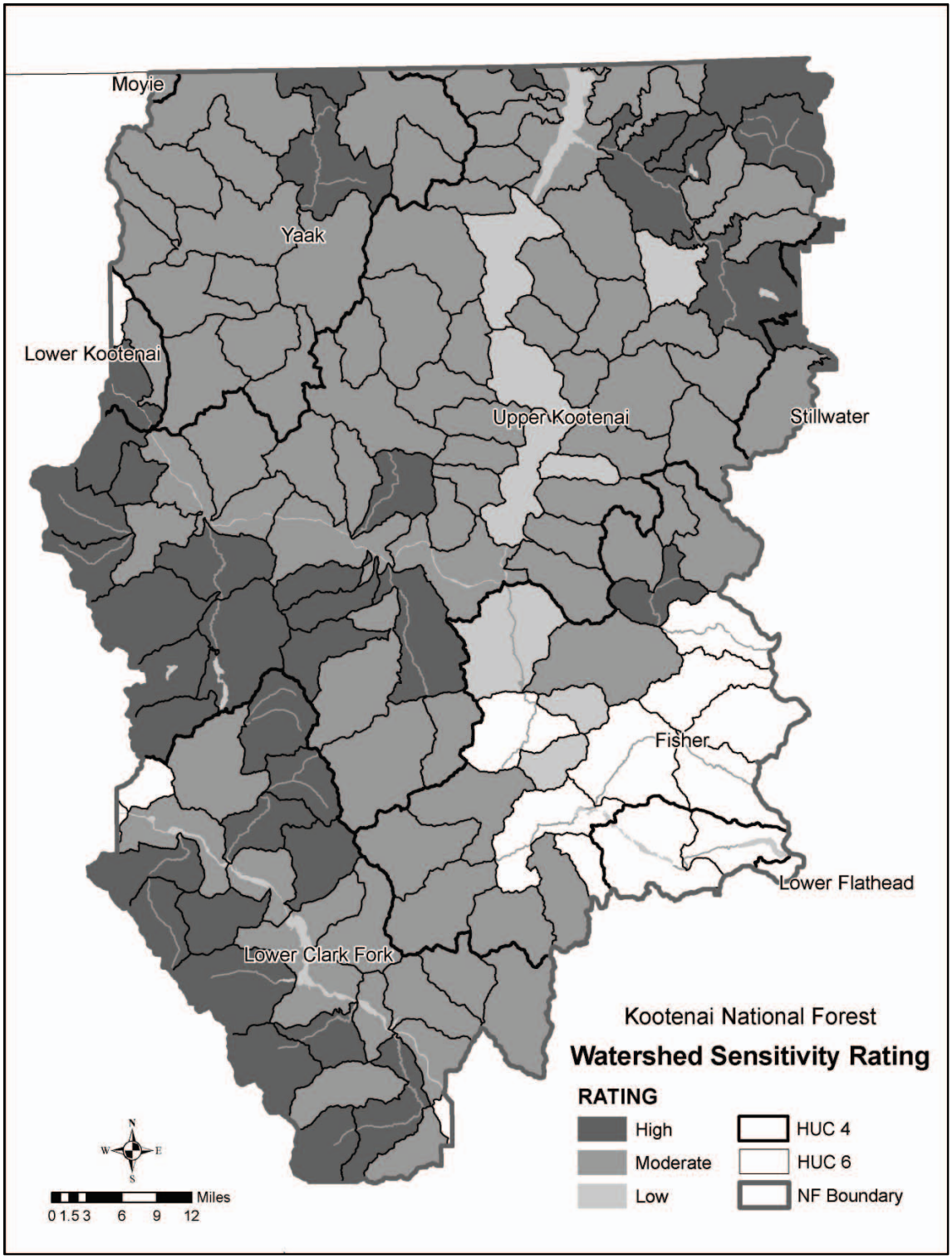


Figure 17. KNF Watershed Sensitivity Rating

Table 21. Watershed Sensitivity Rating, Forestwide

Watershed Sensitivity Rating	Number of Subwatersheds (% of Forest)
Low	8 (6%)
Moderate	82 (64%)
High	38 (30%)
TOTAL	**128**

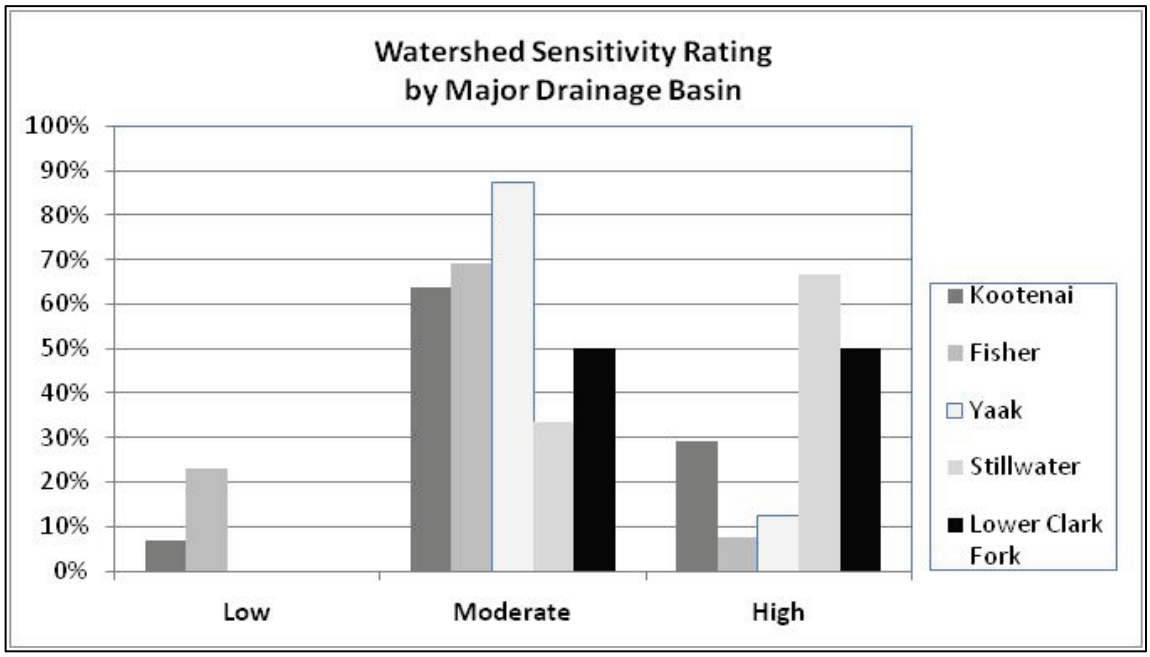


Figure 18. Watershed Sensitivity Rating by Major Drainage Basin

2) Watershed Disturbance Ratings, also used to evaluate watershed condition, provide an estimate of the relative amount of human caused disturbances across subwatersheds and takes into account the following factors: percent equivalent clearcut acres, percent intact riparian, stream crossing density, percent detrimental compaction, and riparian area road density. See appendix E, for a more detailed discussion of the analysis for determining Watershed Disturbance Ratings. Based on that analysis, almost 86 percent of the Forest is considered to have a low to moderate level of human disturbances (see table 22), with most of the higher levels of human influences occurring in the southern portion of the Kootenai River Drainage (see figures 19 and 20) which is a function of the relatively larger land area associated with that drainage, as mentioned above. Table 22 shows the distribution of Watershed Disturbance Ratings across the Forest.

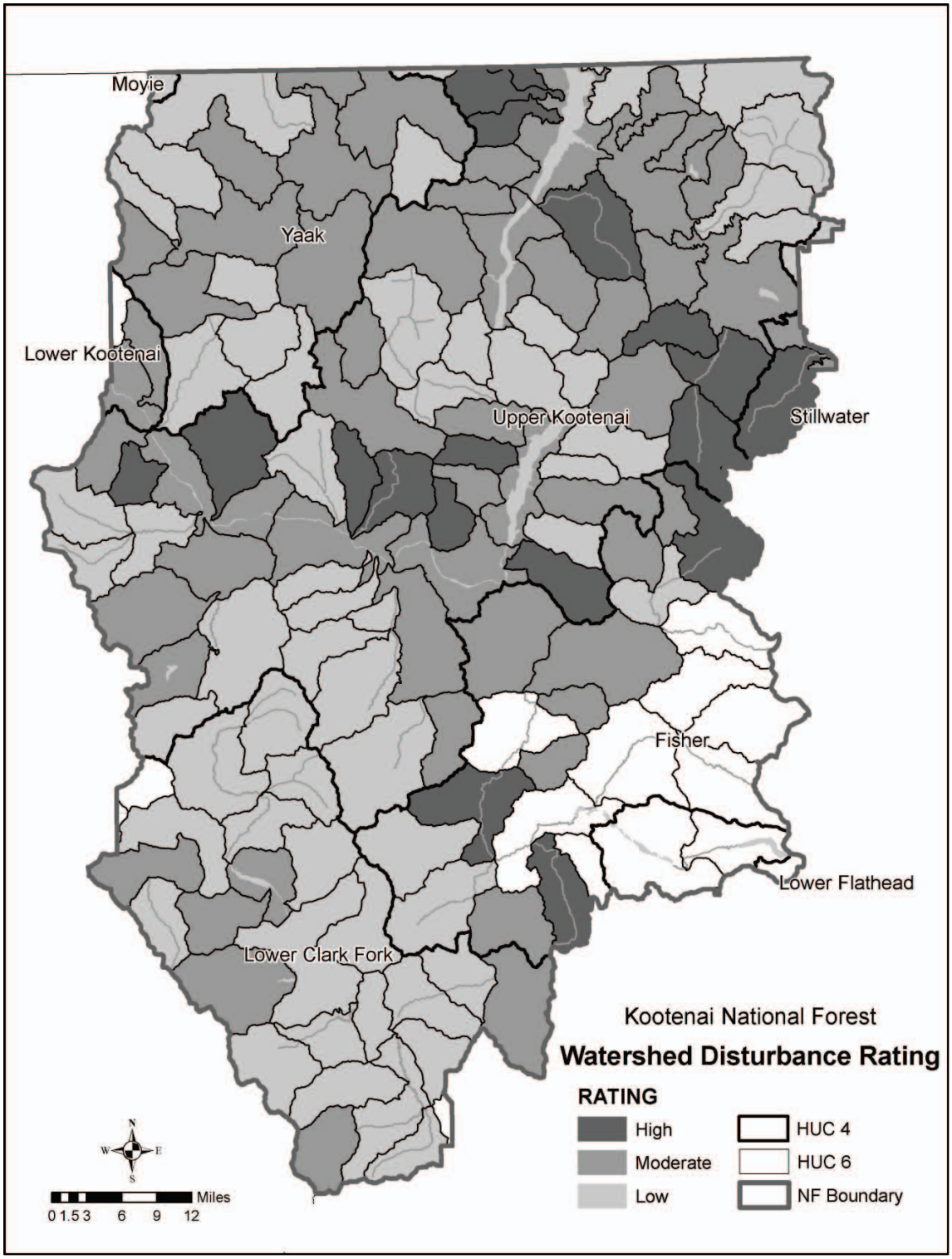


Figure 19. KNF Watershed Disturbance Rating

Table 22. Watershed Disturbance Rating, Forestwide

Watershed Disturbance Rating	Number of Subwatersheds (% of Forest)
Low	57 (45%)
Moderate	53 (41%)
High	18 (15%)
TOTAL	**128**

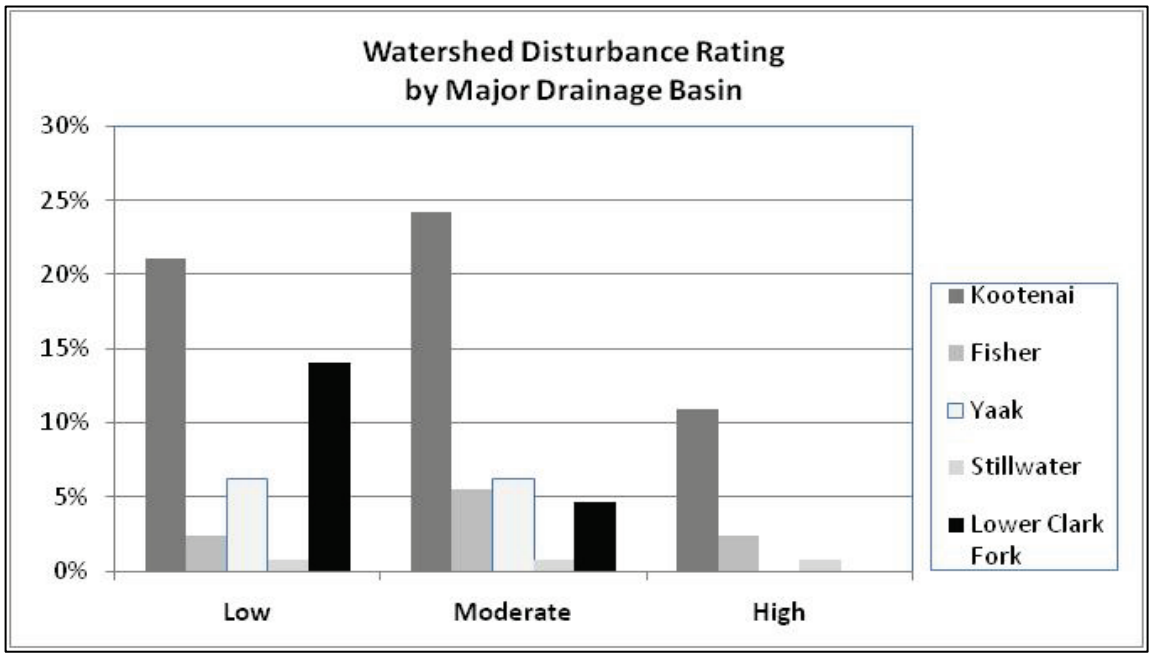


Figure 20. Watershed Disturbance Rating by Major Drainage Basin

The following descriptions provide a basic summary for interpreting Watershed Condition Ratings. It should be noted that a given subwatershed may have different combinations of watershed sensitivity and watershed/riparian disturbance and these are only general descriptions to assist the reader. For example, it is possible for a subwatershed to have a low level of sensitivity and a high level of disturbance, providing an overall rating of "moderate." Appendix E provides details of the analysis used to determine Watershed Condition Ratings for subwatersheds on the Forest. Final Watershed Condition Ratings may also include professional judgment in some cases. Review by resource specialists, with local ground based knowledge and site specific data, may have resulted in a change to a condition rating and those changes are noted in the fields "override" and "comments" (see appendix E).

Subwatersheds rated as "low" generally have a relative low inherent sensitivity to disturbances and low level of overall disturbance. These subwatersheds exhibit geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Soil, aquatic, and riparian systems are assumed to be functional, in terms of supporting beneficial uses.

A rating of "moderate" generally indicates a subwatershed with a low to moderate inherent sensitivity and/or a low to moderate level of disturbances. Subwatersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions

of these subwatersheds may exhibit an unstable drainage network. Soil, aquatic, and riparian systems may or may not support beneficial uses.

In general, subwatersheds rated as “high” have a relatively higher sensitivity to natural and human caused natural disturbances and relatively higher level of overall disturbances. These subwatersheds may have limited geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. It is assumed that beneficial uses may not be supported.

Subwatersheds with less than 25 percent land area under Forest Service jurisdiction were not considered in the analysis. This is due, in part, to limitations in data availability and an assumption that there are enough factors beyond agency control that reduces the agency’s ability to effectively change conditions at that scale. Detailed information related to the methodology used to determine watershed condition can be found in appendix E.

Figure 21 displays the Watershed Condition Ratings by subwatershed. Table 23 summarizes the proportion of the Forest subwatershed by category. The majority of the KNF has a moderate to low subwatershed condition. Figure 21 displays subwatershed conditions by major river basin(s). Data indicates that the Kootenai River drainage has a relatively higher proportion of land area with a moderate level of sensitivity to disturbance; is in a disturbed condition or a combination of both, which is a function of the large amount of the landscape in that drainage. Approximately 60 percent of all subwatersheds in the planning area occur in the Kootenai River basin (see figure 22).

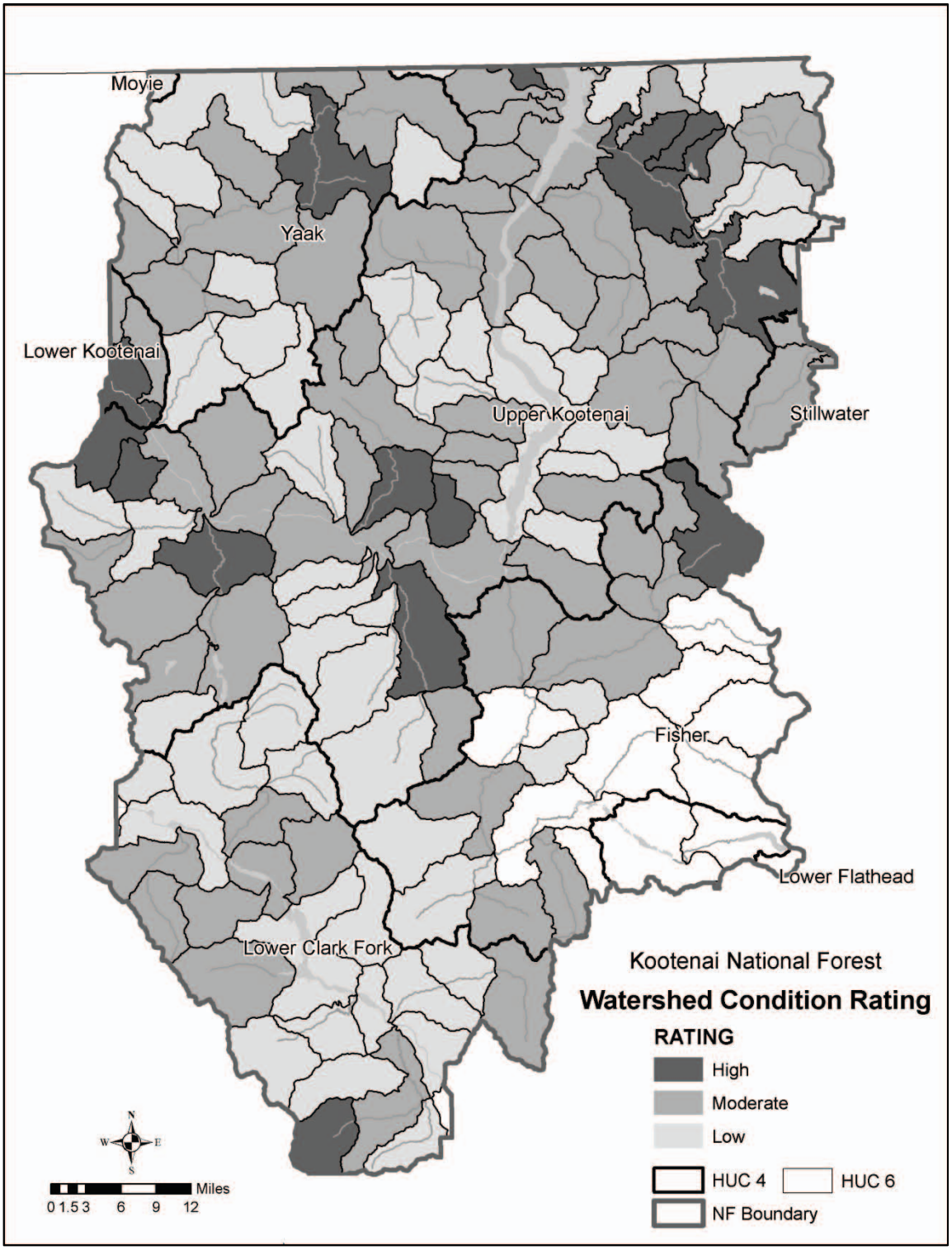


Figure 21. Watershed Condition Rating

Table 23. Distribution of Final Watershed Condition Ratings

Rating	Number of Subwatersheds (% of Forest
Low	52 (41%)
Moderate	62 (48%)
High	14 (11%)
TOTAL	**128**

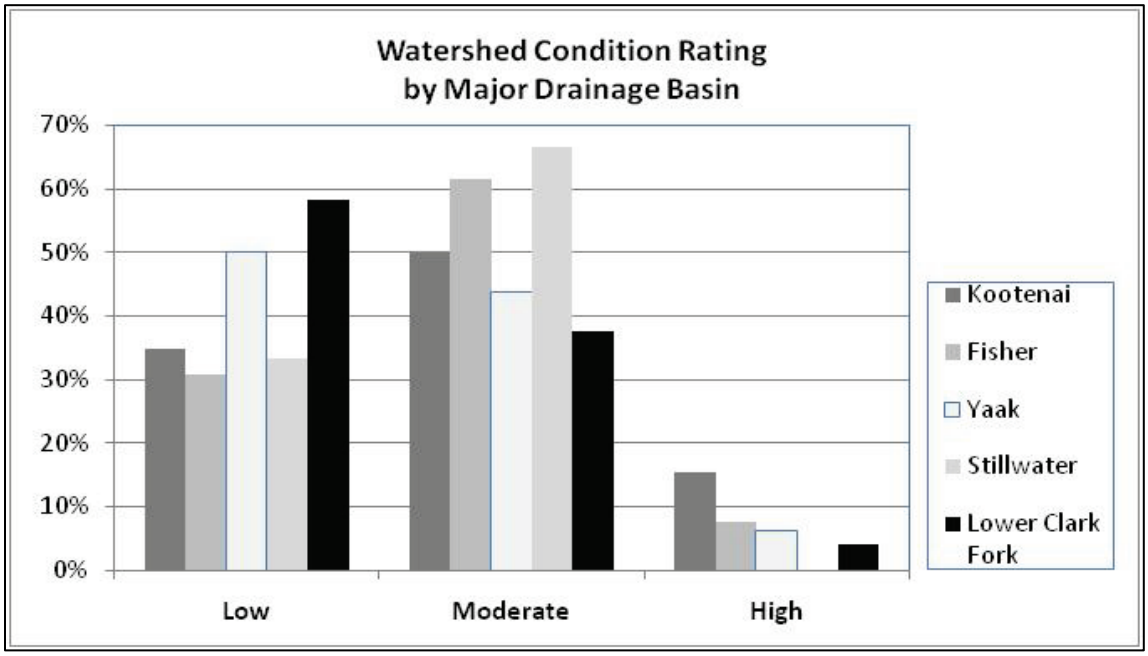


Figure 22. Watershed Condition Rating by Major Drainage Basin

Water Quality

Water quality is regulated under the authority of the Clean Water Act, and States assess the waters within their jurisdiction and identify stream segments and other water bodies whose water quality is “impaired” or generally not meeting water quality standards for beneficial uses. Currently, about one-half of the subwatersheds associated with the Forest include or have the potential to influence one or more of these listed segments.

Individual stream segments, lakes, and other water bodies have been listed as "Water Quality Limited Segments" (i.e., "impaired") by the state of Montana (Montana DEQ 2010) and are described in subsection 303(d) of the Clean Water Act as waters that do not meet State standards; a broad term that includes water quality criteria, designated uses, and anti-degradation policies. These segments or water bodies involve 54 percent of the subwatersheds (N=141) on the Forest. The dominant pollutants currently affecting "impaired" water bodies are sediment and temperature. Other pollutants are listed for a small number of subwatersheds.

Subwatersheds with impaired waters are shown in tables 24 and 25. Subwatersheds in the following tables may be located in more than one GA and have been counted in each GA; therefore, the total number of watersheds is overstated in some cases.

Table 24. Number of 303(d)-Listed Subwatersheds and Pollutants of Concern

Pollutant of Concern	Subwatersheds
Cadmium	3
Lead	5
Metals	5
Nutrients	11
Sediment	29
Thermal modification	21
Zinc	2

Table 25. 303(d)-Listed Subwatersheds by Major Drainage Basin

Pollutant of Concern	Bull Lake	Clark Fork River	Fisher River	Lake Koocanusa	Libby Creek	Tobacco River	Yaak River
Cadmium	2				1		
Lead	1		3		1		
Metals	3				1		
Nutrients	2		1	1		1	7
Sediment	2	5	8	1	4	10	
Temperature	1	5	6	1	4	3	
Zinc					2		

Soils

Volcanic ash from eruptions along the Pacific Northwest Cascade Range has significantly influenced forest soil on the KNF. Volcanic ash soils have lower bulk density, higher porosity, and higher water infiltration and retention than soils unaffected by ash. The capability to hold ample available moisture is thought to enhance site productivity. Unfortunately, ash-capped soils are also very susceptible to negative impacts from machine traffic, and when compacted, the soils may not readily recover over many years.

Presently, soil disturbance in forested ecosystems most commonly occurs from ground-based harvest and site preparation (mechanical and fire), but can also be associated with roads, grazing, and recreation. The effects of soil disturbance on soil productivity, soil quality, or site hydrologic function are dependent on the degree, extent, distribution, and duration of the impacts (Snider and Miller 1985, Clayton et al. 1987, Craigg and Howes 2007); and, for projects, are site-specific rather than watershed based. Many forest soils have shown to be resilient to disturbances, while others are at risk of losing the productive capacity because of limitations in the inherent soil properties (i.e., shallow forest floor or thin mineral mantles over bedrock (Burger and Kelting 1999)).

Detrimental effects on soils are not permanent with regards to vegetative re-growth and depend primarily on soil texture, parent material, aspect, and the level of disturbance. Recovery time is typically between 30 to 70 years as second growth timber becomes established around “disturbed areas” (Dykstra and Curran 2002, Froehlich et al. 1985, Froehlich and McNabb 1983). However, soil displacement that mixes or moves the volcanic ash surface layer and reduces moisture

holding capacity and productivity, may continue to be impacted far beyond the 70 year timeframe.

Post-harvest data collection for soil impacts has occurred on the KNF over the past 23 years (1988-2010). Monitoring activities from 1988 through 1991 involved a walk-through procedure, which only provided a qualitative description of harvest activity effects. Beginning in 1992, soil sampling incorporated a line transect methodology and also included the previous walk-through procedures. Current sampling on the KNF follows soil sampling procedures and guidelines from the R1 Soil Quality Monitoring Protocol/Technical Guide (USDA FS 2011) for site-specific analysis of management effects in an activity area. Data points collected during soil sampling transects fall into one of three categories: 1) no disturbance; 2) disturbance present, but not detrimental; and 3) detrimental soil disturbance. Detrimental disturbance is defined in FSM 2550 and Region 1 Supplement 2500-99-1.

The soil characteristics selected as indicators of management influence on soil productivity are compaction, rutting, burn severity, displacement, surface erosion, and mass movement. When management activities, such as timber harvest or burn treatment, cause the indicators to exceed the threshold established in the soil quality standards; the disturbance is considered detrimental, thus having the potential to impair site productivity. Authorized forest roads as defined in 36 CFR 212.1 are not considered part of the productive land base and are excluded from evaluation of disturbance from harvest activities, although they may be considered when analyzing effects on other soil functions.

Under direction in the 2011 Soil Quality Monitoring Guide, soil monitoring includes both timber management-related temporary roads and landings outside of activity areas. Such data was not included in the soil sampling protocol under previous direction in FSM 2550.

Intensive mechanized harvest prior to the early 1980s was widespread on private and Forest Service land and resulted in wide-ranging soil quality concerns (Kuennen 2005, Niehoff 2002). Between the early 1950s and early 1980s extensive unconstrained tractor skidding, dozer piling, windrowing, hot burning of slash and burn piles, and associated soil disturbance was wide-spread. During this time period, riparian harvest was still the norm and dozer piles were often up to 20 feet high with dozer piling-pushing covering between 80 to 90 percent of the ground in a sale unit. In the early 1980s, dozer piling was replaced with excavator; skid lines (trails) running over slash material which resulted in considerably less soil disturbance. Some controls had been imposed, but compaction and displacement were still widespread between the early 1980s and early 1990s.

However, post-harvest soil monitoring over the past two decades has indicated that the extent of detrimental disturbance has declined over time as newer harvest equipment and procedures have been implemented (Kuennen 2008, Kuennen 2005, Niehoff 2002). As activities on the KNF moved away from dozer piling towards excavator piling and skyline yarding in the early 1980s, the amount of detrimental disturbance, especially compaction and displacement, was greatly reduced. Early post-harvest soil monitoring data (1992) showed that approximately half of the soil data collected did not meet Regional soil quality standards and exceeded the 15 percent requirements. This deviation from the standard is assumed to be the result of the transition from clearcut to intermediate harvest activities, resulting in more equipment entries into a particular unit and more pile burning. Changes in harvest and site preparation methods quickly changed disturbance values on post-harvest sites to less than 15 percent and even less than five percent in many cases. Additional reasons for improvement include: more careful layout of harvest units

and skid trail spacing, seasonal restrictions, fewer visits to harvest units, and an overall awareness of the importance of protecting long-term soil quality.

To date, the KNF has collected over 234,000 individual data points associated with post-harvest linear transect soils monitoring, which includes approximately 13,033 acres. At the same time an additional 9,279 acres involving 257 units were reviewed between 1988-2010 involving walk-through soil monitoring procedures. To display overall trends and post-harvest conditions, the linear transect data points collected from 1992 to 2010 have been compiled in table 26. It should be kept in mind that the units monitored were randomly selected following harvest activities. Soil monitoring data collected from 1988 to 1991 only included walk-through reviews and thus is not represented in the table 26.

Table 26. Summary of Disturbance Ranges and Trends for Post-Harvest Soil Conditions Monitored over Three Decades (1992 to 2010)

Range of Detrimental Soil Disturbance	# of Units	% of Total
0 – 5	206	52
6 – 10	129	32
11 – 15	48	12
>15	15	4
Total	**398**	**100%**

Observations from field visits and monitoring of units that were harvested from as early as the 1930s show that many affected soils are recovering. In general, main skid trails and landings, which were heavily disturbed in the past and involved considerable soil displacement, often remain in some disturbed condition; while many of the side skids and other disturbances are improving to levels that show either minimal or no longer traceable impacts to soils and surrounding vegetation. Recall that the signs of remaining disturbance may often be more directly related to the land type or soil characteristics present than the past activity which occurred.

Post-harvest monitoring results are displayed by decade in table 27 and contribute to the estimated range of detrimental soil disturbance. Monitoring has included units that were logged with various types of ground-based equipment, skyline and cable yarding, as well as some horse logging. More recent methods, such as combinations of feller-bunchers, forwarders, rubber tired skidders, skyline yarding, and helicopter harvest, are also included. During the two decades monitored more rubber tired skidder, forwarder, feller-buncher units were monitored as these harvest procedures were expected to display much higher impacts to soils than would be expected in similar units; and similar physical conditions where skyline harvest activities had occurred along with the fact that these procedures were more actively being used.

Regional soil standards require that 15 percent detrimental disturbance within an activity area should not be exceeded. Disturbance levels provided in table 27 shows that impacts in more than 90 percent of the field visited and monitored units remained below 15 percent after harvest activities, while 99 percent of the units sampled in the past decade remained below 15 percent. Given current management strategies, the KNF is meeting Regional soil quality requirements and supporting an upward trend, compared to previous harvest methods. It should also be noted that most burn piles continue to fall outside of the 15 percent detrimental disturbance category. However, it should be noted that there has been an increase in the number and size of these

activities, which coincides with machinery and harvest practice changes over time. Between 1988-1991 soils data was collected using a random walk-through procedure and, therefore, cannot be represented on table 27.

Table 27. Summary of Disturbance Ranges and Trends for Post-Harvest Soil Conditions Monitored over the past Two Decades (1992-2010)

Range of Detrimental Soil Disturbance	1990s		2000s	
	# of Units	%	# of Units	%
0 – 5	72	56	134	50
6 – 10	34	26	95	36
11 – 15	13.5	11	35	13
>15	9.5	7	5	1
Total	**129**	**100%**	**269**	**100%**

To approximate current soil conditions, residual impacts from past management-related disturbances on soils were estimated from the annual KNF Soil Monitoring reports and supporting KNF soil monitoring database. The KNF soil monitoring database consists of field data which was randomly selected and field monitored to determine post harvest soil disturbance values. As a result, this database contains only a small representative percent (5-15 percent) of the total annual harvest actions for a given year. Many of the land areas (soil polygons) monitored in the field to determine soil disturbance values were treated or harvested more than once. The potential detrimental soil disturbance values are based on empirically derived coefficients that were obtained and averaged from numerous monitoring sites throughout the KNF (Kuennen 2003, Kuennen 2007). The assumptions are limited to the harvest and slash disposal methods for which disturbance coefficients have been determined, and the coefficients assume that best management practices have been implemented. The end detrimental soil disturbance figure is a composition of all disturbances and does not separate each category of disturbance values where present within a given unit. Although the KNF soil monitoring database originated in 1988 the average disturbance values listed in table 28 below are based on 48,660 soil monitoring sites collected between 2000-2005 which is more closely aligned with current management activities than data sampled prior to 2000 (Louis Kuennen pers. comm. 2009). Thus, the value of 8 percent detrimental soil disturbance for summer tractor is a "statistical summary" which takes into account not only the skid trails but temporary roads, mechanized piling, and fire lines if present within the units being surveyed at that time and date. Detailed spreadsheet results are available in the project file and past Forest Plan monitoring reports.

Table 28. Disturbance Coefficients

Equipment Class	Season of Operation	Disturbance Coefficient
Dozer	NA	15
Tractor	Summer	8
Tractor	Winter	4
Forwarder	Summer	4
Forwarder	Winter	2
Excavator Piling	NA	2

Equipment Class	Season of Operation	Disturbance Coefficient
Skyline	NA	1
Cable Yarding	NA	1
Site Preparation	NA	2
Fireline Construction	NA	1
Helicopter	NA	0
Grazing	NA	2
Horse Logging	NA	2
TOTAL		

In general, the amount of heavily disturbed soils increases directly with the machinery operations and the amount of area impacted where heavy equipment makes repeated passes over the same ground, particularly during times of high soil moisture.

The detrimental soil disturbance percent is not necessarily additive to other past management activities. This is because the percentages listed for each management activity includes some units with excavator piling, fire line construction, and/or grazing. In addition, disturbance from these activities usually overlaps at least a portion of the skidding disturbance.

Tractor logging acres are split in half, which represents logging before and after 1992; (15 to 8 percent respectively). This reduction of soil disturbance exceeding 15 percent is based on the change from dozer operations, which resulted in 85-95 percent of a given unit acres being disturbed to a much smaller percent of disturbance using excavator equipment.

Based on field monitoring, most activities that occurred before 1990 have undergone some level of recovery and using professional judgment and local ground based knowledge, the specialist determined an equal split gives a representative estimate.

Riparian

Riparian ecosystem areas represent some of the most dynamic and ecologically diverse areas across the landscape. Most riparian areas are obvious because of abundant water and unique vegetation and soil characteristics. Ecological drivers such as geology, climate, glaciations, and stream gradient all influence the type, complexity, quantity, and distribution of these ecosystems and there is great variability in the size and complexity of riparian areas across the Forest. Wetlands, such as swamps, bogs, marshes, and wet meadows, are also considered riparian areas. Wetlands occur in sites with seasonally or permanently high water tables, as well as on the margins of ponds and lakes and commonly support characteristic plant or animal communities which require those unique conditions for survival. Although riparian ecosystems cover a relatively small proportion of the Forest, their ecological significance within the landscape exceeds their limited distribution. Riparian ecosystems can be highly responsive to both natural and human disturbances, although they may respond to restoration activities more quickly than other habitats, due to the dynamic interaction between, water, vegetation, and soils.

Healthy riparian areas, with a typical abundance of trees, shrubs, forbs, and grasses help to slow flood waters and reduce the likelihood of downstream flooding. Riparian areas also help to improve or maintain water quality by filtering runoff, sediment, and nutrients. Water slowed by riparian areas enters the groundwater table where it is released at a later time. Riparian areas also provide for stream shading, keeping water temperatures cool for aquatic organisms. Fish also

depend on healthy riparian areas for supporting stable channels and habitat, reliable stream flows, clean water, food, and hiding cover. Benefits for terrestrial wildlife include; food, cover, and nesting habitat as well as migration corridors to other habitats. Riparian areas are also attractive and inviting to humans because of proximity to water and aesthetic and recreational purposes.

The conditions of riparian areas can be an indicator of overall ecosystem quality. There are an estimated 385,000 acres of riparian areas across the planning unit and on average; these areas are considered to be approximately 91 percent intact. In general, many riparian areas on the Forest are believed to be functioning at or near their potential; and most degraded areas are in a stable condition or improving. It is estimated that almost all subwatersheds on the Forest have a low to moderate amount of disturbance. Although these areas are relatively functional and there has been improvement in some areas, there are localized areas where riparian areas may be functioning below potential.

Roads can have a relatively high impact on riparian areas and overall road density in a watershed can be an indicator of these effects. There are an estimated 2,000 miles of road located in riparian areas, which amounts to approximately 14 percent of all road miles on the planning unit, with an average road density of 2.9 mi/mi2. Another potential indicator of riparian condition effects to water quality and aquatic habitats is the number of road crossings within a subwatershed. Although all stream crossings are not created equally, higher numbers of stream crossings and density indicate the potential for negative effects to riparian areas, water quality and aquatic habitats. There are an estimated 12,000 stream crossings across the entire planning unit and an average of 2.4 stream crossings/mi2, for all subwatersheds on the Forest.

Aquatic Habitat/Species

Species distribution and abundance have changed from historic conditions. Changes in the physical environment and habitat alteration have been among the main contributors to these changes. There are indications that historic distribution and abundance shifts continued during the term of the 1987 Forest Plan; however, the rates of change may have been somewhat tempered or even improved with the implementation of protection measures including INFISH amendments and other best management practices.

Current conditions and trends show that populations of many native aquatic species are stable or improving. Land management practices, particularly historic practices, while not the only cause (introduction of non-native species, influence of hatchery fish, and harvest are other contributing causes), have had major influences.

Research indicates a need to identify aquatic habitats that support the most productive, diverse, and otherwise critical populations (Rieman et al. 2000). These habitats provide the best opportunities for ensuring the short-term persistence of aquatic species and also provide a nucleus for rehabilitating more complete networks in the future. In these “conservation” watersheds land management activities should focus on the protection and maintenance of high quality aquatic habitats and strong native fish populations, while minimizing the risk to existing values and retaining ecological health. An emphasis on conservation in these subwatersheds does not necessarily mean forest management activities be deferred, but does imply that any activity must clearly minimize or eliminate risks that might compromise the ability of native fish populations to persist (Rieman et al. 2000).

In addition, long-term persistence of aquatic species depends on more than the conservation of existing habitats and populations. Protection of fish habitats and populations alone is not sufficient to maintain biological diversity, as these reserves will never be large or well distributed enough (Franklin 1993). Long-term persistence will also depend on restoring watershed processes that create and maintain habitats across stream networks (Rieman et al. 2000); and the use of ecologically compatible land use polices to ensure the long-term productivity of aquatic and riparian ecosystems (Thurow et al. 1997). Site specific restoration can address or treat specific elements of watershed-scale problems, while larger restoration actions at the subwatershed scale are expected to provide the most benefits for aquatic species, their habitats, and other aquatic dependent resources.

The concept of "priority watersheds" as described in INFISH (USDA Forest Service 1995) is further refined in the draft Forest Plan as "conservation" and "restoration" watersheds. Priority watersheds in INFISH were designated based on the following criteria:

- Watersheds with excellent habitat or strong assemblages of inland native fish, with a priority on bull trout populations;
- Watersheds that provide for meta-population objectives; and
- Degraded watersheds with a high restoration potential.

INFISH states that priority watersheds are intended to provide a pattern of protection across the landscape, where habitat for inland native fish would receive special attention and treatment. Priority watersheds would have the highest priority for restoration, monitoring, and watershed analysis. Priority areas in good condition would serve as anchors for the potential recovery of depressed stocks, and also would provide colonists for adjacent areas where habitat had been degraded by land management or natural events (USDA FS 1995). Subwatersheds (6th level HUC) in this condition are considered "conservation" watersheds in the draft Forest Plan. Subwatersheds that are "areas of lower quality habitat, with high potential for restoration, would become future sources of good habitat with the implementation of a comprehensive restoration program (USDA FS 1995)" are labeled "restoration" watersheds in the draft Forest Plan.

Subwatersheds were identified as “conservation” or “restoration” areas, for an analysis of existing condition, based on a synthesis of the physical condition and status, and that of associated aquatic species status (see appendix E for further description of the process). Conservation subwatersheds are intended to protect stronghold populations of native salmonids and compliment restoration efforts. Conservation watersheds were identified using the following considerations: areas with excellent habitat, water quality and strong populations of native fish species. Restoration subwatersheds were identified by looking for areas with: degraded habitat conditions, water quality limitations, depressed populations of native fish species, or a combination of the above, and a relatively higher potential for improvement.

It is estimated that there are 21 conservation subwatersheds and 45 restoration subwatersheds on the Forest (figure 23).

Long-term persistence of aquatic species depends on more than the conservation of existing habitats and populations. Protection of fish habitats and populations alone is not sufficient to maintain biological diversity, as these reserves will never be large or well distributed enough (Franklin 1993). Long-term persistence will also depend on restoring watershed processes that create and maintain habitats across stream networks (Rieman et al. 2000) and the use of ecologically compatible land use polices to ensure the long-term productivity of aquatic and riparian ecosystems (Thurow et al. 1997). Site specific restoration can address or treat specific

elements of watershed-scale problems, while larger restoration at the subwatershed scale are expected to provide the most benefits for aquatic species, their habitats, and other aquatic dependent resources. Restoration subwatersheds generally have degraded habitat conditions, but have a high potential for improvement. Restoration activities would be accomplished by identifying and treating risk factors (i.e., unstable roads or poorly located and/or drained roads, certain invasive plants and animals, major obstructions to physical and biological connectivity) which threaten aquatic and riparian ecosystem integrity and are likely to adversely influence achievement of desired conditions.

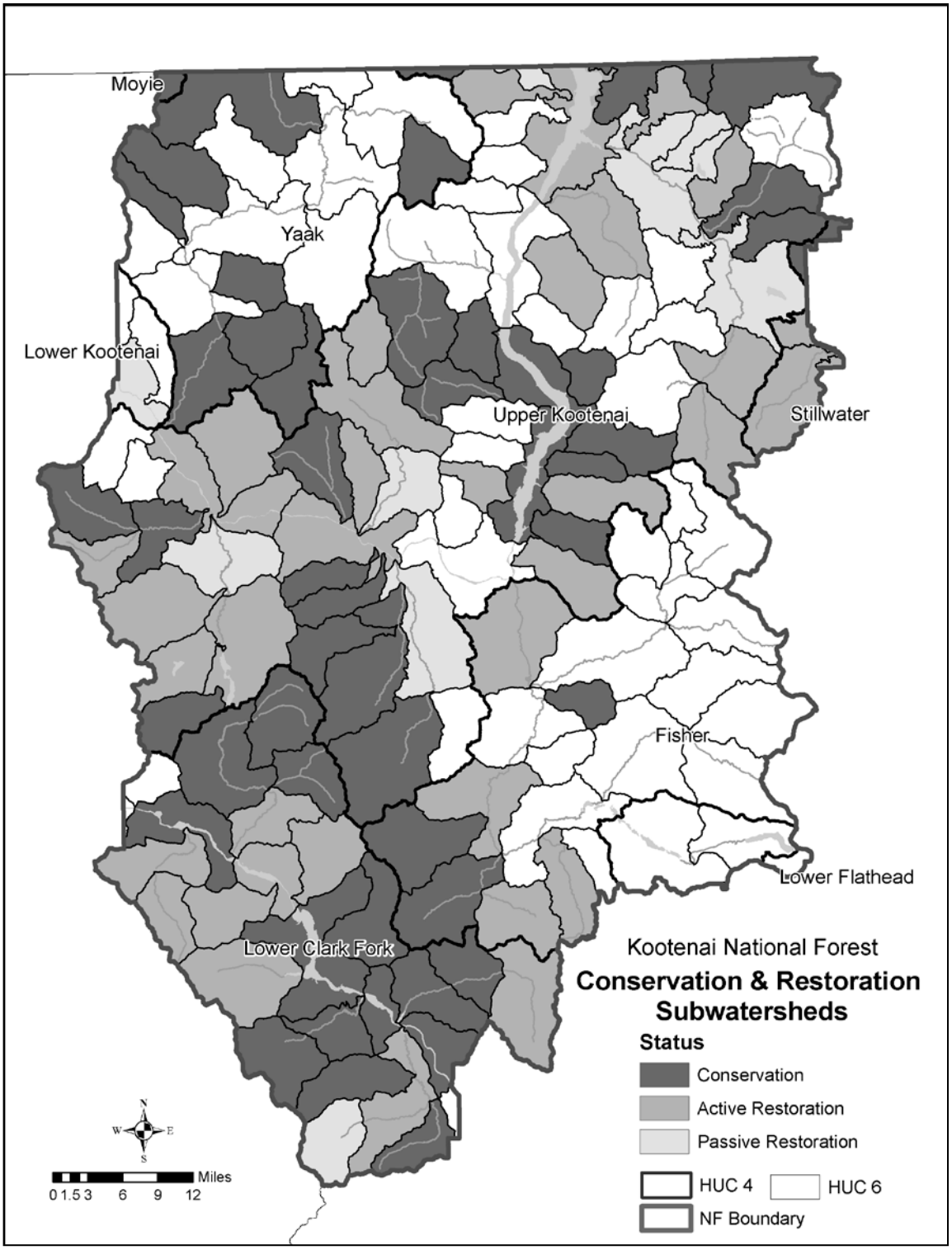


Figure 23. Conservation & Restoration Subwatersheds

The following are general statements about the current conditions of some native fish and amphibian species. There are five fish species and two amphibian species listed as threatened or endangered, or on the Regional Forester's Sensitive Species list (Region 1 United States Forest Service 2011).

Bull Trout (Salvelinus confluentus) (Threatened)

Current bull trout distribution on the Forest is shown in figure 24. According to Lee et al. (1997), bull trout are widely distributed across the Columbia River Basin, although their current range is about 60 percent of historic distribution (figure 25). Although many populations of native aquatic species are stable or improving, bull trout are considered to be in decline across their range; and local extirpations have occurred across the planning area. Watersheds that are predicted to be strong spawning and rearing areas represent less than 10 percent of the historic range. Migratory life histories have been lost or are limited throughout the current range due to the introduction of non-native species, intensive land management activities such as road construction and timber harvest that have affected habitat conditions for the species.

Status of the Species

The bull trout in the coterminous United States was listed as threatened on November 1, 1999 (USDI, Fish and Wildlife Service 1999a). Earlier rulemakings had listed the Columbia River distinct population segment of bull trout as threatened (USDI, Fish and Wildlife Service 1998b). The Columbia River distinct population segment occurs throughout the entire Columbia River basin within the United States and its tributaries, excluding bull trout found in the Jarbidge River, Nevada. The distinct population segment serves as an interim recovery unit in the absence of an approved recovery plan (USDI, Fish and Wildlife Service 2008). Critical habitat has been designated for bull trout (USDI, Fish and Wildlife Service 2010).

Distribution

Bull trout occur in the northwestern portion of North America from Nevada to the Yukon Territory (Behnke 2002). Bull trout are native to the streams and rivers within the Columbia River Basin in western Montana and Idaho. Bull trout populations on the KNF are included in the Columbia River distinct population segment.

The Columbia River bull trout distinct population segment is represented by relatively widespread populations that have declined in overall range and numbers of fish. There have been numerous local extirpations reported throughout the Columbia River basin. A majority of Columbia River bull trout occur in isolated, fragmented habitats that support low numbers of fish and are inaccessible to migratory bull trout. The few remaining bull trout "strongholds" in the Columbia River basin tend to be found in large areas of contiguous habitats in the Snake River basin of central Idaho mountains, upper Clark Fork and Flathead Rivers in Montana, and several streams in the Blue Mountains in Washington and Oregon.

Habitat and Life History Needs

Bull trout have more specific habitat requirements than most other salmonids. Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, substrate for spawning and rearing, and migratory corridors. Bull trout are found in colder streams and require colder water than most other salmonids for incubation, juvenile rearing, and spawning. Spawning and rearing areas are often associated with cold-water springs, groundwater infiltration, and/or the coldest streams in a watershed.

Throughout their lives, bull trout require complex forms of cover, including large woody debris, undercut banks, boulders, and pools (USDI, Fish and Wildlife Service 2002). Bull trout exhibit three life history types: adfluvial, fluvial, and resident, all which require cold water temperatures <60°F during portions of their life cycle to persist. Bull trout are opportunistic feeders with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull

trout prey on terrestrial and aquatic insects, macrozooplankton and small fish (Donald and Alger 1993). Adult migratory bull trout are primarily piscivorous, known to feed on various fish species (Fraley and Shepard 1989).

For spawning and early rearing, bull trout require loose, clean gravel relatively free of fine sediments. Bull trout typically spawn from August to November during periods of decreasing water temperatures. However, migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 155 miles to spawning grounds (Fraley and Shepard 1989). Because bull trout have a relatively long incubation and development period within spawning gravel (greater than 200 days), transport of bedload in unstable channels may kill young bull trout. Bull trout use migratory corridors to move from spawning and rearing habitats to foraging and overwintering habitats and back. Different habitats provide bull trout with diverse resources, and migratory corridors allow local populations to connect, which may increase the potential for gene flow and support or refounding of populations.

Maintaining bull trout habitat requires stream channel and flow stability (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period and channel instability may decrease survival of eggs and young juveniles in the gravel during winter through spring (Pratt 1992, Pratt and Huston 1993).

In summer, key aquatic habitat elements for bull trout include: (1) spawning habitat with water quality and quantity (including flow regimes) conditions and substrates favorable to incubation and larval development; (2) rearing habitat with water quality (including temperature conditions) and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (3) rearing habitat with foraging to support juvenile development; (4) cover habitat, including shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks; and (5) migration corridors for adults and juveniles free of obstruction and excessive predation with favorable water quantity and quality conditions.

Core Areas

The draft recovery plan (USDI, Fish and Wildlife Service 2002) identified a bull trout core area as the closest approximation of a biologically functioning unit for bull trout. By definition, a core area includes a combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (a group of one or more local bull trout populations that exist within core habitat) constitutes the basic unit on which to gauge recovery (USDI, Fish and Wildlife Service 2002).

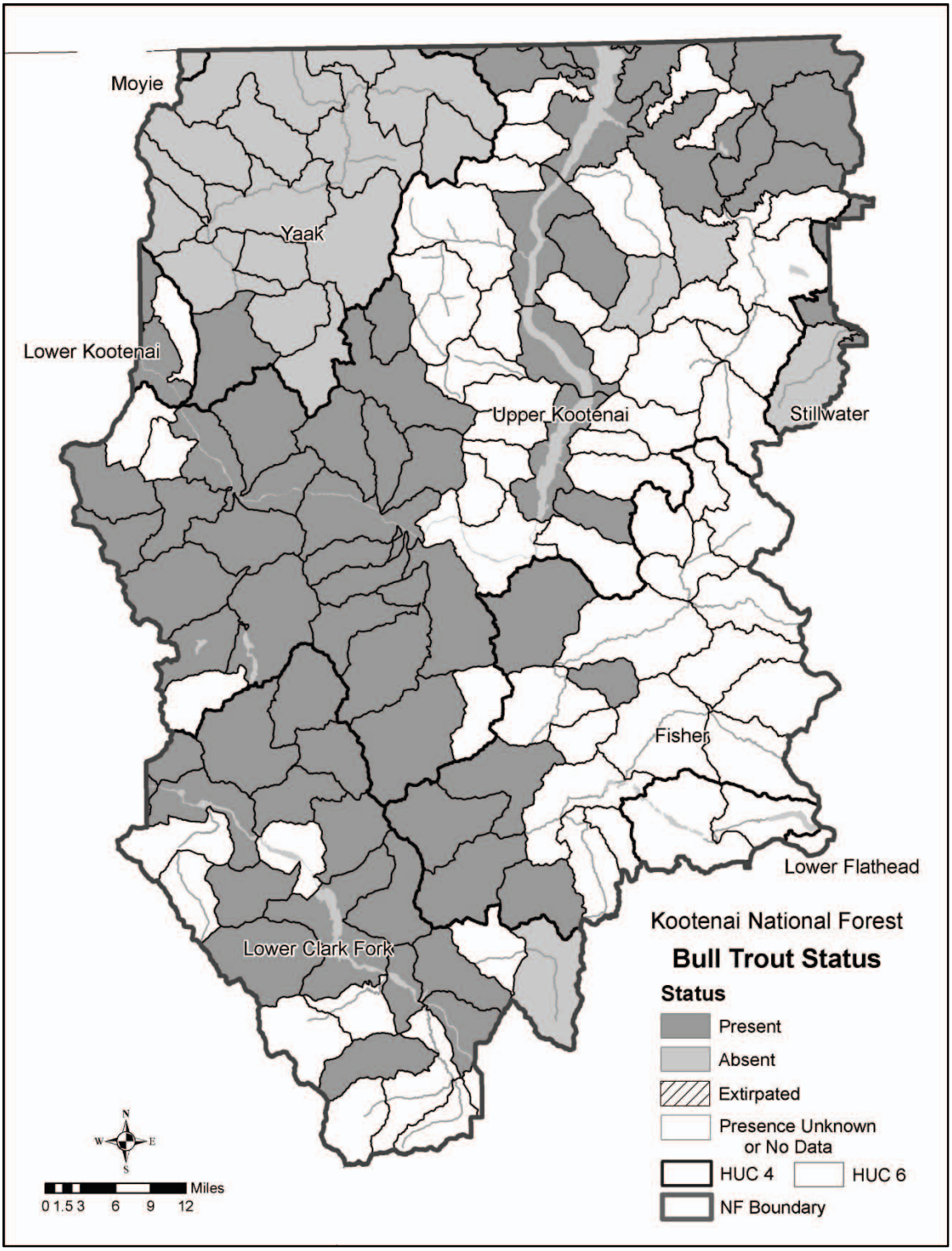


Figure 24. Current Bull Trout Distribution and Population Status

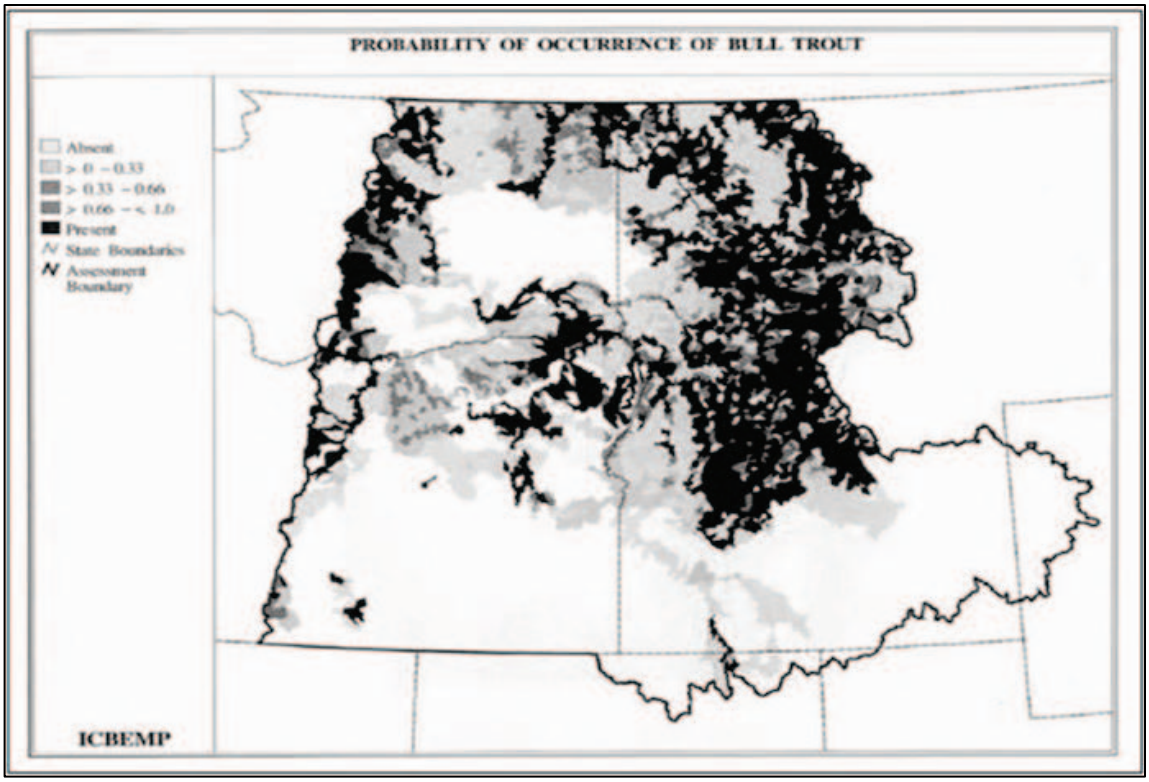


Figure 25. Probable Bull Trout Historic Range (from Lee et al. 1997): Current Bull Trout Distribution and Population Status

Core areas require both habitat and bull trout to function, and the number and characteristics of local populations inhabiting a core area provide a relative indication of the core areas likelihood to persist (USDI, Fish and Wildlife Service 2008). A core area is a system of watersheds within larger basin. Each watershed is the habitat for a local population that interacts with other local populations throughout the larger basin. Local populations within a core area have the potential to interact because of connected aquatic habitat. A local population is defined as a group of bull trout that spawn within a particular stream or portion of a stream system. A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. In most areas, a local population is represented by a single headwater tributary or complex of headwater tributaries where spawning occurs. Gene flow may occur between local populations (i.e., those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

The bull trout draft recovery plan describes 121 bull trout core areas across the species range in five states (USDI, Fish and Wildlife Service 2002) and the KNF has lands within six core areas (Cabinet Gorge Reservoir, Noxon Reservoir, Clark Fork River, Bull Lake, Kootenai River, Lake Koocanusa).

Westslope Cutthroat Trout (Oncorhynchus clarkii lewisi) (Sensitive)

This subspecies was petitioned for listing under ESA, although listing was determined to be “not warranted” by the U. S. Fish and Wildlife Service. Current westslope cutthroat trout distribution on the Forest is shown in figure 26. Westslope cutthroat trout are still widely distributed, but remaining populations may be seriously compromised by habitat loss and genetic introgression (Lee et al. 1997) (see figure 27), although current populations are stable or improving in some

cases. This subspecies is estimated to occur in 60 percent of its historic range (Shepard et al. 2005). Migration barriers (dams, irrigation diversions, road-stream crossings) have isolated or eliminated habitat once available to migratory populations.

Status of the Species

Westslope cutthroat trout is a State Species of Special Concern in Montana (S2). This species is a Region 1 Sensitive Species.

Distribution

Westslope cutthroat trout occur along both sides of the Continental Divide from Yellowstone National Park into British Columbia and Alberta; additionally, there are several disjunct populations in Oregon, Washington, and British Columbia (Behnke 2002). Westslope cutthroat trout occur on the KNF (see figure 26).

Habitat and Life History Needs

Westslope cutthroat trout live in small mountain streams, main rivers, and large natural lakes. They require well-oxygenated water, clean, well-sorted gravels with minimal fine sediments for successful spawning, temperatures less than 70°F, and a complexity of instream habitat structure such as large woody debris and overhanging banks for cover.

Westslope cutthroat trout spawn in small tributary streams on clean gravel substrate, where mean water depth is 17 to 20 cm and mean water velocity is 0.3 to 0.4 m/sec, and they tend to spawn in natal streams (McIntyre and Rieman 1995). Adfluvial populations live in large lakes in the upper Columbia drainage and spawn in lake tributaries. Fluvial populations live and grow in rivers and spawn in tributaries. Resident populations complete the entire life history in tributaries. All three life-history forms may occur in a single basin (McIntyre and Rieman 1995). Migrants may spawn in the lower reaches of the same streams used by resident fishes. Maturing adfluvial fishes move into the vicinity of tributaries in fall and winter and remain there until they begin to migrate upstream in spring. Of migratory spawners, some remain in tributaries during summer months, but most return to the main, river or lake, soon after spawning (Behnke 1992).

Adults prefer large pools and slow velocity areas, stream reaches with numerous pools, and some form of cover generally has the highest adult fish densities. Juveniles of migratory populations may spend one to four years in their natal streams, and then move (usually in spring or early summer, and/or in fall in some systems) to a main river or lake where they remain until they spawn (McIntyre and Rieman 1995, Spahr et al. 1991). Many fry disperse downstream after emergence (McIntyre and Rieman 1995). Juveniles tend to overwinter in interstitial spaces in the substrate. Larger individuals congregate in pools in winter.

In cold higher elevation streams, growth rates are slower than warmer streams with some fish living up to twelve years, but only attaining lengths of seven to eight inches. Adfluvial and stocks in warmer waters reach lengths of twelve to fifteen inches. Westslope cutthroat trout spawn between March and July when water temperatures are about 50°F. Maturity also depends on location ranging from four to six years and sizes of four to fourteen inches. Diets are primarily aquatic invertebrates; although larger fish, at times, will habitually or mainly feed on other fish.

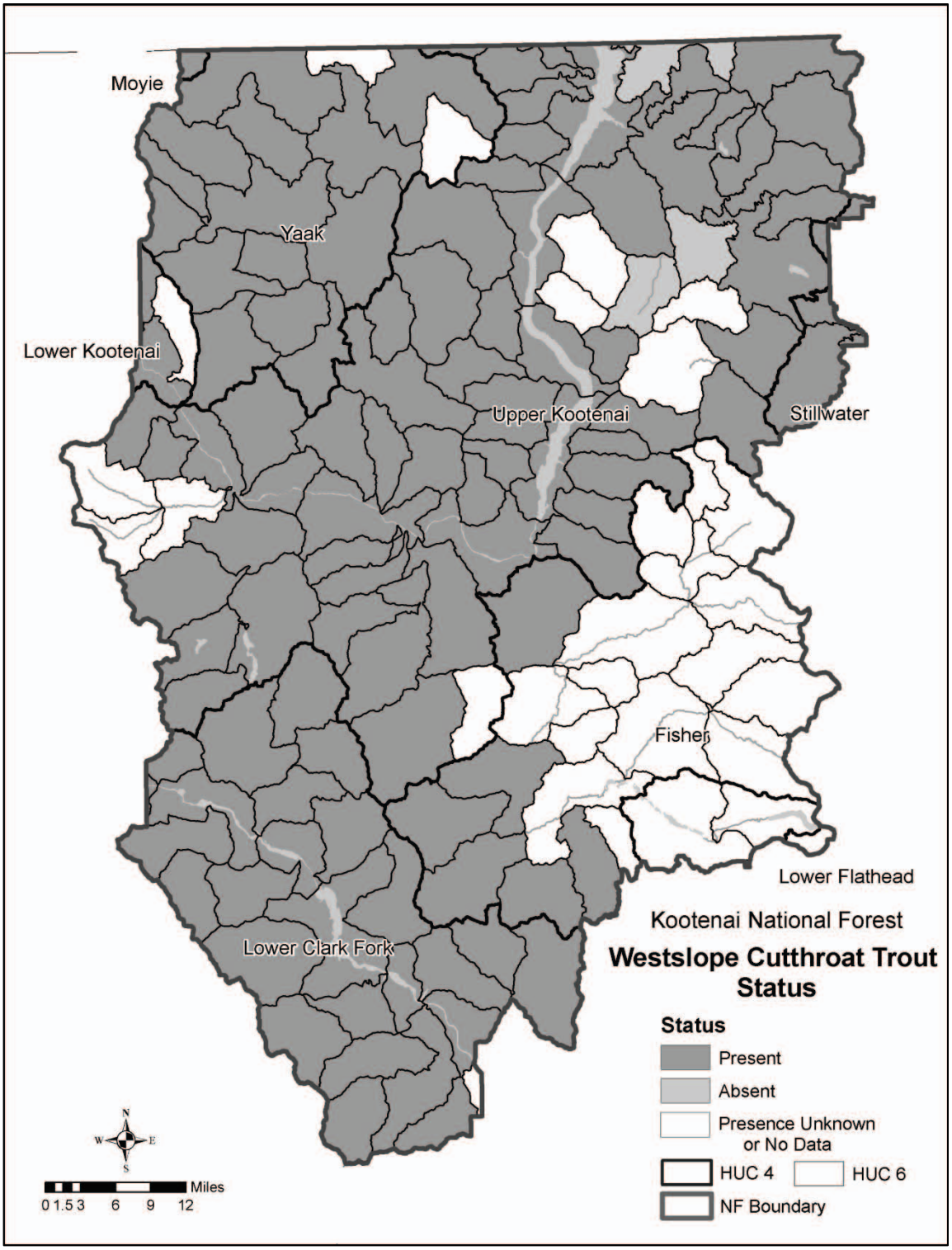


Figure 26. Current Westslope Cutthroat Trout Distribution and Population Status

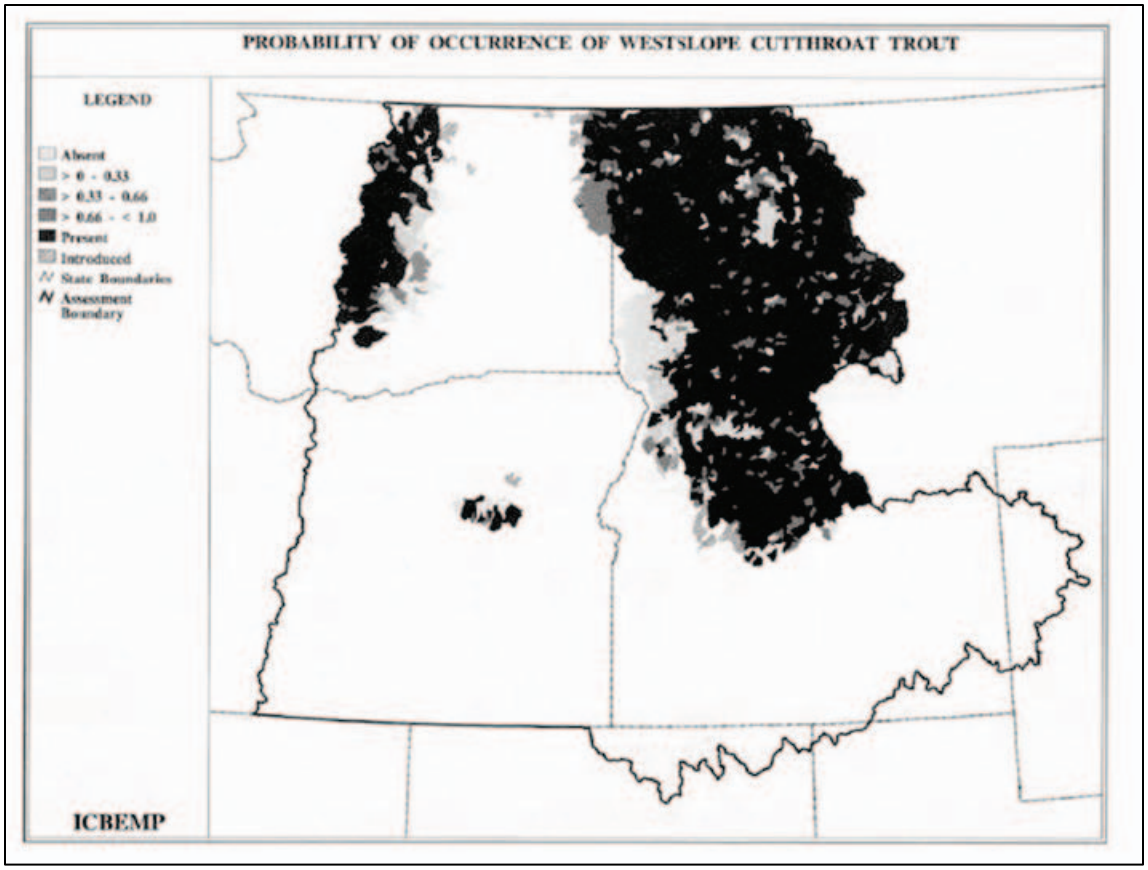


Figure 27. Probable Historic Westslope Cutthroat Trout Distribution (Lee et al. 1997): Current Westslope Cutthroat Trout Distribution and Population Status

Interior Redband Trout (Oncorhynchus mykiss gairdneri) (Sensitive)

The allopathic form (i.e., not found in the same areas as steelhead trout) of interior redband trout is found in the Kootenai River drainage. Current interior redband trout distribution on the Forest is shown in figure 28. Distribution of the species throughout the Columbia Basin is shown in figure 29 (Lee et al. 1997). Historically, this species was widely distributed throughout the Columbia River Basin, although it was not widespread on the KNF. Current populations on the KNF range from strong to depressed. Hybridization and competition are its main threats.

Status of the Species

Inland redband trout is a State Species of Special Concern in Montana (S1) and also included on the Region 1 Sensitive Species list (USDA FS 2011).

Distribution

Inland redband trout are found in the interior Columbia River basin: from east of the Cascades, upstream to geologic barriers such as Shoshone Falls on the Snake River, Kootenai Falls on the Kootenai River, and in the upper Fraser River (Behnke 2002).

Habitat and Life History Needs

Inland redband trout are found in a range of stream habitats. They prefer cool streams with temperatures less than 70°F; however, they can survive daily cyclic temperatures up to 80°F for a short period of time (Wydoski and Whitney 2003). Resident stream redband trout may attain a

maximum size ranging from six to eighteen inches depending on location. Spawning occurs in the spring between February and June, depending on temperature and location. Diets are primarily drifting invertebrates, both terrestrial and aquatic. Larger fish will occasionally consume other fish.

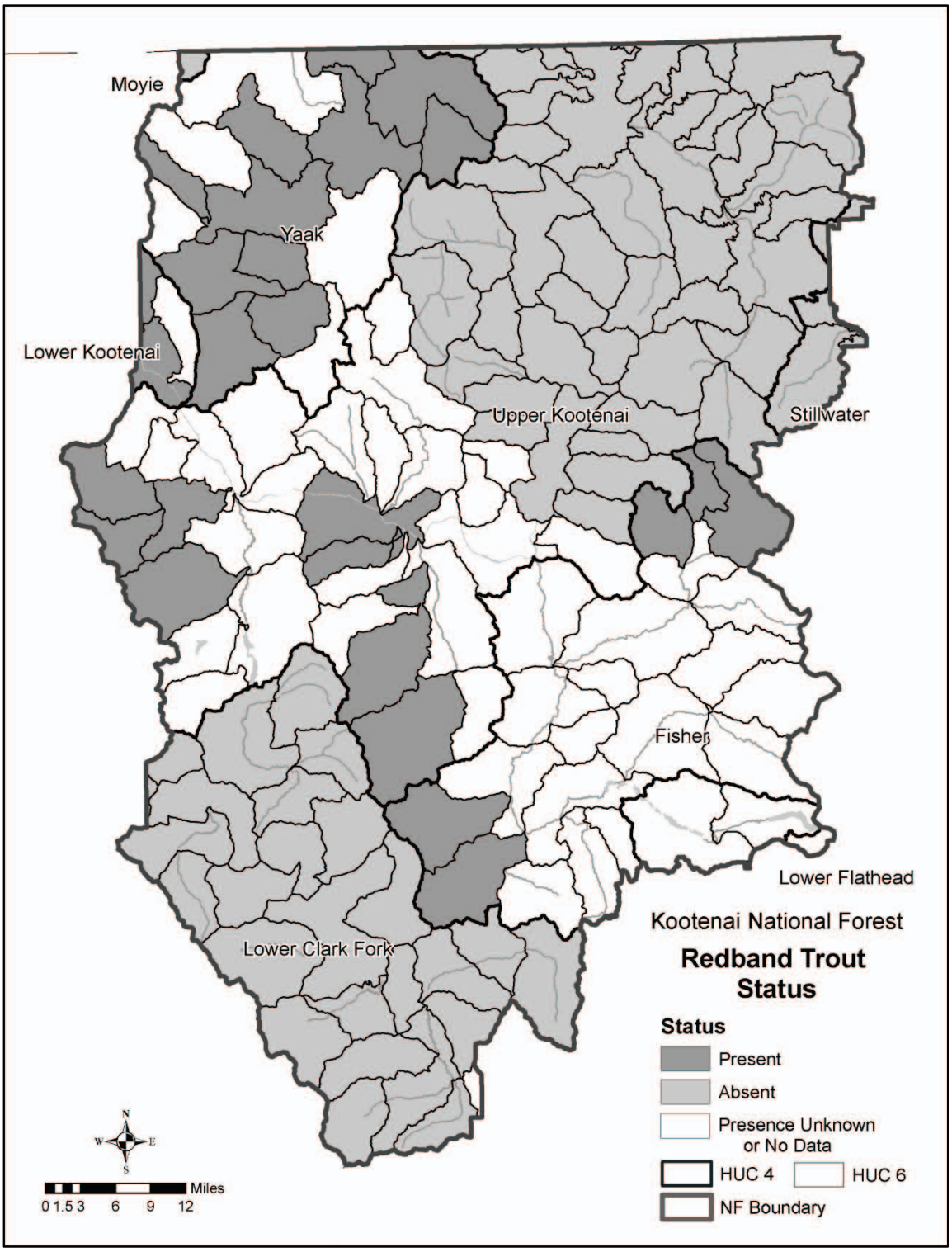


Figure 28. Current Interior Redband Trout Distribution and Population

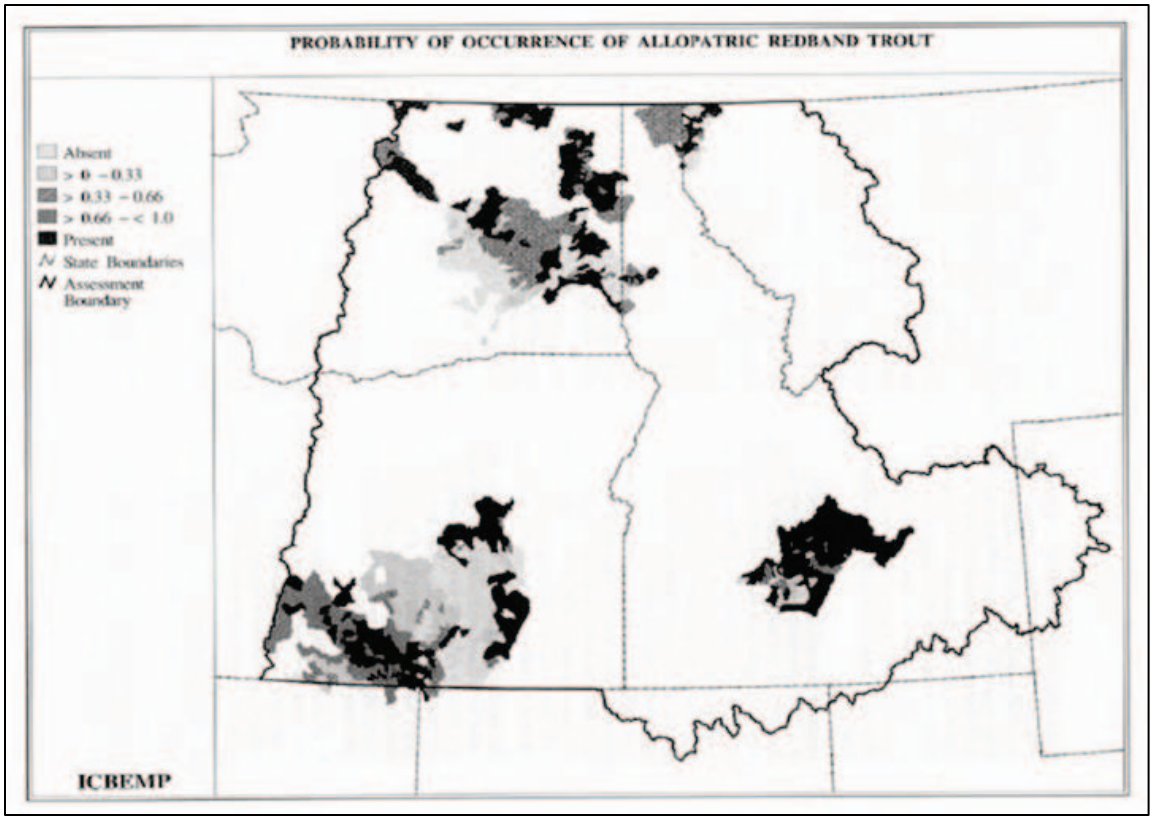


Figure 29. Probable Interior Redband Trout Distribution (from Lee et al. 1997): Current Interior Redband Trout Distribution and Population

Kootenai River White Sturgeon (Acipenser transmontanus) (Endangered)

This species is restricted to approximately 695 river kilometers (430 miles) of the Kootenai River. These fish have not successfully spawned in recent years due to changes in river flow dynamics resulting from operations of the Libby Dam. Past land management activities conducted by the Forest Service, such as road construction and timber harvest, are considered a secondary impact to populations of this species (Lee et al. 1997).

Status of the Species

The Kootenai River white sturgeon was listed as an endangered species in 1994 (USDI, Fish and Wildlife Service 1994). The recovery plan for the Kootenai River population of the white sturgeon was completed in 1999 (USDI, Fish and Wildlife Service 1999b).

Critical habitat has been designated for Kootenai River white sturgeon; however, none was designated on the KNF.

Distribution

The white sturgeon is an ancient fish that inhabits large rivers, lakes, and marine environments from southern California to Cook Inlet of Alaska. It is a migratory species reaching lengths nearly 20 feet, weights of 1,970 pounds, and ages of 100 years or more. The Kootenai River white sturgeon exhibit both the riverine and adfluvial life histories.

The Kootenai River white sturgeon is restricted to 168 miles of the Kootenai River from Cora Linn Dam, Canada, upstream to Kootenai Falls, Montana. 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. White sturgeon migrate freely throughout the Kootenai River (Andrusak 1980), but are uncommon upstream of Bonners Ferry, Idaho (Graham 1981, Apperson and Anders 1991). There are no published reports of sturgeon using lateral tributaries in Idaho or Montana (Partridge 1983). The majority of adult fish resides in Kootenay Lake, and makes extended (> 100 km) migrations to spawn in a 19 km stretch below Bonners Ferry, Idaho. Some adult fish remain in the river and overwinter in the deep (> 30 m) pools.

The KNF contains watersheds which drain into the Kootenai River. In the 1994 Final Listing Rule the U. S. Fish and Wildlife Service issued a biological opinion stating that the Libby Dam, completed in 1974, is the primary factor affecting the Kootenai River white sturgeon (USDI, Fish and Wildlife Service 1994). There has been an almost complete lack of recruitment of juveniles into the population since 1974, soon after Libby Dam began operation (Partridge 1983, Apperson and Anders 1991 as cited in USDI, Fish and Wildlife Service 1994). Forest management activities have not been identified as a factor in the decline of the Kootenai River white sturgeon (USDI, Fish and Wildlife Service 1994). It is highly unlikely that forest management activities affect the mainstem Kootenai River or the Kootenai River white sturgeon population; therefore, this species does not have species-specific requirements beyond those of the Cold Water Group in the development of plan components.

Habitat and Life History Needs

Kootenai River white sturgeon require rocky substrates (boulder and cobble) and high water velocities (three to seven ft/sec) for spawning. These appear to be the two most critical spawning elements. White sturgeon spawn during spring peak flows when velocities are high and turbidity is elevated. The fertilized eggs sink to the bottom and then hatch within a few weeks. The newly hatched sac-fry briefly drift with the current before retreating into the substrate for up to a month. The juveniles eventually emerge from the substrate and begin a free-roaming life. Juvenile fish use a wide range of depths and water velocities as habitat.

Older white sturgeon are relatively sedentary in the deepest locations of the Kootenai River drainage, often selecting low velocity waters greater than twenty feet deep. Kootenai River white sturgeon are typically 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 these fish are selecting for sand or are forced to use it. White sturgeon are opportunistic feeders and subsist on insects, clams, snails, plant material, and fish (Brown 1971). Kokanee from Kootenay Lake were once an important prey item prior to the collapse of the salmon fishery in the mid-1970s.

Western Toad (Bufo boreas) (Sensitive)

This species is in widespread decline throughout its range. Past land management activities, (timber harvest and road construction) in and around streams and wetlands, have likely resulted in habitat loss. Because of the species' specific habitat association, and the number of unoccupied historical sites, it is possible that populations have declined or even been extirpated locally. Migration barriers, especially roads, have isolated habitats, probably impacting reproduction and/or winter survival. Mortality at roads may be high near breeding ponds that are near roads with large amounts of vehicle traffic.

Western toad ecology, biology, habitat use, status and conservation are described and summarized in Maxell et al. (2007) and Reichel and Flath (1995).

Status of the Species

The western toad is currently recognized as two subspecies with *Bufo boreas* currently recognized as occurring in Montana. However, mitochondrial DNA analysis indicates that four main phylogenetic groups exist and each may warrant recognition as separate species (Maxell et al. 2009).

Globally, western toads are classified as G4 (apparently secure) and nationally as N4 (apparently secure) in both the U.S. and Canada. Throughout the states in which it occurs, its rank varies widely from S1 (at high risk) to S4 (uncommon but not rare and usually widespread). It is ranked as S2 in Montana. The western toad is a Forest Service Northern Region sensitive species.

Distribution

This species occurs along the Pacific coast of North America from southern Alaska to Baja California, and ranges eastward to the Rocky Mountains of west central Alberta, Montana, Idaho, Wyoming, Utah, Colorado, and (formerly) northern New Mexico (NatureServe 2009). In Montana, the western toad is found throughout the mountains and intermountain valleys of the western third of the state on both sides of the Continental Divide. They are considered fairly common and well distributed throughout their range in Montana as well as on the Forest.

Population Sizes and Trends

The total adult population size is unknown, but likely exceeds 100,000 (IUCN 2011). Within the last 25 years populations of western toads have undergone crashes in Colorado, Utah, southeast Wyoming, and New Mexico (Corn et al. 1997, Loeffler 1998 in Maxell et al. 2007). *Bufo boreas* is now listed as endangered by the State of Colorado and considered a candidate species, which is warranted but precluded for federal listing by the USFWS in the southern Rocky Mountains. Surveys in the late 1990s revealed that toads were absent from a large number of their historic localities in the northern Rocky Mountains and that although they were still widespread across the landscape they occupied an extremely small proportion of suitable habitat (less than 10 percent in most cases, but usually less than 5 percent) (Werner and Reichel 1994 and 1995, Reichel and Flath 1995, Reichel 1996, Reichel 1997, Hendricks and Reichel 1996, Werner et al. 1998, Maxell et al. 2009). Overall population trend is considered to be decreasing (IUCN 2011).

Population sizes or trends are unknown for Montana (Maxell et al. 2007). The boreal toad was considered the most abundant amphibian of the western third of Montana in previous decades (Maxell 2003) and is still encountered widely and frequently but not commonly, and is no longer ranked as the most abundant amphibian. Numerous surveys since the early 1990s indicate this species has experienced regional population declines in the state. The population size is unknown and direct measures of population trend on the Forest are not available. However, surveys conducted between 1993 and 1995 located 63 adults. Of the 134 wetland sites surveyed during the 1993 and 1994 field seasons, 10 had evidence of successful breeding (Werner and Reichel 1994) and five additional sites were confirmed during the 1995 field season (Werner and Reichel 1996).

Habitat and Life History Needs

Habitats used by western toads in Montana are similar to those reported for other regions and range from low-elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes to high-elevation ponds, fens, and tarns at or near tree line. Normally, toads remain fairly close to ponds, lakes, reservoirs, and slow-moving rivers and streams during the day, but may range widely at night. Eggs and larvae develop in still, shallow areas of ponds,

lakes, or reservoirs or in pools of slow-moving streams, often where there is sparse emergent vegetation. Boreal toads are known to migrate between aquatic breeding and terrestrial non-breeding habitats. Adult and juvenile western toads dig burrows in loose soil, use burrows of small mammals, or occupy shallow shelters under logs or rocks. At least some toads overwinter in terrestrial burrows or cavities, apparently where conditions prevent freezing (MFWP 2005).

Coeur d'Alene Salamander (Plethodon idahoensis) (Sensitive)

This species is endemic to the northern Idaho, northwest Montana, northeast Washington, and southern British Columbia. Past land management activities, such as timber harvest and road construction in and near streams, have likely resulted in some level of habitat loss. Because of the species' specific habitat association, it is possible that populations have declined or even been extirpated locally.

Coeur d'Alene salamander population biology, ecology, habitat description, and relationships identified by research are described in Cassirer et al. (1994), Groves et al. (1996) and Maxell et al. (2007).

Status of the Species

Globally the Coeur d'Alene salamander is classified as G4 (apparently secure) and nationally as N3 (at moderate risk) in both the U.S. and Canada. It is ranked as S2 in Montana (MNHP 2008). The Coeur d'Alene salamander is a Forest Service Northern Region sensitive species.

Distribution

The species maintains a disjunctive distribution in northern Idaho, western Montana, and southeastern BC (Wilson et al. 1997, NatureServe 2008). The majority of the species range is found on the KNF and IPNF. This species is a remnant of a once diverse plethodontid salamander fauna in the central Rocky Mountains that was likely reduced by climatic changes over the last 10 to 14 million years (Nussbaum et al. 1983). Most known U.S. sites (87 percent) occur on lands administered by the U.S. Forest Service, but this data is biased by the fact that most surveys have been conducted on NFS lands (Ibid).

Population Sizes and Trends

Overall, the global population trend is unknown (Globalamphibians.org, 2008). The total number of adults is also unknown but probably exceeds 10,000 (NatureServe 2009). Population declines or extinctions have not yet been documented in Montana; however, some populations continue to be vulnerable to highway construction, and most occur at elevations and in forest types where timber harvest is a common activity (MNHP 2008). Population sizes are difficult to measure and no estimates are available (i.e., surveys are generally conducted at night, when salamanders are active (MNHP 2008)).

Habitat and Life History Needs

Montana populations of Coeur d'Alene salamanders are found primarily in talus areas along splash zones of creeks, or with seeps running through (Maxell et al. 2007). Nearby habitats are typically forested (Reichel and Flath 1995). Foraging areas include seepage areas and splash zones with high humidity, high substrate moisture, and relatively high temperatures. Shelter is provided by deep bedrock fractures or in talus habitat (Wilson and Larsen 1988).

This species is an invertivore. When above ground, Coeur d'Alene salamanders feed primarily on insects and other invertebrates, including millipedes, mites, spiders, harvestmen, snails, and

segmented worms (Wilson and Larsen 1988). They appear to be opportunistic feeders and generally restrict foraging activities to moist spray zones, seeps, or streamside rocks and vegetation, although they may venture beyond these areas during rainy periods. The diet is most similar to other salamanders that occupy semi-aquatic habitats (MNHP 2007).

Northern Leopard Frog (Rana pipiens) (Sensitive)

Globally, the northern leopard frog is classified as G5 (secure) and nationally as N5 (secure) for both the U.S. and Canada (NatureServe 2008). Throughout the states in which it occurs its rank varies widely from S1 (at high risk) to S5 (common, widespread and abundant). It is ranked as S1S3 in Montana (NatureServe 2009). It is listed as a Species of Greatest Conservation Need (Tier 1) in Montana and has been on the regional foresters list of sensitive species for a number of years.

Status and Distribution

This species is known from the Great Slave Lake and Hudson Bay, Canada, south to Kentucky and New Mexico. It has a spotty distribution in the west where it has been introduced in many localities (NatureServe 2009). The northern leopard frog's historical distribution is irregular but includes western Montana except in the Big Hole area, as well as the tip of the Idaho Panhandle and southeast and parts of southwest Idaho (Stebbins 1985).

In Montana the species range includes the eastern two-thirds of the state (figure 30); however, there are two disjunct populations that occur in the western portion of the state, including the Forest (figure 31). On the Forest northern leopard frogs are documented as occurring only in the Tobacco Valley area, in several small populations.

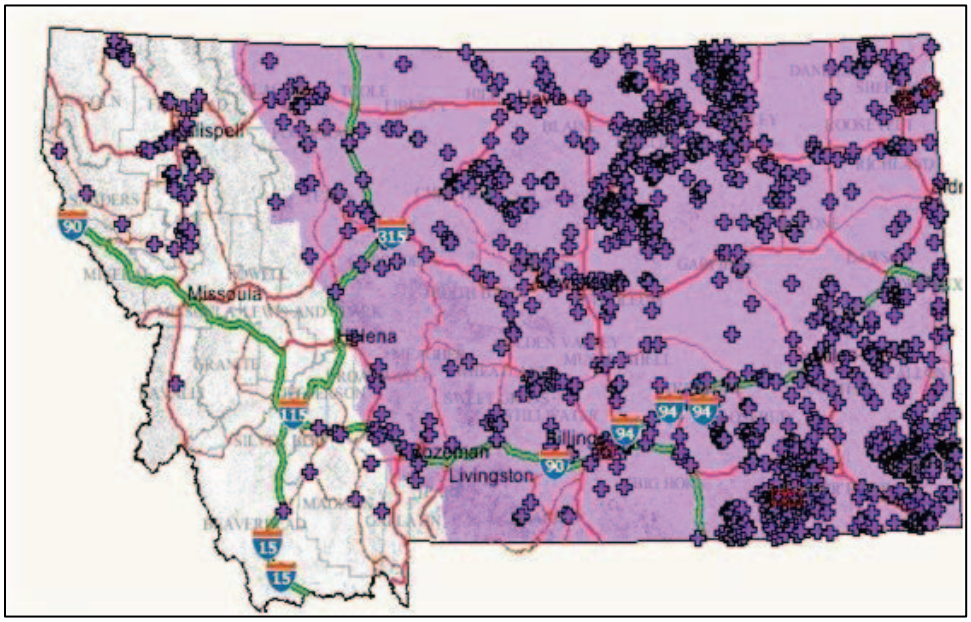


Figure 30. Distribution of Northern Leopard Frog in Montana

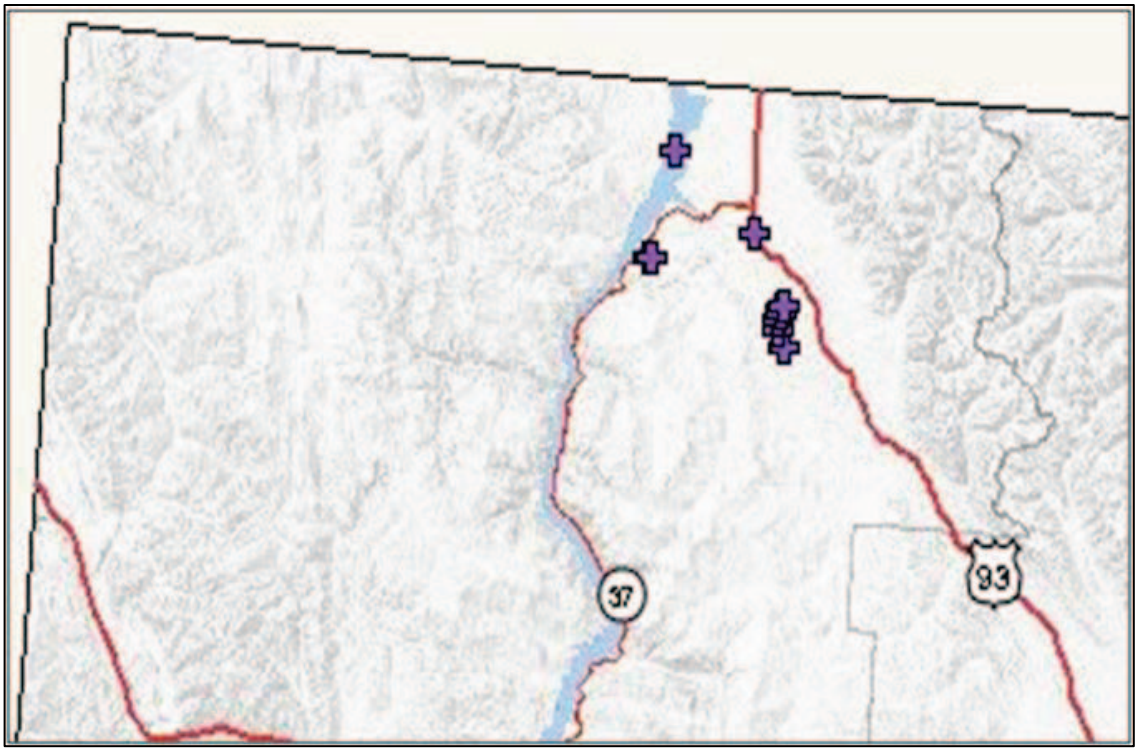


Figure 31. Disjunct Populations of Northern Leopard Frog in Western Montana

Population Sizes and Trends

Overall population size is unknown, although in North America there are thousands of populations (NatureServe 2009). The total adult population is probably in the hundreds of thousands or millions (Ibid). Over the last few decades, northern leopard frog populations have undergone declines and extinctions across much of the western portion of their range (Stebbins and Cohen 1995). Overall population trend is considered to be decreasing (globalamphibians.org 2008). It is still widespread and common in many areas, especially in lowland areas, but many other populations appear to have declined, especially in the Rocky Mountains of Colorado, Wyoming, and Montana where the species no longer is extant in most localities where it historically occurred (Corn and Fogleman 1984, Core et al. 1989, J. Reichel, unpublished map 1996 all in IUCN 2011). It has nearly disappeared from the Greater Yellowstone ecosystem (Peterson 1995 in IUCN 2011); is apparently extirpated from most of its historical range in Washington (Leonard et al. 1999 in IUCN 2011); has not been observed in recent years in the few historical localities in Oregon (Csuti et al. 1997 in IUCN 2011); and local extirpations have been reported for Alberta (Russell and Bauer 1993 in IUCN 2011) and British Columbia (Orchard 1992 in IUCN 2011).

In central Montana, out of 47 historic sites revisited in the mid 1990s, northern leopard frogs were only found at nine (19 percent) (Reichel 1995a). Recent extirpations are reported in all of western Montana and across much of the neighboring states (Werner and Reichel 1994, Reichel and Flath 1995) (MFWP 2005). Most northern leopard frog populations in western Montana apparently became extinct sometime in the late 1970s or early 1980s when virtually no amphibian studies were being conducted in the state (Maxell 2000, page 142). Although historically known to occur in several locations on the Forest, most populations of northern leopard frog appear to have been extirpated (MFWP 2005). Only two population centers are now

known to exist in western Montana, one of which is on the Forest in the Tobacco Valley (Werner et al. 1998 in Maxell et al. 2007).

Habitat and Life History Needs

Habitats used by northern leopard frogs in Montana include low-elevation and valley bottom ponds, spillway ponds, beaver ponds, stock reservoirs, lakes, creeks, pools in intermittent streams, warm water springs, potholes, and marshes (Brunson and Demaree 1951, Mosimann and Rabb 1952, Black 1969, Miller 1978, Dood 1980, Reichel 1995, Hendricks and Reichel 1996, Hendricks 1999). Northern leopard frogs require a mosaic of habitats to meet annual requirements of all life stages. They occupy a variety of wetland habitats of relatively fresh water with moderate salinity, including springs, slow streams, marshes, bogs, ponds, canals, floodplains, beaver ponds, reservoirs, and lakes, usually in permanent water with rooted aquatic vegetation (MFWP 2005).

Adults and juveniles commonly feed in open or semi-open wet meadows and fields with shorter vegetation, usually near the margins of water bodies where there is permanent water and growth of cattails or other aquatic vegetation, yet they may forage far from water in damp meadows (Stebbins 1985). They seek cover underwater and seem to avoid denser vegetation (MFWP 2005).

Western Pearlshell (Margaritifera falcata) (Sensitive)

Status of the Species

Western pearlshell is a State Species of Special Concern in Montana (S2) and also included on the Region 1 Sensitive Species list (USDA FS 2011).

Distribution

Montana's populations of *M. falcata* may be significantly contracting and becoming less viable with stream decreased flows, warming, and degradation. Previously reported mussel beds in the larger rivers (Blackfoot, Big Hole, Bitterroot, Clark Fork,) are extirpated from the drainage or are at such low densities that long-term viability is unlikely. This mussel species appears to have crossed the continental divide in Montana from west to east with its salmonid host, the westslope cutthroat trout, *Oncorhynchus clarki lewisi* (Gustafson 2001). This is the only native trout in the Missouri River headwaters. Reports of the eastern *M. margaritifera* in Montana are apparently due to the mistaken assumption that a mussel could not cross the continental divide.

Habitat and Life History Needs

Western pearlshell occurs in sand, gravel and even among cobble and boulders in low to moderate gradient streams up to larger rivers. This species prefers stable gravel and pebble substrates in low-gradient trout streams and intermountain rivers. Western pearlshell is found in runs and riffles in stable main-current channel areas. This mussel is intolerant of silt and warm water temperatures (Stagliano et al. 2007).

In large river systems, *M. falcata* attains maximum density and age in river reaches where large boulders structurally stabilize cobbles and interstitial gravels. Boulders tend to prevent significant bed scour during major floods. Boulder-sheltered mussel beds, although rare, may be critical for population recruitment elsewhere within the river, especially after periodic flood scour of less protected mussel habitat. In localized areas, where canyon reaches are aggrading with sand and gravel, *M. falcata* is often replaced by *Gonidea angulata*.

Nearly all mussels require a host or hosts during the parasitic larval portion of their life cycle. Hosts are usually fish species, and hosts for *M. falcata* in Montana were typically and historically *Oncorhynchus* spp. (e.g., westslope cutthroat trout); but *Salmo* and *Salvelinus* (introduced species) and even *Rhinicthys* and *Catostomus* (dace and suckers) are anticipated to be suitable hosts as well.

Macroinvertebrate Assemblage (Management Indicator Species (MIS))

Macroinvertebrates are useful and convenient indicators of the ecological health of a waterbody or river. They are almost always present, and are easy to sample and identify. Macroinvertebrates can be used to reveal pollution problems and are ideal bioindicators of water quality for several reasons: they live in the water for all or most of their life; stay in areas suitable for their survival; are easy to collect; differ in their tolerance to amount and types of pollution; are relatively easy to identify in a laboratory; often live for more than one year; have limited mobility; and are integrators of environmental condition. For example, the macroinvertebrate orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Tricoptera (caddisflies), are considered the three most pollution intolerant species found in freshwater streams and rivers. Because of this characteristic, a high percentage of these orders collected at a specific site typically indicate good water quality.

The PACFISH/INFISH Biological Opinion Implementation and Effectiveness Monitoring Team (PIBO monitoring crew), established by the Forest Service to evaluate the implementation and effectiveness of that decision, collects and analyzes this type of data annually, using accepted and peer reviewed methods. Macroinvertebrates are sampled using the protocol recommended by the Center for Monitoring and Assessment of Freshwater Ecosystems, Utah State University (Hawkins et al. 2003). Samples are analyzed and summarized by the BLM/USU National Aquatic Monitoring Center using 10 metrics (Karr and Chu 1997). One summary attribute was developed by the Center for Monitoring and Assessment of Freshwater Ecosystems in cooperation with the National Aquatic Monitoring Center that provides an index of biological condition for each reach. Specifically, the river invertebrate prediction and classification system describes the similarity of the invertebrate species composition at a reach (observed) to the species composition predicted to occur at a reference site within similar environmental conditions (expected) (Archer et al. 2009).

As of 2010, there have been numerous macroinvertebrate sample locations (both repeated and single samples) across the KNF, with a sampling period beginning in 1998; and an average river invertebrate prediction and classification system score of 0.89 for managed sites, indicating relatively high water quality and high quality aquatic habitat, as evidenced by the proportion of water quality indicator species present. A river invertebrate prediction and classification system score below 0.68 is considered to significantly deviate from reference conditions.

Environmental Consequences

Effects of Forestwide Direction

Alternative A – No-action Alternative

Watershed, Soils, Riparian, and Aquatic Habitat/Species

Legacy effects from past timber harvest, mining, and other land management activities, continue to affect watershed health and the aquatic ecosystem. As amended by the INFISH (USDA Forest

Service 1995), the 1987 Forest Plan direction had reduced the risk to watersheds, soils, riparian, and aquatic resources from new and ongoing activities. For some resources, the standards and guidelines in the previous Plan contain general direction for repairing past damage, although it is lacking for other resources, such as timber harvest. Under the direction of the 1987 Forest Plan, the intensity and risks associated with new and ongoing land management activities has been greatly reduced as compared to the last several decades. It is anticipated that vegetation treatments associated with timber production, vegetation restoration, and other projects harvesting timber will be lower than historic levels, over the past 20 to 25 years.

Under the current Forest Plan, watershed, soil, riparian, and aquatic habitat conditions would continue to improve, as a reflection of the current trend in reductions of timber harvest activities and associated ground disturbance.

Soil conditions should reflect an ongoing reduction in harvest and disturbance levels and should improve in response to implementation of the Plan.

Management for riparian and aquatic habitat and species is based on direction outlined in the INFISH, which was amended in to the Forest Plan in 1995; and was designed to provide protection but did not focus on restoration, and primarily provided direction for protection and passive restoration measures.

The PACFISH/INFISH Biological Opinion Implementation and Effectiveness Monitoring Team (PIBO monitoring crew) was established by the Forest Service in order to evaluate the implementation and effectiveness of that decision on 21 Forest Service and seven BLM units within the Columbia River Basin, including the planning unit. Preliminary analysis of the first three years of data from repeated site visits across the Upper Columbia River basin suggest that land management strategies implemented for the protection of aquatic habitats may be meeting the intent of the 1998 Biological Opinion for bull trout, salmon, and steelhead. For complete PIBO summary information, visit the Forest Service Fish and Aquatic Ecology website.

Factors that may have contributed to a decrease in riparian area function include: improper livestock grazing, timber harvest, road construction, water diversions, and disturbances associated with recreational use. These types of management activities have altered riparian conditions by changing flow regimes, altering channel morphology, and changing plant communities in some cases. Natural disturbance in riparian areas may temporarily degrade conditions, but are also necessary for the regeneration of many native plant species. Riparian ecosystems are tied to the surface and groundwater hydrology, natural sediment supply, and disturbance regime of a particular landscape and many riparian plant species reproduce only after flood disturbances. Appropriate hydrologic and sediment regimes are important for maintaining the integrity of these ecosystems. Changes in the sediment load within stream channels may lead to down cutting or lateral erosion, altering floodplains and water table relationships. Riparian areas can often be key sites for invasion of exotic plant species due to the relatively higher level of human uses in these areas. Loss of native vegetation can disrupt the functioning of riparian areas because of decreases in root densities, which are important for stream channel stability, and changes in plant communities.

Another potential indicator of riparian condition and effects to water quality and aquatic habitats is the number of road crossings within a subwatershed. Although all stream crossings are not created equally, higher numbers of stream crossings and density, indicate the potential for negative effects to riparian areas, water quality and aquatic habitats. Current management activities to improve water quality and aquatic habitats have included a reduction of the number

crossings or improvement of their condition. It is presumed that this emphasis in stream crossing improvements would continue over the course of the next planning period.

Threatened, Endangered, and Sensitive Species

As protection measures outlined in the 1995 INFISH Biological Opinion continue to be implemented, populations of threatened, endangered, and sensitive species will continue to remain stable or increase in population size and distribution.

Management Indicator Species (MIS)

Under Alternative A, it is anticipated that the level of diversity for the water quality indicator macroinvertebrate assemblage across the entire planning unit will be at least maintained, at current proportions (River invertebrate prediction and classification system score = 0.83).

Alternatives B, C, and D

INFISH is forestwide direction that has been brought forward through all action alternatives (FW-STD-RIP-03); therefore, the effects from implementation of this strategy described under Alternative A are also common to all of the action alternatives.

Watersheds, Soils, Riparian, and Aquatic Habitat

Forestwide objectives, standards, and guidelines would protect watershed health and aquatic habitats for vegetation management activities. The construction of few new roads is anticipated and existing roads will be routinely improved, upgraded, or removed as they are evaluated during planning efforts for individual management activities. Any miles of road construction will be greatly offset through miles of road decommissioning. The draft Forest Plan does not include any objectives specifically for road construction as it relates to soil and aquatic resource protection or restoration; however, the Plan does include an objective for 10 to 15 miles of road decommissioning or placing roads into intermittent storage as an annual average over a five year period (FW-OBJ-AR-03). Consequently, watershed conditions are not expected to decline from the current level of management in the Plan and are expected to improve.

Riparian Conservation Areas (RCAs): INFISH provides for protection from some effects of timber harvest and prescribed fire on riparian and aquatic habitats through the implementation of Riparian Conservation Areas (RCAs), which buffer streams from non-point source sediment generated by land management activities. Riparian conservation areas are zones typically associated with riparian vegetation and stream channels, for the protection of riparian vegetation, streambank stability, shading characteristics, and aquatic habitat. Riparian conservation areas contribute to maintaining the integrity of aquatic ecosystems by influencing the timing and delivery of sediment, organic matter, and woody debris to streams; providing root strength for channel stability; and providing shade and thermal regulations to streams. Because of the importance of riparian systems to the integrity of aquatic ecosystems that support aquatic habitat, appropriate delineation of RCAs during project analysis and implementation is critical. Recent studies about the structure and dynamics of riparian zones have extended the scope of understanding about this landscape attribute and have important management implications for streams, riparian areas, and adjacent uplands (Spence et al. 1996, Quigley and Arbelbide 1997). Riparian conservation areas allow specialists to determine the level of analysis that best suits the needs of a project based on potential effects, baseline conditions, management direction, and issues. Riparian conservation areas define the type and levels of management actions that are suitable within or adjacent to RCAs. Riparian conservation areas establish a network of refugia that promotes the conservation of aquatic species while preserving and restoring riparian

function and ecological processes. Riparian conservation areas will help to reduce the threats associated with the factors of decline in riparian condition and contribute to the comprehensive recovery and restoration strategy for listed fish species and their habitats.

Although RCAs are currently applied during project planning and implementation, Alternatives B, C, and D, includes more appropriate direction for future management and restoration of these areas. Proposed forestwide direction includes specific standards associated with RCAs:

> **FW-STD-RIP-01:** When RCAs are intact and functioning at desired condition, management activities shall maintain or improve that condition. Limited short-term effects from activities in the RCAs may be acceptable when they support long-term benefits to the RCAs and aquatic resources.
>
> **FW-STD-RIP-02:** When RCAs are not intact and not functioning at desired condition, management activities shall include restoration components that compensate for project effects to promote a trend toward desired conditions. Large scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site specific project analyses.

These standards require specialists to evaluate the function and condition of RCAs during project planning. Based on this information, specialists can determine the level of analysis required for riparian areas that best suits the needs of a project. The direction also defines the type and level of management actions that are suitable within or adjacent to RCAs. The direction would ensure that RCAs provide a network of refugia that promotes the conservation of aquatic species while preserving and restoring riparian function and ecological processes.

Conservation and Restoration Watersheds

As described in the "Affected Environment" section of this document, subwatersheds were characterized as having conservation or restoration characteristics as a function of watershed condition ratings and native salmonid presence and level of persistence. Conservation watersheds contain excellent habitat, water quality, and strong populations of native fish species. Restoration watersheds may have degraded habitat conditions, water quality limitations, depressed populations of native fish species, or a combination of the above, but have a relatively higher potential for improvement.

All the action alternatives include a forestwide desired condition that states "Conservation watersheds provide habitats that can support population strongholds of federally listed and sensitive species. Conditions in restore watersheds (see glossary) improve to support population strongholds." (FW-DC-AQH-03) Based on desired conditions and language provided for in the definitions of these strategies, conservation and restoration subwatersheds would have a relatively higher priority for the protection or restoration of listed fish species, sensitive species, monitoring, future multi-scale analyses, and expansion and re-colonization of aquatic dependent species into habitats in adjacent subwatersheds.

These conservation and restoration areas should provide a level of protection and identify areas that have a relatively higher need for restoration of native species and water quality limited drainages. These areas serve to reduce the risks associated with factors of decline and contribute to the recovery and restoration of aquatic species, their habitats, water quality, and other aquatic resources. Land management in these priority subwatersheds are designed to complement other

recovery/restoration plans and build on actions already taking place to recover species and improve the condition of water bodies that do not support designated beneficial uses.

Restoration activities implemented under the draft Forest Plan should be prioritized based on the presence and sensitivity of native fish species and subwatershed functional rating. This restoration prioritization approach formulates the template for recovery and restoration by applying the appropriate restoration approach (active or passive) and prioritization for subwatershed restoration to all subwatersheds within their respective subbasins across the Forest, thereby providing an efficient means to promote restoration activities and recovery of aquatic species and improvements in water quality and aquatic habitats. Watershed restoration is designed to facilitate the recovery of watershed functions and related physical, biological and chemical processes that promote recovery of riparian and aquatic ecosystem structure and function and benefit native aquatic species. Proposed watershed restoration in the draft Forest Plan includes both passive and active components to achieve aquatic and riparian desired conditions depending on the opportunities provided for in different Management areas such as MA1b (recommended wilderness) and MA6 (general forest).

Active restoration is the direct manipulation of ecosystems to re-establish or facilitate the improvement of selected ecosystem processes. It is generally applied through the use of integrated treatments strategically located and implemented at the watershed scale. Active restoration relies on identifying and treating root causes that have contributed to the loss of aquatic ecosystem health. Treatments that address several ecosystem characteristics can influence the desired trajectory of conditions at a subwatershed scale. It may be impossible to achieve former (pre-human disturbance) conditions through restoration; however, it is desirable to restore ecosystem patterns and processes to support native species even if the best that can be achieved is a facsimile of a former condition. Selection of high priority restoration subwatersheds considers the extent of habitat degradation and the degree to which their natural diversity and ecological processes are retained. Active restoration activities consider and complement recovery plans for fish, other riparian dependent species, and water quality. Active restoration opportunities would be more prevalent in designated areas such as MA6 (general forest).

Passive restoration relies on the implementation of guidelines, other sources of design criteria (e.g., Forest Service Manual and Handbook direction) and best management practices to maintain watershed processes and aquatic habitat conditions and allow for natural rates of recovery. Because passive restoration primarily maintains current conditions, active restoration is often needed to move a degraded system toward recovery. Passive restoration opportunities would be more prevalent in MAs such as 1b and 1c that have wilderness characteristics.

To be successful at restoration it is important to have solid linkages to other plans (e.g., Montana State Wildlife Conservation Plans, Federal Recovery Plans, State water quality plans) and strong working relationships with other land owners and stakeholders. Watershed scale restoration is an interdisciplinary effort and necessitates close coordination between multiple resource programs, watershed councils, adjacent landowners, and other stakeholders and partners. Cooperation with land owners and interested parties such as watershed councils, state agencies, tribes, and conservation districts, can result in large benefits and returns on investments because mutual priorities and opportunities are identified and resources can be pooled to accomplish conservation and restoration actions. Direction in the draft Forest Plan that provides for this restoration component can be found in FW-DC-AQS-03 and 04.

Active restoration opportunities will be pursued whenever possible, and considered in the context of existing budget levels and other land management priorities. Draft Forest Plan direction will be applied to these priority areas and merit special consideration of their values during the planning and implementation of project level management actions.

As the draft Forest Plan is implemented, there is an anticipated shift in the amount of active restoration towards conservation condition as habitats improve; and restoration components in the Plan move subwatersheds from a rating of "moderate" or "high" towards a rating of "low" and native species move in to those improved habitats.

Watershed, soil, riparian, and aquatic habitat conditions under Alternative B are expected to improve more rapidly than under Alternative A or C, as a reflection of the current trend in reductions of timber harvest activities, associated ground disturbance, as well as proposed direction in the draft Forest Plan. For example, forestwide direction common to all action alternatives are designed to improve watershed condition (FW-OBJ-WTR-01 and 02); protect soil conditions, soil quality, and maintain soil productivity (i.e., FW-GDL-SOIL-01, 02, 03 and 04); restore riparian and aquatic habitats (FW-STD-RIP-01 through 04, and FW-OBJ-AQH-01 through 03).

Threatened, Endangered, and Sensitive Species

Alternative B: Due to the protection and restoration measures outlined in the draft Forest Plan, it is anticipated that these species will show a more rapid improvement than under Alternative A or C. As an example, statements FW-DC-AQS-04 and 05 describe desired conditions for bull trout and objective FW-OBJ-AQS-01 seeks to improve the condition of subwatersheds rated as "moderate" or "high."

Alternative C: Populations of these species are anticipated to show improvements under Alternative C, but those improvements will be achieved more slowly than other alternatives as a result from more passive restoration opportunities in MA1b.

Alternative D: Populations of these species are anticipated to show improvements under Alternative D, and may be achieved more rapidly than other alternatives as a result from more potential for active restoration opportunities in land MA6 (general forest).

Management Indicator Species (MIS)

Alternatives B: The macroinvertebrate assemblage, used to indicate the condition of water quality and aquatic habitat conditions across the entire planning unit, is expected to improve. Measures in the draft Forest Plan that emphasize macroinvertebrates include direction such as FW-DC-AQS-01 and FW-OBJ-AQH-02.

Alternative C: Given the passive restoration nature of Alternative C, it is expected that the assemblage diversity will improve, but at a slightly slower rate than Alternative B or D.

Alternative D: Given the active restoration nature of Alternative D, it is expected that the assemblage diversity will improve, but at a more rapid rate than Alternative C.

Effects of Management Area Direction

MA1b: Alternative C proposes more recommended wilderness (MA1b) and in order to retain the wilderness characteristics of those areas there would be an overall improvement to watershed, soil, riparian and aquatic habitat conditions. Although there

are anticipated improvements, these benefits would be realized through more passive restoration activities and could actually be more slowly attained than A, B, or D, because of limited opportunities for active restoration.

MA6: Under Alternative D, there could be relatively more improvement in watershed, soil, riparian, and aquatic habitats, relative to Alternatives A, B, or C. This interpretation is based on the fact that there is more land area allocated to MA6 (general forest), which increases the possibility of more land management activities, it does not preclude as much potential active restoration opportunities associated with those activities as do the other alternatives. In other words, more activities are expected, allowing for more protection and restoration opportunities related to watersheds, soils, riparian and aquatic habitats and species.

Consequences to Watersheds, Soils, Riparian, and Aquatic Resources from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Roads

General Effects

Roads have the potential to affect aquatic ecosystems and aquatic organisms through several direct and indirect pathways; and to modify natural drainage patterns which often lead to accelerated erosion of road surfaces and associated cut and fill slopes. This can lead to increased sediment delivery to streams. Excess fine sediment can fill interstitial spaces in gravels and cobbles, which reduces available habitat for aquatic macroinvertebrates. In addition, this fine sediment reduces the quality of spawning gravels for salmonids and can ultimately reduce reproduction. Excess sediment can also reduce the quantity and quality of pool habitats. Roads can affect stream channels directly if they are located on active floodplains or directly adjacent to stream channels. For example, a road located adjacent to a stream can be a chronic source of sediment. If the road changes the morphological characteristics of the stream, this can set forth a chain reaction of channel adjustments that can result in accelerated bed and bank erosion, which produces excessive sediment.

Roads can result in changes in channel morphology, especially at road crossing locations. Poorly placed roads can encroach on stream channel and floodplain areas. Many older roads were constructed very close to stream channel areas, often in the floodplain. Often streams were straightened to accommodate road routing. Sometimes roads capture flow out of the channel and can result in stream re-routing down the road. Unpaved roads are the most common source of sediment to streams on NFS lands. Excessive sediment loading often leads to changes in channel morphology because of pool filling, widening of the channel, and making the channel shallower. These types of changes in channel morphology are reflected in changes in width to depth ratios, number of pools, pool depth, bank angle, and amount of undercut bank. Roads can permanently affect wetlands by interrupting natural flow paths and reducing vegetation. Roads can be a source of invasive weed species. Road crossing locations often create migration barriers to fish and other aquatic species, thereby fragmenting habitat.

Roads result in a form of semi-permanent vegetation removal. Roads in riparian areas create a loss of riparian vegetation which can influence the amount of solar radiation, water temperature regimes, and amount of wood available for recruitment into the stream ecosystem. Loss of riparian vegetation can influence the amount of solar radiation reaching a water body and

increase water temperatures. These changes can ultimately lead to shifts in dissolved oxygen and pH. In addition, removal of riparian vegetation can increase nitrate levels which can increase the biological activity in water. Greater temperature fluctuations (diurnal and seasonal) can also occur when riparian vegetation is removed or decreased. The addition of nutrients in the stream ecosystem and reduced wood recruitment can affect the physical processes that create habitat complexity, such as deep pools and material available for hiding cover.

Road systems can change a natural hydrologic regime by altering natural flow patterns, particularly on hill slopes, thereby reducing infiltration and increasing surface runoff and may desynchronize flow regimes. Where a dense road network is well connected to the stream network, it can be an "extension" of the actual stream network. This can result in a more rapid delivery of water to the mouth of a watershed during snow melts and storm events, which can increase peak flows. Wetlands may be easily dewatered by road intersections that increase drainage efficiency in those areas allowing for a conversion to upland plant communities or facilitate exotic plant invasion.

Alternative A – No-action Alternative

Recent activities have helped to improve soil and aquatic resource conditions through changes in road and travel management. Forest roads that are maintained on an annual basis are typically those roads that have the most administrative and visitor use. Roads that have been closed or receive limited visitor use have re-vegetated to some degree, or have been decommissioned. During the last several years, many roads that are graded have had new surfacing such as gravel or oil to reduce the rate of road deterioration and subsequent erosion from road surfaces (INFISH RF-2 and RF-3). Several roads have been moved out of riparian areas or decommissioned, and culverts installed or removed at stream crossings that were contributing sediment directly to the aquatic ecosystem or impeding passage of aquatic organisms (INFISH RF-4 and RF-5). Although there have been improvements in the overall road network, roads and stream crossings will continue to provide affects to the soil and aquatic ecosystem. Maintenance, closure, and decommissioning of roads is expected to continue at similar levels or slightly decreased levels compared to more recent management.

Alternatives B, C, D

Forestwide direction common to all action alternatives will lead toward improvement regarding the effects of roads on watersheds, soils, riparian, and aquatic habitat and species.

As described under "General Effects," roads are a key contributor to watershed condition (see also appendix E). FW-OBJ-WTR 01 and 02, aim to remove or mitigate risk factors; including roads, to improve watersheds and water quality.

The desired condition for access includes a transportation system that has minimal impacts on watersheds, riparian areas, and aquatic species including threatened, endangered, and sensitive species (FW-DC-AR-07).

FS-OBJ-AQH-03 aims to reconnect fragmented habitat in streams to increase the distribution of aquatic and riparian associated species. Road crossings are a primary cause of habitat fragmentation; therefore, forestwide direction promotes reducing the effects of roads on fragmented habitat.

Regular road maintenance and decommissioning or placing roads into intermittent stored service is an access objective (FW-OBJ-AR-03). Project-level design criteria directs that roads that are

decommissioned, or put into storage, be treated to make them hydro logically stable in order to avoid futures risks to watershed conditions (FW-GDL-WTR-02).

Opportunities for road construction are greatest under Alternative D as it contains the most acres of MA6 (general forest), and least under Alternative C, which contains the most acres of recommended wilderness (MA1b), and backcountry (MA5)[1], which only allows for temporary road construction under limited circumstances.

Effects from Timber Harvest and Prescribed Fire

General Effects

Riparian vegetation removal influences channel morphology through increased potential sediment delivery to water bodies, reduced large wood recruitment, and subsequent changes in pool depth and complexity. Fire along streambanks and shorelines can result in variable amount and distribution of ground exposure. Moderate to light severity fires generally have little influence on riparian vegetation and ground litter removal, and subsequent surface erosion. Severe fires may remove virtually all riparian vegetation and ground cover, and result in soil erosion and sedimentation to nearby water bodies and loss of important transitional habitats for aquatic species such as amphibians and insects. Loss of riparian vegetation can influence the amount of solar radiation reaching a water body and increase water temperatures. Greater temperature fluctuations (diurnal and seasonal) can also occur when riparian vegetation is removed or decreased.

Timber harvest has the potential to cause accelerated erosion, primarily through construction of temporary roads and skid trails. Timber harvest can also affect flow regimes by reducing evapotranspiration, interception, and snow accumulation patterns; and by increasing soil moisture and surface runoff. Use of wildland fire for multiple objectives and prescribed fire can affect flow regimes by reducing evapotranspiration, interception, and snow accumulation patterns; and by increasing soil moisture and surface runoff. Timber harvest directly adjacent to wetlands can reduce shade, raise water temperatures, and reduce the potential for recruitment of woody material. In the short term, 2 to 3 years, prescribed fire can reduce vegetation upstream and around wetlands. This can cause delivery of sediment and nutrients from burned areas, as well as recruitment of woody material. Prescribed fire can also reduce the evapotranspiration demands and make more water available for wetlands. Over the long term, greater than 2 to 3 years, prescribed fire is expected to improve riparian condition, if applied to meet site specific riparian management objectives.

Alternative A – No-action Alternative

Timber harvest is prohibited in RCAs except in specific situations, including when it can be used as a tool to improve riparian vegetation conditions (INFISH TM-1). Projects that use prescribed fire should be designed to improve riparian condition (INFISH FM-4).

A variety of timber harvest treatments; such as clearcut, partial cut, selection cut, and shelterwood, have occurred in the past and most of those harvest units have been stocked, re-vegetated as a result of natural succession, or a combination of both. Historically, areas such as

[1] This MA allows temporary road construction based on the May 28, 2010 - Secretary's Memorandum 1042-155 - Authority to Approve Road Construction and Timber Harvesting in Certain Lands Administered by the Forest Service, and the June 18, 2010 - Secretary's Re-delegation of Authority for Certain Activities in Inventoried Roadless Areas.

skid trails, temporary roads, and cutting units include riparian vegetation removal or were constructed close to stream channels, localized sedimentation and temperature increases are likely to have occurred. Overall soil productivity and impacts to water quality and aquatic habitats may have occurred from past vegetation treatments, but natural recovery and improvements in present and future management techniques has mitigated or improved conditions of these resources.

Alternatives B, C, D

Forestwide direction for all action alternatives aspires to protect watersheds, soils, riparian, and aquatic habitat and species from detrimental effects due to timber harvest and prescribed fire. As restoration activities trend vegetation towards desired conditions, watershed health is expected to improve. FW-DC-WTR-01 emphasizes the protection of water quality during all management activities. FW-STD-WTR-01 ensures that source water areas for public water supplies are protected from ground-disturbing activities, including timber harvest and prescribed fire.

Desired conditions for soils include maintaining soil productivity and hydrologic function (FW-DC-SOIL-01), as well as minimizing effects and recovering areas that have incurred detrimental disturbance (FW-DC-SOIL-02). Restoring soil productivity on these areas is a forestwide objective (FW-OBJ-SOIL-01). Project-level design criteria contain direction to protect soils during vegetation treatment, such as timber harvest and prescribed fire (FW-GDL-SOIL-01, 02, 03, 04). FW-GDL-RIP-06 minimizes effects to RCAs by limiting ground based logging equipment; while FW-GDL-RIP-05 protects peatlands from management activities that disturb soil, vegetation, above and below groundwater flows, and/or water chemistry. Such activities include timber harvest and prescribed fire.

Opportunities for more intensive types and amounts of timber harvest are greatest under Alternative D because it has the most acres in MA6 (General Forest), which allows for timber production (scheduled on a rotation basis). Alternative C is expected to have the least intensive timber harvest opportunities because it has the most MA1b (recommended wilderness, which does not allow timber harvest of any kind), and MA5 (backcountry, which only allows for limited timber harvest based on the May 28, 2010 - Secretary's Memorandum 1042-155 - Authority to Approve Road Construction and Timber Harvesting in Certain Lands Administered by the Forest Service, and the June 18, 2010 - Secretary's Re-delegation of Authority for Certain Activities in Inventoried Roadless Areas) combined. More effects to watersheds, soils, riparian, and aquatic resources are generally expected with more intensive timber harvest (Alternative D) and less effects in Alternative C, with effects from Alternative B being in between. The forestwide direction common to all alternatives is in place to minimize these effects and protect these resources regardless of alternative.

There are no differences among action alternatives for prescribed fire opportunities because prescribed fire is an allowable activity in all MAs whose acres differ between alternatives.

Effects from Recreation

General Effects

Permanent development and campground facilities in riparian areas can result in sediment increases to nearby streams, loss of stream bank vegetation, and reduced water infiltration. Associated human activities such as off highway vehicle use on trails and stream bank trampling can also decrease ground cover and increased soil disturbances. Direct effects to channel morphology include the loss of pool volumes, habitat complexity, and decrease in the size of

stream channel substrate. Recreation use (primarily ATV use) can cause soil compaction and loss of vegetation in wetlands and/or directly adjacent to them. This can reduce sub-surface water flow and increase surface runoff. Increases in surface runoff may contribute sediment to streams and associated aquatic habitats, depending on the proximity or connectedness to the hydrologic network. Facilities can be similar to roads in terms of potential effects. Facilities can permanently affect wetlands by interrupting natural flow paths and reducing vegetation.

Alternative A – No-action Alternative

Motorized recreation is a growing concern as use increases and off-road vehicle technology improves. Off highway vehicles are becoming more powerful, have better suspension, and better traction than ever before. With the advent of improved technology, visitors will be able to access areas previously unavailable to off-highway vehicles, which may contribute cumulatively to effects on soils and aquatic resources. Off-road vehicle use is anticipated to increase even more into the future, as populations increase. Along with this increased use there may be an associated increase in effects to soil and aquatic resources. Past impacts from recreation trails and developed recreation sites have likely contributed to effects on soil and aquatic dependent resources.

INFISH (USDA Forest Service 1995) directs recreation facilities, including trails and dispersed sites, to be located in a way that avoids adverse effects on riparian and aquatic resources, including relocating or closing sites that degrade riparian and aquatic habitats (INFISH RM-1). This direction also includes adjusting recreation practices that adversely affect riparian and aquatic resources (INFISH RM-2). The Travel Management Rule designates routes and areas for wheeled motorized travel. Motor vehicle use off designated roads and trails and outside designated areas is prohibited by 36 CFR 261.13. The implementation of the Travel Management Rule will decrease effects of off-highway vehicles on soils and aquatic resources by eliminating cross country travel.

Alternatives B, C, D

The protections from INFISH and Travel Management Rule direction described under Alternative A are also common to all action alternatives.

The objective common to all action alternatives for dispersed recreation sites will benefit riparian and aquatic resources by improving conditions through interpretation and education, by implementing human waste management techniques, and physically improving sites at heavily used areas near water on the KNF (FW-OBJ-AR-01). Desired conditions for access and recreation include completing and implementing motor vehicle use designations (FW-DC-AR-08), which will meet INFISH RM-2 by moving off-road vehicle use away from riparian and aquatic resources.

Current management and future trends in recreation management are likely to include relocation of trails and developed sites away from streams and riparian areas, in order to meet the intent of the draft Forest Plan to protect water quality and aquatic habitats.

Effects from Mining

General Effects

Mining directly adjacent to wetlands, or within streams or floodplains that are connected to wetlands, can reduce water availability/flow, sedimentation, and/or pollution. Mining of the stream channel causes direct increases of sediment. As equipment dredges stream channels,

water flow immediately transports material downstream. In addition, placer mining can cause bank erosion from equipment use and loss of riparian vegetation. Loss of riparian vegetation through mining activities can influence the amount of solar radiation and water temperature regimes. These changes can ultimately lead to shifts in dissolved oxygen and pH. In addition, removal of riparian vegetation can increase nitrate levels which can increase the biological production in water.

Alternative A – No-action Alternative

INFISH contains several standards and guidelines for minimizing effects of mining on riparian and aquatic resources (INFISH MM-1-6).

Alternatives B, C, D

Additional protection from effects of mining to riparian and aquatic resources is found in the forestwide direction common to all action alternatives, which includes the following standard: Unless necessary for reclamation of a site, mine waste (waste rock, spent ore, tailings) and mining facilities shall be located outside of RCAs and managed to prevent impacts to RCAs and aquatic resources. Mine waste shall be stabilized to prevent sedimentation and release of acid or toxic materials to aquatic and riparian environments (FW-STD-RIP-04). These protections would reduce the potential adverse effects from mining on soil and aquatic resources.

Effects from Dams and Diversions

General Effects

Dams and diversions can change the streamflow regimes, alter sediment transport through aquatic ecosystems, and affect water chemistry. Water released from the bottom of a reservoir is often much colder than natural streams and contains high concentrations of nutrients. Diversions can create changes in water chemistry by altering the temperature regime. Usually, smaller volumes of water tend to heat up faster than larger volumes. Higher water temperatures result in increased biological activity and decreased dissolved oxygen. These changes can often result in a different composition of aquatic biota downstream of a dam. Types of changes are a function of how a particular dam is operated to achieve power generation and flood control goals. If a dam is operated for power generation, flows often fluctuate on a daily basis (ramping) for peak power demand. Annual floods are often “buffered” by dams and their reservoirs, resulting in smaller annual floods. Diversions change flow regimes simply by making less water available, particularly during the summer months. Dams interrupt sediment transport in streams and rivers, and can change availability of sediment in two ways: (1) Immediately downstream of dams, there is a deficiency of sediment which can cause channel degradation and accelerated bank erosion. These effects are variable and can be seen several miles downstream of a dam. (2) Dams also can cause channels to aggrades or “fill with sediment” because they reduce the frequency and magnitude of floods. Removal of water from streams during a substantial part of the year reduces the volume of water (energy) available to transport the sediment load, and this can result in aggradations downstream of the structure. Dams and diversions often create barriers to migrating aquatic species.

Alternative A – No-action Alternative

INFISH direction for dams and diversions is included in standards and guidelines (INFISH LH-1, LH-2).

Alternatives B, C, D

In addition to INFISH direction, forestwide direction common to all action alternatives includes desired conditions and objectives to protect or minimize effects from dams and diversions. Flow conditions that fully support beneficial uses and meet the ecological and habitat needs of aquatic species; and provide for natural water and sediment conveyance as well as overall channel maintenance are supported in the desired conditions (FW-DC-WTR-02 and 03; FW-DC-RIP-02). Connectivity between waterbodies to support migrating aquatic species is a desired condition (FW-DC-AQH-02) and is an objective (FW-OBJ-AQH-03). While most dams on the KNF are stressors that are not under Forest Service control, cooperation and coordination with state agencies, federal agencies, tribes and other groups may be used where possible to achieve upward trends of aquatic species (FS-DC-AQS-03), such as through connection of habitat around dams and diversions. There are no differences among action alternatives for dams and diversions because their construction is an allowable activity in all MAs whose acres differ between alternatives.

Effects from Livestock Grazing

General Effects

Livestock grazing near streams can result in changes in channel morphology (Belsky et al. 1999). Livestock trailing, chiseling, and general soil displacement along stream bank areas can result in collapse of undercut bank areas and an overall increase in bank angle, loss of bank cover, and stream widening along the entire stream reach. Over long-periods of time grazing can lead to the entire channel becoming down-cut to the point that a gully forms and a new channel is formed at the bottom of the gully. This type and extent of down-cutting results in an entire channel type change. Livestock trampling and hoof chiseling along streambanks can increase ground exposure, surface erosion, and increased sedimentation. Concentrated livestock waste can cause eutrophication of lakes and ponds. Livestock grazing directly in wetlands or immediately adjacent to them can cause soil compaction, hummocking, and loss of vegetation. This ultimately inhibits sub-surface water flow.

Removal of riparian vegetation through livestock management can influence the amount of solar radiation and water temperature regimes. These changes can ultimately lead to shifts in dissolved oxygen and pH. In addition, removal of riparian vegetation can increase nitrate levels which can increase the biological production in water. Loss of riparian vegetation can influence the amount of solar radiation reaching a water body and increase water temperatures. Greater temperature fluctuations (diurnal and seasonal) can also occur when riparian vegetation is removed or decreased. Livestock grazing has the potential to cause increased sediment delivery through trampling of stream banks and by removal of riparian vegetation.

Alternative A – No-action Alternative

Livestock grazing is a minor component of management on the planning unit and would continue to occur across all MAs. Although livestock grazing is not a large management component on the Forest, there may be localized effects of past management. Livestock management has only slightly changed since the last planning period and livestock stocking rates are less than historical levels.

INFISH standards and guidelines that protect or minimize effects to riparian and aquatic resources from livestock grazing include modifying grazing practices, locating new facilities

outside of RCAs, relocating or closing facilities, and limiting livestock handling efforts (INFISH GM-1, 2, and 3).

Alternatives B, C, D

Opportunities for more grazing are higher under Alternative B and D than Alternative C, because C has more acres of recommended wilderness (MA1b), which does not allow grazing. It is unlikely that grazing will increase under any alternative because of the lack of non-transitory range land on the KNF.

As allotment management plans are revised and incorporate forestwide direction common to all action alternatives (i.e., FW-GDL-RIP-02, and INFISH), these revisions will improve soil and water quality conditions within allotments for all action alternatives.

Effects from Fire Suppression

General Effects

Long term fire suppression causes forest successional processes to continue which can evapotranspiration and interception, potentially resulting in less water available for wetlands. In many cases, lack of fire can lead to the encroachment of woody species (primarily shrubs) into peatland habitats, which could lead to competitive exclusion of herbaceous species. Suppression of natural fire regimes causes fuel loads to accumulate. When wildfire does occur, the intensity and severity are often higher than they would be with more natural levels of fuel. This can result in higher rates of fuel consumption and availability of ash and nutrients that can be delivered to aquatic environments. Suppression of natural fire regimes results in forests that have more trees and associated leaf area. This results in higher evapotranspiration and interception levels, which leaves decreased amounts of water available for surface and sub-surface flow. Lower levels of stream flow can affect the aquatic species as a result of warmer water temperatures and changes in water chemistry. In addition, fire suppression can allow fuels to accumulate above natural levels, which can cause wildfires to burn more severely. This process can change infiltration characteristics of the soil and change hydrologic characteristics. Fire suppression activities, such as retardant use and drafting water from streams, can also affect riparian and aquatic resources.

Alternative A – No-action Alternative

INFISH standards and guidelines contain direction on fuel treatment and fire suppression strategies (INFISH FM-1), locating fire suppression centers for incident activities outside of RCAs (INFISH FM-2), avoiding delivery of chemical retardant to surface waters (INFISH FM-3), and immediately establishing emergency teams to rehabilitate areas significantly damaged by wildfire (INFISH FM-5).

Alternatives B, C, D

In addition to protections provided by INFISH direction, forestwide direction common to all action alternatives included guidelines to minimize effects to RCAs from fires suppression activities through the implementation of minimum impact suppression tactics (FW-GDL-RIP-03); as well as to protect fish and aquatic organisms while drafting water by screening pumps and locating intakes away from spawning gravels (FW-GDL-RIP-04).

Cumulative Effects

Soil and aquatic dependent resources are greatly influenced by all activities occurring within the Forest boundaries and can be a good indicator of large scale cumulative effects. Nearly all

activities proposed in the draft Forest Plan have the potential to affect soils and aquatic dependent resources. Land management activities that disturb the soil surface have the greatest potential, and risk, of adverse effects. Risk increases with proximity or connectivity to the stream network and riparian habitats. Mitigation of the cumulative effects to soil and aquatic dependent resources is controlled through management direction provided for in the draft Forest Plan and also through the use of best management practices and other watershed conservation practices at the project level. These practices will minimize the risk for ground disturbing activities to have far reaching impacts to soil and aquatic resources by controlling the timing and location of these activities. Management activities on the Forest that may cumulatively affect water quality are: roads, vegetation management, recreation, livestock grazing, and mining.

The cumulative effect of these activities and uses will continue to be expressed by aquatic organism populations as a result of improvements in the quality of aquatic habitats. Fish populations and other aquatic dependent species will be maintained and are likely to increase, within the Forest boundary, as stream and riparian conditions are improved through restoration activities (although stochastic events such as disease, climate changes, natural disturbances, or aquatic nuisance species will continue to have population effects beyond the control of management activities).

Climate Change

Effects of climate change on watershed processes and aquatic ecosystems in the West, including western Montana, are described in detail in the KIPZ Climate Change Report (USDA Forest Service 2010). The paper concludes that the way to reduce impacts from climate change is to increase the resiliency of watersheds and forests to the changes in disturbance regimes that result from climate change. This synthesis suggests that the way to increase resiliency of watersheds is to maintain and restore watershed processes and aquatic ecosystems.

The following section is excerpted from the KIPZ Climate Change Report:

Over the last 50 years, average spring snowpack (April 1 snow water equivalent) has declined and average snowmelt runoff is occurring earlier in the spring. These trends are observed for northwestern Montana, the entire Pacific Northwest, and much of the western U.S. Since the available data is limited to the last 50 years, it is not clear whether these trends are persistent long-term trends or reflect short-term decade-to-decade variability that may reverse in coming years. Several recent studies of the same trends across the entire western U.S. have concluded that natural variability explains some, but not all, of the west-wide trend in decreasing spring snowpack and earlier snowmelt runoff.

Potential changes in streamflow and rising stream temperatures are likely to increase risks to maintaining existing populations of native cold-water aquatic species. Over the last century, most native fish and amphibians have declined in abundance and distribution throughout the western U.S., including northwest Montana. It is unknown whether, or to what degree, these changes are attributable to climate trends. Potential climate-induced trends of altered streamflow timing, lower summer flows, and increased water temperature will likely reduce the amount, quality, and distribution of habitat suitable for native trout, and contribute to fragmentation of existing populations. Climate related impacts are likely to add cumulatively to other stressors on native fish and amphibian species. Non-native trout and other aquatic species better adapted to warm water temperatures may increase in abundance and expand their existing ranges.

These climatic and hydrologic trends, combined with climate-related trends in wildfires and forest mortality from insects and diseases, can significantly affect aquatic ecosystems and species (Dunham et al. 2003, Casola et al. 2005, Dunham et al. 2007, Isaak et al. 2010). A growing body of literature has linked these hydrologic trends with impacts to aquatic ecosystems and species in western North America, often as a result of climate-related factors affecting stream temperatures and the distribution of thermally suitable habitat (Peterson and Kitchell 2001, Morrison et al. 2002, Bartholow 2005, Kaushal et al. 2010, Isaak et al. 2010). Lower summer streamflows and higher air temperatures, as observed over recent decades in northwestern Montana, are generally expected to result in increased stream temperatures. However, stream temperatures are controlled by a complex set of site-specific variables; including shading from riparian vegetation, wind velocity, relative humidity, geomorphic factors, groundwater inflow, and hyporheic flow (Caissie 2006).

Potential impacts to fish include:

- Egg incubation and fry emergence may be adversely affected due to flood flows, dewatering, and/or water temperatures. Shifts in the timing and magnitude of natural runoff will likely introduce new selection pressures that may cause changes in the most productive timing or areas for spawning.
- Spring/summer rearing may be adversely affected due to reduction in stream flow and higher water temperatures.
- Overwinter survival may be positively affected by higher winter water temperatures enabling fish to feed more actively, potentially increasing growth rates if sufficient food is available. If food is limited, the elevated metabolic demands could reduce winter growth and survival.

Bull trout is the native trout species most vulnerable to potential increases in stream temperatures because it has the coldest range of thermally suitable habitat among native salmonids in the Northern Rockies. For this species, increasing stream temperatures may cause a net loss of habitat because areas are not available further upstream to replace those that become unsuitably warm. For rainbow trout, which tolerates warmer stream temperatures than bull trout and is often limited by upstream temperatures that are too cold, warming may only shift suitable habitats toward higher elevation stream reaches with little or no net change in total amount of thermally suitable habitat (Rieman and Isaak 2010). Cutthroat trout in high-elevation streams currently are commonly limited by low water temperatures and short growing seasons (Coleman and Fausch 2007, Harig and Fausch 2002). These populations may benefit from climate-induced increases in thermally suitable habitat in higher elevation stream reaches (Rieman and Isaak 2010). However, warmer stream temperatures may also lead to nonnative fish and other aquatic species moving into previously unsuitable upstream areas where they will compete with native species (Rieman et al. 2007, Rahel and Olden 2008, Fausch et al. 2009, Haak et al. 2010)

Projected increases in air temperatures, along with projected decreases in summer stream flows, will likely lead to warmer stream temperatures in the Columbia River basin, particularly during summer low flow periods (Casola et al. 2005). Recent scientific publications suggest that projected air temperature changes are likely to reduce the distribution of thermally suitable natal habitat for bull trout, fragment existing populations, and increase risk of local extirpation (Rieman et al. 2007, Isaak et al. 2010). However, the risk of climate-induced extirpation in subbasins of northwestern Montana may be less than other, relatively drier and warmer, subbasins in the Columbia River basin (Rieman et al. 2007).

Other recent publications conclude that westslope cutthroat trout, which can generally tolerate warmer stream temperatures than bull trout, is at a low risk for increasing summer stream temperatures in most basins within its range, including the Clark Fork, Coeur d'Alene, and Kootenai basin of northwestern Montana (Haak et al. 2010). These studies also conclude that stream temperature impacts resulting from projected climate-change-induced increases in wildfire extent and severity posed a moderate or high risk of cutthroat trout extirpation in 46 percent of occupied subwatersheds throughout the species' occupied range. However, wildfire posed a moderate or high risk to cutthroat trout in only 3 percent of subwatersheds in the Coeur d'Alene and Kootenai basins, but 45 percent of subwatersheds in the Clark Fork Basin (Haak et al. 2010).

Kootenai River white sturgeon, spawn in May or June in water temperatures around 8-9°C and cease to spawn at 12°C (Paragamian et al. 2001). Under future scenarios of warming water temperatures and reduced summer flows, there is a possibility that the white sturgeon may be stimulated to spawn earlier than the May-June period. This may actually be advantageous for white sturgeon for both egg incubation/survival as well as flow/velocity requirements for successful recruitment (ISAB 2007).

Haak et al. (2010) conclude that risks to native trout resulting from projected increases in winter flood risk in north Idaho and northwestern Montana are greater than risks associated with climate-induced changes in wildfire, drought, or stream temperatures. They estimate that cutthroat trout in most subwatersheds in the Clark Fork, Coeur d'Alene, and Kootenai basins face high to moderate risk of increased winter flooding (Haak et al. 2010).

Terrestrial Wildlife

Introduction

The KNF provides a great variety of wildlife; which includes almost 300 species of birds, from the calliope hummingbird to the bald eagle, and more than 50 species of mammals, from the little brown bat to the grizzly bear. Many of the species that exist today on the KNF were present before European settlement. An example of a recent species introduction is the Merriam's turkey. The AMS Technical Report (USDA Forest Service 2003) provides a list of species known to occur in the Forest. Using information gathered during the revision process, this species list was updated to reflect appropriate changes (additions, deletions, and modifications).

Legal and Administrative Framework

Law and Executive Orders

- **The National Forest Management Act (NFMA) of 1976:** The NFMA states that the Secretary shall "promulgate regulations," under the principles of the Multiple-Use Sustained-Yield Act of 1960, to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the Plan" (P.L. 94-588, Sec. 5 (g)(3)(B)).
- **Sikes Act of 1960:** Forest Service policies recognize that state agencies and Indian tribes are responsible for the management of animals and assign national forests a role in cooperatively managing wildlife habitat.
- **The Migratory Bird Treaty Act of 1918:** Addresses concerns for migratory birds. In a subsequent MOU 2001, with the USFWS, the Forest Service agreed to: (a) incorporate migratory bird habitat and population objectives and recommendations into the agency planning process, in cooperation with other governments, state, federal agencies, and non-federal partners; (b) strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent the further loss or degradation of remaining habitats on NFS lands.
- **The Endangered Species Act of 1973, as amended:** Provides requirements for federal agencies with regard to species listed under the act. Section 2 states that ". . . all federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this act." Section 5 directs the Secretary of Agriculture to "establish and implement a program to conserve fish, wildlife, and plants," including federally listed species. Section 7 directs federal departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats.

Regulation and Policy

- **Forest Service policy included within FSM 2670:** States that regional sensitive species will be identified and management taken to ensure that these species do not trend toward federal listing as a result of management actions.
- **The USDA policy:** For wildlife, fish, and plant habitat management in NFS lands is presented in Departmental Regulation 9500-4. This policy states that by means of the

planning process habitat goals will be established for plants and animals, including wildlife and fish species in demand for hunting, fishing, and trapping and those with special habitat needs. This regulation also directs the Forest Service to: (a) manage habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species; (b) conduct activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species; and (c) avoid actions which may cause a species to become threatened or endangered.

- **Additional requirements for wildlife were also identified and included in the 1982 Planning Procedures:** Which directs the Forest Service to (a) estimate the effects of changes to wildlife habitat; (b) consult with biologists from other agencies; (c) consider access and dispersal problems of hunting, fishing, and other uses; (d) evaluate the effects of pest and fire management; and (e) select management indicator species to be monitored.

Key Indicators

- Changes in forest composition, structure, and pattern; and
- Security habitat (nonmotorized areas).

Analysis Area

In general, the analysis area for wildlife includes all lands managed by the KNF; however, for the purposes of this document it may include segments outside NFS boundaries. In some cases NFS lands may provide all or a high percentage of the habitat for a given species; however, in most instances, wildlife generally move from area to area and habitats on NFS lands may be critical to a species survival. Management for various wildlife species and habitats is analyzed, measured, and monitored at a variety of scales: timber stand, watershed, district, species recovery area, and forest.

The draft Forest Plan would have fewer MAs (7) than the 1987 Plan (23); they would be much larger and would generally follow distinguishable features on the landscape. Management direction for wildlife habitats and species in the draft Forest Plan would be included in Forest- and Management-wide desired conditions, objectives, standards and guidelines, and incorporated into all land management activities. Additional direction can be found at the geographic area level.

Methodology and Analysis Process

Included in this analysis were threatened or endangered species, sensitive species, and MIS. Threatened or endangered species for the KNF includes Canada lynx and grizzly bear. In 2011, the Region 1 Sensitive Species list was amended. Proposed terrestrial MIS for the KNF include Rocky Mountain elk, and a landbird assemblage (insectivores).

Chapter 2 of the AMS Technical Report discusses ecological sustainability and one of its primary components, ecosystem diversity. The wildlife revision topic in the AMS Technical Report discusses management under the "coarse" and "fine" filter approaches and briefly discusses wildlife in terms of specific species.

The AMS discusses changes in management strategies that have taken place over time, including: new perspectives, ecosystem management, biodiversity, and fragmentation. In recent times, management of NFS lands has emphasized fuel reduction, reducing the risk of fire and the designation of the WUI under the Healthy Forest Restoration Act and the Healthy Forests

Initiative. Management strategies associated with these activities have the potential to impact wildlife habitats.

Providing for ecological diversity is a critical step in comparing the current abundance and condition of various habitats with ecological reference conditions (HRV) based on our knowledge of the past and on our understanding of ecological processes (e.g., fire, flooding, insects, and disease). The companion approach to ecosystem diversity (coarse filter) is the "fine filter" approach in which conservation strategies are used for individual species or groups of species to contribute to species diversity. The fine filter approach narrows the focus to those species that require habitat that may be outside the range of variation. In addition, there are species whose populations have been reduced to levels requiring special management considerations (e.g., species listed as threatened, endangered, or sensitive).

A variety of sources was used to determine historic and existing vegetative conditions on the KNF. The development of management recommendations for the draft Forest Plan to maintain or restore ecological communities was based on the HRV and desired future condition (see “Vegetation” section of this EIS). Movement toward the HRV or desired conditions for vegetation under the draft Forest Plan would provide for an array of ecological communities of sufficient size, structure, and distribution that is expected to maintain habitats for the vast majority of native species that occur on the Forest.

Population changes can occur when there is a change in habitat (e.g., reduction in density, loss, fragmentation, or habitat made inaccessible). However, fluctuations in species populations will occur even when there has not been a change in habitat. These fluctuations may be due to climatic changes, disease, predation, excessive harvest, competition or displacement from exotic species, and other factors not related to habitat changes. For migratory species, a change in population may not represent changes in local forest habitat conditions. Many species migrate at different times of the year and are influenced by activities or conditions that occur outside the Forest.

Management activities may include short- and long-term habitat loss. Timber harvest and associated activities can result in habitat changes that last for 30 to 100 years, depending on the successional stage impacted. In late successional stands, these changes could last over 100 years. The major factor in the decline and/or loss of wildlife species is a loss of suitable habitat, which can produce a related decline/loss in population levels. The draft Forest Plan would strive to provide management direction that would continue to provide for species diversity (see below for individual or group discussions specific to draft Forest Plan direction).

For more detailed information on methodology see the Wildlife Specialist Report.

Terrestrial Wildlife Habitat

This section provides a brief overview of wildlife habitat and a discussion on connectivity and fragmentation on the KNF. More detailed information related to terrestrial wildlife habitat and species can be found in the Wildlife Specialist Report.

Approximately 93 percent of the NFS land on the KNF is classified as being forested. The KNF is one of the most diverse and productive forests found within the Inland Northwest, largely due to a relatively moist and warm climate as well as the presence of forest soils that are often “capped” with a layer of volcanic ash. The most abundant dominance groups on the KNF are the Douglas-fir and subalpine fir mix and each of those groups occupy over 24 percent of the forest

acres. The ponderosa pine and western white pine are the rarest groups on the KNF with each occupying approximately 3 percent or less (see “Vegetation” section, figure 7). As indicated by figure 8 of the “Vegetation” section, the medium and small size classes occupy the greatest amount of the forested area on the KNF, at approximately 30 and 27 percent, respectively. The large and seed/sap size classes occupy lower amounts of the forested lands, approximately 23 percent, and 20 percent respectively. Although there are exceptions, in general, stands in the seed/sap size class range from 0 to 40 years old. Stands in the small and medium size classes, range in age from 40 to 70, and 70 to 100 years old, respectively. Stands in the large size class are generally 100 years old or older.

Vegetation conditions have a direct relationship to wildlife habitat. The “Vegetation” section describes current and desired vegetation composition, structure, density, and pattern and predicted effects by alternative. It includes a discussion on the affected environment and environmental consequences for old growth and snags, which are habitats for some species. It also includes a description of current and desired vegetation conditions by biophysical setting. Movement of vegetation towards desired condition provides the necessary habitat for species. Those alternatives that do the best job of moving towards desired condition (Alternatives B and C) would provide the best overall habitat conditions for wildlife. See the “Vegetation” section for specific information.

Affected Environment – Connectivity and Fragmentation

Connectivity is the arrangements of habitats that allow organisms and ecological processes to move across the landscape. A “well-connected” landscape enables organisms to readily move among habitat patches over the long term. Fragmentation is the loss of connectivity across the landscape and is a substantial threat to many species, especially those that are smaller or less mobile. Fragmentation occurs when large blocks of habitat are broken into smaller parcels by natural (e.g., wind throw) or human induced (e.g., roads or timber operations) forces. As habitat is lost or fragmented, residual habitat patches become smaller and more isolated from each other. This limits the movement of species, and through their increased isolation, puts them at greater risk of extirpation. Open spaces left by fragmentation can act as travel barriers for some species, or increase the risk of predation for other species that venture across them.

Connectivity can take several forms; from linear corridors; to stepping stones of suitable habitat; to managing the landscape as a whole so that movement is facilitated without the need for a "corridor." Connectivity is species specific, and what is considered homogenous habitat for a wide-ranging carnivore can be heterogeneous for a small mammal (p. 164-166 in Morrison 2002). High-volume roads can create a barrier that degrades habitat connectivity. These roads can cause mortality, prevent movement, change habitat near the roadway, and alter animal behavior (p. 505-506 in Clevenager and Wierzchowski 2006). As described in Hilty et al. 2006, "Connectivity is determined (1) by the distances between patches relative to an organism's ability to travel, (2) by the quality of the patches themselves, (3) by the hospitality of the matrix that must be traversed, and (4) by the presence of corridors or paths of less resistance for these movements" (p. 146 in Hilty et al. 2006). On the KNF, vertical stand structure, size class, stand density, vegetative species, composition, and pattern play a vital role as landscape linkages because they provide functional connectivity habitats.

The NFMA regulations provide that habitat must be “well distributed” so that "individuals can interact with others in the planning area."

The KNF is contiguous with the IPNF to the west, Canada to the north, the Flathead National Forest to the east, and the Lolo National Forest to the south. Wildlife and natural ecosystem processes occur irrespective of political boundaries. On the KNF, connectivity of vegetation has been influenced to varying degrees by road construction, ski area development, timber harvest, wildfire, utility corridors, and land ownership. Construction of primary roads (maintenance level 3 through 5) and highways (200, 2, 56, and 37) has reduced connectivity of patches to some degree. In addition, roads may also serve as dispersal routes for some wildlife and plant species.

There is one small ski area on the KNF (Turner Mountain) with no likely addition of other ski areas. This ski area has had minimal impacts on connectivity or patch size due to its small size.

Utility corridors can impact connectivity and increase the amount of edge created. There are eleven existing electric transmission lines on the KNF. All of the lines, except for one, are a part of the northwest power transmission grid and are interconnected. All of the lines are of two sizes, 115kv and 230kv.

Railroads also can create barriers to wildlife movement, such as the railroad that parallels the Kootenai River.

Land ownership and the associated management of it can also have an effect on connectivity. Land managed to differing intents can create more edge or affect patch size. Private development, especially in winter range, can lead to a loss of connectivity.

Changes to connectivity have largely been associated with roads. Just prior to the time the Plan was approved in September 1987, about 27 percent of the NFS roads had either yearlong or seasonal prohibitions in effect (1987 Forest Plan FEIS, page IV-51). The Plan projected that in order to provide the issue resolution desired, about 57 percent of the roads would eventually need some form of prohibition. This would be about double the miles of road with prohibitions at the time the Plan was approved. The assumption was that the number of new roads needed to harvest timber would increase significantly, and that they would all have prohibitions in effect when the timber sales were completed; the net result being an increase in the number of miles of road with prohibitions but the number of miles of roads without prohibitions would remain the same. The need for additional prohibitions was to protect dispersed recreation values, provide for wildlife security in big game winter and summer range, reduce road maintenance costs, and provide for grizzly bear recovery. Because of the significant increase in the amount of miles of road under prohibitions needed (from 27 percent to 57 percent), it was assumed that it would take about 10 years to accomplish. This is about an 11 percent increase each year to reach the planned level.

By FY 97, the objective of having prohibitions on approximately 57 percent of the Forest's roads (Forest Plan p. II-10) was achieved. By 2002, the percentage of existing roads with either yearlong or seasonal prohibitions reached 63 percent. In 2004, the percentage stabilized at 63 percent and continued to be stable through 2007. It has increased to 65 percent in 2009. Table 29 shows this progression. The roads with prohibitions are both yearlong and seasonal. The percentage of roads with prohibitions is 8 percent greater than estimated, and the total amount roads without prohibitions are 1,699 miles less than was estimated in the 1987 Forest Plan. This is partly a result of the fact that new road construction was less than anticipated due to reductions in the timber sale program. Prohibitions have been placed on roads that previously had no prohibitions (which were not anticipated to have prohibitions in the Forest Plan) and on newly constructed roads. The reasons for these unanticipated prohibitions include additional wildlife

habitat security measures, to decrease potential sedimentation, and to improve hydrological conditions.

The trend over the last five years is that the number of roads where motor vehicle use is prohibited, either yearlong or seasonally, has risen slightly (approx. 86 mi.).

Table 29. Forest Roads Access Restrictions

Fiscal Year	Total Miles of Road	Total Miles of Road with Prohibitions	Percent of Total Roads with Prohibitions	Total Miles of Road without Prohibitions	Difference in Miles of Road without Prohibitions since FY87
1987	6,200	1,669	27%	4,530	0
1992	7,149	3,784	53%	3,365	(1,165)
1997	7,460	4,275	57%	3,185	(1,345)
2002	7,954	4,982	63%	2,934	(1,596)
2004	7,916	4,971	63%	2,945	(1,585)
2006	7,908	4,968	63%	2,940	(1,590)
2007	7,888	4,983	63%	2,905	(1,645)
2008	7,886	5,030	64%	2,856	(1,674)
2009	7,888	5,057	65%	2,831	(1,699)

* National Forest System roads only, where motor vehicle use is prohibited either yearlong or seasonally.

The 1987 Forest Plan contained direction for connectivity, generally in terms of providing travel corridors for big game. In many cases, these travel corridors were simply timbered stands, approximately 150-300 feet wide, which occurred between regeneration harvest units. The importance of connectivity has been addressed in various recovery plans (grizzly bear in 1993), the Interagency Grizzly Bear Guidelines (1986), various biological opinions, and the NRLMD (USDA Forest Service 2007).

Several analyses (Servheen et al. 2003, American Wildlands 2008, Ruediger and Lloyd 2003, Mattson 2004, as well as others) have been conducted by various entities, including federal and private, to address connectivity. The Forest reviewed the various analyses that have been completed and conducted an analysis of forest conditions in relation to providing for wildlife movement within and across the forests (see project files). Management areas such as wilderness and others (recommended wilderness, wilderness study area, IRAs) that allow for limited motorized route densities and have low levels of development are considered to provide higher quality habitats for such use.

Table 30 lists the 1987 Forest Plan MAs that are nonmotorized or have very few roads. Backcountry or semi-primitive motorized/nonmotorized (MA2 and 3 in the 1987 Forest Plan) areas are generally without roads and are in unsuitable timberlands. These areas vary in size (300 to 22,000 acres) and management activities are generally less intensive, less frequent, and less visible than management activities in other MAs. Few improvements, with the exceptions of trails, are provided. Higher levels of wildlife security are provided and water quality and aquatic health are normally good to excellent within these areas.

Table 30. Existing Acres (87 Plan as Implemented) of Management Areas 2, 3, 7, 8, and 9

Management Area	Description	Existing Acres
MA2	Semi-primitive nonmotorized	302,800
MA3	Semi-primitive motorized	13,400
MA7	Existing Wilderness	93,500
MA8	Recommended Wilderness	76,500
MA9	Montana Wilderness Study Area	34,100

Inventoried roadless areas on the KNF account for 28 percent of the land base. Under the 1987 Forest Plan, 257,000 acres (or eleven percent of NFS lands) of the IRAs allow for road construction and road reconstruction, and 265,000 acres don't allow for road construction/road reconstruction (twelve percent of land base).

The AMS documented how traditional timber harvest strategies had changed the Forests from historical conditions. The range of patch sizes was significantly smaller following harvest activities and post-harvest conditions were often similar. While prescribed fire has the potential to approximate certain natural ecological conditions and processes, it is often applied on a much smaller scale and with less variability in severity than wildfires.

There has been a significant reduction in the overall number of wildfires compared to historical conditions, although in recent decades the acres contained in large fires has increased and become more variable. Low and mixed-severity wild fires have essentially been eliminated as a significant disturbance process. Most high-severity fires have also been successfully suppressed. It has been recognized; however, that the overall suppression of wildfires has increased fire risk in certain forest types; producing unusually severe effects, particularly in drier forests. The suppression of fires has contributed to the overall effect of changes in landscape pattern (more homogeneity across the landscape), and changes in species composition (e.g., increases in species that are shade tolerant, fire and drought intolerant, and trees that are more susceptible to insects and disease).

Interrelated with the suppression of fires, was the associated change in insect and disease activities that have occurred. Insects and diseases are now the dominant disturbance process on the KNF. Particularly susceptible are those trees that have benefited from fire exclusion (shade tolerant/drought and fire intolerant species). Certain insects/diseases that historically thinned the forest at regular intervals now occur as stand replacing disturbances (e.g., root diseases and Douglas-fir bark beetles). Furthermore, white pine blister rust has substantially reduced the amount and changed the age-class structure of five needle pines (e.g., western white pine and whitebark pine) throughout the Forest.

Environmental Consequences – Connectivity and Fragmentation

Alternative A – No-action Alternative

Under current management (Alternative A), it is more likely that most fires would be suppressed and, therefore, negatively impact connectivity for a variety of species. The NRLMD, FSEIS 2011, and INFISH (USDA Forest Service 1995) apply under all alternatives, including the connectivity portions. Managing for connectivity for lynx would benefit other species that need similar conditions, including other wide-ranging carnivores. This alternative would retain the

existing amount of recommended wilderness and nonmotorized areas. Large areas with limitations on motorized use can aid in connectivity of wildlife populations. Alternative A is more likely to result in continued suppression of most fires and, therefore, less passive restoration/maintenance of habitat pattern.

Alternatives B, C, and D

All three action alternatives trend vegetative conditions towards desired conditions (FW-DC-VEG-01 through FW-DC-VEG-08, FW-DC-VEG-10 and 11, FW-STD-VEG-01 and 02, FW-GDL-VEG-01 through 06, and FW-DC-FIRE-03), which are based on HRV and natural disturbance processes. The vegetative conditions under natural disturbance processes would be similar to what species on the Forest would have evolved with. The difference between the alternatives is primarily how much vegetative treatment is predicted each year to trend conditions toward the desired conditions for vegetation. Alternative C (15,740 acre/yr) has the most active restoration followed by Alternatives B (15,689 acre/yr), D (14,833 acre/yr), and A (5,294 acre/yr) under constrained budgets. With an unconstrained budget, Alternative B (16,148 acre/yr) has the most active restoration followed by Alternatives C (15,987 acre/yr), D (14,214 acre/yr), and A (5,527 acre/yr). Approximately 10,000 acre/yr of prescribed burning is predicted under the action alternatives, with very little or none in Alternative A. Of the alternatives, C (1,741 acre) would be expected to have more regeneration treatments per year under constrained budgets in the first decade, followed by D (1,660 acre), A (1,641 acre) and then B (1,595 acre). Of the alternatives, D (5,353 acre) would be expected to have more regeneration treatments per year under unconstrained budgets in the first decade, followed by A (4,812 acre), B (3,128 acre) and then C (2,983 acre).

Large areas with limitations on motorized use can aid in connectivity wildlife populations. Alternative C (1,515,400 acres wheeled motorized, 1,761,000 acres over-snow motorized) would have the least acreage allowing motorized use, followed by Alternatives B (1,659,100 acres wheeled motorized, 1,865,100 acres over-snow motorized), A (1,677,200 acres wheeled motorized, 1,961,200 acres over-snow motorized), and D (1,817,700 acres wheeled motorized, 1,939,700 acres over-snow motorized). All alternatives have the same acreage of wilderness (MA1a, 93,700 acres). Alternative C (214,800 acres) has the most land in recommended wilderness (MA1b), followed by Alternatives B (110,200 acres), A (76,500 acres), and D (36,100 acres). Both MA1a and MA1b do not allow over-snow motorized use.

The Forest Service EIS for grizzly bear access (USDA Forest Service 2011) applies to all alternatives and reduces road densities, and over time, will improve conditions for a variety of species with regard to connectivity.

Given the predicted amounts of harvest, active restoration would have little impact on habitat pattern at the forest scale compared to the potential impacts of fire use. The use of fire for resource benefit (passive restoration) has a much greater likelihood of maintaining or improving habitat pattern across the Forest. Alternative A (current Forest Plan as implemented) is more likely to result in continued suppression of most fires and, therefore, less passive restoration/maintenance of habitat pattern. The use of wildfire for resource benefit (passive restoration) is more likely in MA1, and Alternative C (342,600 acres) has the most MA1, followed by B (238,000 acres), A (204,300 acres equivalent to MA1), and D (163,900 acres). Fire may also be used more in MA5 compared to MA6, and Alternatives C (477,900 acres) and B (477,500 acres) have more than D (278,000 acres).

The increased use of fire, both wildfire and prescribed fire, would maintain or improve the pattern of connectivity habitat across the Forest. As described above in the "Forestwide Direction" section, managing for the desired conditions for vegetation (HRV) would likely result in a pattern of connectivity habitat similar to what was found historically under natural disturbance processes.

Key Stressor(s): Forest Service activities that may have effects on connectivity include vegetation/fire management (timber harvest, fuels reduction, fire suppression, noxious weeds, grazing, etc); access and disturbance.

Management Direction: Direction in the draft Forest Plan that aids in providing security habitat or areas with lower disturbance that can contribute to connectivity include:

- FW-DC-AR-06, 07; FW-DC-WL-02 through 05; FW-STD-WL-02 through 03; and FW-GDL-WL-10.

A desired condition for the KNF (FW-DC-WL-17) is to work cooperatively with other agencies when there is a proposal to build or improve highways bisecting the KNF. The management of KNF lands near future crossing structures would be the same for all action alternatives (FW-DC-WL-17, FW-GDL-WL-13 through 15).

Geographical Area direction that is specifically directed at maintaining or improving connectivity includes:

- GADC-WL-BUL-01; GADC-WL-CLK-03; GADC-WL-FSH-01; GADC-WL-KOO-02; GADC-WL-LIB-01; GADC-WL-TOB-01, 02; and GADC-WL-YAK-01.

Connectivity of lynx habitat is incorporated into the existing Plan through the NRLMD (FW-STD-WL-01). Additional direction related to INFISH (FW-STD-RIP-03) and riparian areas (FW-STD-RIP-01 and 02) also contribute to connectivity for terrestrial wildlife species that utilize these areas.

MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01. This would be useful to maintain/restore connectivity in the long-term.

Wilderness areas, recommended wilderness areas and inventoried roadless areas, as well as other nonmotorized areas contribute to secure habitat and connectivity for some species. These areas are generally in more rugged terrain that was historically difficult to log and therefore no roads were built there. These areas also have less human disturbance because of the limits on motorized use:

- MA1a-STD-AR-01 and 03; MA1b-STD-AR-01; MA1b-STD-AR-03 and 04; MA1c-STD-AR-03 and 04; MA1a-DC-WL-01; MA1b-DC-WL-01; MA1c-DC-WL-01; FW-STD-WL02 and 03; FW-GDL-WL-10; MA3-DC-WL-01; MA5abc-DC-WL-01

Terrestrial Wildlife Species

With more than 300 species on the KNF, it is impossible to track them all, so certain groups are carried forward in this EIS. Landbirds are of interest not only for wildlife viewing but also

because of the international interest in conservation and the protection afforded them through the Migratory Bird Treaty Act and Executive Order 13186. Threatened and endangered species are considered because of the requirements of the ESA. Northern Region sensitive species or their habitat found on the KNF is discussed in detail. These species are used to help insure continued diversity and viability of species as required in NFMA and 36 CFR 219.19 and 219.26. Management indicator species are required under 36 CFR 219.19.

This section provides an overview of key species and their habitats on the KNF, describes current management related to terrestrial wildlife habitat and relevant policies. More detailed information related to terrestrial wildlife species can be found in the Wildlife Specialist Report.

The following species accounts or groups are divided into four sections: threatened and endangered species; Forest Service sensitive species; MIS and migratory birds. Table 31 lists the threatened, endangered and candidate, MIS, and sensitive species considered for this section.

Table 31. Wildlife species on the Kootenai National Forest that are Federally Listed Species or Candidate for listing under the ESA, Management Indicator Species, or Forest Service Sensitive Species

Species Common Name (*Scientific name*)	Federal T&E Listed Species	Federal Candidate Species	Management Indicator Species	Forest Service Sensitive Species
American peregrine falcon (*Falco peregrines*)				X
Bald eagle (*Haleaeitus leucocephalus*)				X
Bighorn sheep (*Ovis Canadensis*)				X
Black-backed woodpecker (*Picoides arcticus*)				X
Canada lynx (*Lynx Canadensis*)	X			
Chipping sparrow (*Spizella passerine)*			X	
Common loon (*Gavia immer*)				X
Dusky flycatcher (*Empidonax oberholseri)*			X	
Flammulated owl (*Otus flammeolus*)				X
Fisher (Martes pennanti)				X
Gray wolf (*Canis lupus*)				X
Grizzly bear (*Ursus arctos horribilis*)	X			
Hairy woodpecker (*Picoides villosus)*			X	
Hammond's flycatcher (*Empidonax hammondii)*			X	
Harlequin duck (*Histrionicus histrionicus*)				X

Species Common Name (*Scientific name*)	Federal T&E Listed Species	Federal Candidate Species	Management Indicator Species	Forest Service Sensitive Species
North American Wolverine[1] (*Gulo gulo luscus*)		X		X
Northern bog lemming (*Synaptomys borealis*)				X
Olive-sided flycatcher (*Contopus borealis)*			X	
Rocky Mountain Elk (*Cervus Canadensis nelson*)			X	
Townsend's big-eared bat (*Corynorhinus townsendii*)				X

1 Discussed under sensitive species

Threatened and Endangered Species

The KNF is home to two threatened species (Canada lynx and the grizzly bear) and one Federal candidate species (wolverine). The wolverine is discussed in the "Sensitive Species" section of this chapter.

Affected Environment – Canada Lynx

Lynx in the conterminous U.S. are at the southern margins of a widely-distributed range across Canada and Alaska. At the present time, there are inadequate methods available to develop lynx population estimates in all of the six core areas (northwestern Montana/northeastern Idaho, Greater Yellowstone Area, Kettle/Wedge, northern Cascades, northern Minnesota, and northern Maine/northern New Hampshire). As a result, the USFWS has concluded that it is not practicable, at this time, to establish demographic criteria for delisting the species (Recovery Outline, Page 14, USDI Fish and Wildlife Service 2005).

Exact lynx population numbers are unknown for the Forest, although the relative density is fairly high (http://fieldguide.mt.gov/ accessed on 3/2/11). Lynx are known to occur throughout the KNF, based on historic and recent trapping records. Research is currently being conducted throughout the region, including the KNF (Squires et al. 2003) to capture and radio collar lynx in the Purcell Mountains. From 2003 to 2005, 25 individual lynx were captured and collared.

Lynx linkage areas have been identified (Claar et al. 2003) and are intended to maintain connectivity and allow for movement of animals between blocks of habitat that are otherwise separated by intervening non-habitat areas such as basins, valleys and agricultural lands, or where habitat naturally narrows due to topographic features. There are several identified linkage areas (USDA Forest Service 2007 [NRLMD], KNF Lynx Taskforce 1997) for lynx in the analysis area.

A large portion of the recovery area for Canada lynx is also within the recovery zones for grizzly bear on the Forest. Canada lynx are afforded the security provided in the management of bear habitat in these areas. Controlling and/or managing access improves Canada lynx use by reducing the risk of displacement and poaching. With the advancement in snowmobiles and increase in winter recreation on the Forest, there has been an increase in snowmobile use throughout lynx habitat. Wheeled motorized vehicle access management strategies for grizzly bear were analyzed in the FSEIS (USDA Forest Service 2011). There will be lower levels of wheeled motorized vehicle access and an increase in the amount of core (secure) habitat, which

in turn would provide higher levels of security for lynx. Many areas of the Forest have limited accessibility for snowmobiling off-route due to tree densities and topography.

Environmental Consequences – Canada Lynx

Effects of Forestwide Direction

Alternative A – No-action Alternative

Current management for the lynx on the KNF is directed by the NRLMD (USDA Forest Service 2007). The NRLMD determined that there would be long-term benefits or maintenance of lynx habitat, although some short-term adverse effects by implementing the direction in the decision. There is less emphasis on utilizing fire for resource benefit under current management compared to the action alternatives; therefore, the likelihood of fire being utilized in its natural role of regenerating lynx habitat over time would be less under current management. Given current budgets for vegetation management, fire is more important in maintaining lynx habitat in the long-term than timber harvest.

Alternatives B, C, and D

All three action alternatives would incorporate draft Forest Plan desired conditions (FW-DC-VEG-01 through FW-DC-VEG-05, FW-DC-VEG-08, FW-DC-VEG-11, FW-GDL-VEG-03, and FW-DC-FIRE-03), for vegetation which are based on HRV and natural disturbance processes. The NRLMD shall be applied to projects on the KNF as stated in FW-STD-WL-01. Vegetative conditions, under all action alternatives, would be maintained or improved for lynx and their prey in the long-term. The difference between the alternatives is primarily how much vegetative treatment is predicted each year to trend conditions toward vegetation desired conditions. Alternative C would have the most active restoration followed by Alternatives B, D, and A under constrained budgets (table 32). With an unconstrained budget, Alternative B) would have the most active restoration followed by Alternatives C, D, and A (table 32). Approximately 10,000 acres/yr of prescribed burning is predicted under the action alternatives, with very little or none in Alternative A. Of the action alternatives, D would be expected to have more regeneration treatments, followed by B and then C. The primary constituent elements of critical habitat that are under the influence the KNF management would be maintained or improved under the action alternatives.

Table 32. Acres of Active Restoration by Alternative for Constrained and Unconstrained Budgets

Active Restoration Acres/Year	Alternative			
	A	B	C	D
Constrained Budget	5,294	15,689	15,740	14,833
Unconstrained Budget	5,527	16,148	15,987	14,214

Pattern (size and arrangement of habitat patches) is addressed through the desired conditions for vegetation and fire (FW-DC-VEG-05). Other draft Forest Plan elements for vegetation and fire desired conditions that address pattern for all action alternatives would include FW-DC-VEG-01 through FW-DC-VEG-04, FW-DC-VEG-08, FW-DC-VEG-11, FW-GDL-VEG-03, and FW-DC-FIRE-03. The desired conditions are based on HRV and natural disturbance processes, which mean the pattern of lynx habitat across the Forest, would be similar to what would have been present under natural disturbance processes. FW-DC-FIRE-03 would allow for the use of

wildland fire in achieving vegetation desired condition. Given the predicted amounts of harvest, active restoration would have little impact on habitat pattern at the forest scale compared to the potential impacts of fire use. The use of fire for resource benefit (passive restoration) would have a much greater likelihood of maintaining or improving habitat pattern across the Forest. Alternative A (current Forest Plan as implemented) would be more likely to result in continued suppression of most fires and, therefore, less passive restoration/maintenance of habitat pattern. The use of wildfire for resource benefit (passive restoration) would be more likely in MA1; Alternative C has the most MA1, followed by B, A (acre equivalent to MA1), and D. Fire would also be allowed as a management tool in MA5 and Alternatives C and B have more than MA5 than Alternative D (table 33).

Table 33. Acres of Management Area 1 and 5 by Alternative

Management Area	Alternative			
	A	B	C	D
MA1a	93,700	93,700	93,700	93,700
MA1b	76,500	110,200	214,800	36,100
MA1c	34,100	34,100	34,100	34,100
MA1 - Total	**204,300**	**238,000**	**342,600**	**163,900**
MA5a	343,800	227,600	336,700	112,600
MA5b		163,800	121,200	47,900
MA5c	n/a	86,100	20,000	117,500
MA5 - Total	**n/a**	**477,500**	**459,900**	**278,000**

Draft Forest Plan direction to improve conditions for lynx on the Forest would include FW-DC-WL-01 (would protect known den sites) and desired condition stated in FW-DC-WL-03 (would help ESA listed species trend towards recovery).

Effects of Management Area Direction

Alternative A would retain the existing amount of recommended wilderness and nonmotorized areas. Although lynx are generally tolerant of human disturbance (p. 1-12 and 2-6 in Ruediger et al. 2000), large areas with limitations on motorized use can aid in connectivity of lynx populations. Alternative C would have the least acreage allowing motorized use, followed by Alternatives B, A, and D (table 34). All alternatives would have the same acreage of wilderness (93,700 acre) (table 33, above). Alternative C has the most land in recommended wilderness, followed by Alternatives B, A, and D (table 33, above). Neither MA1a nor MA1b of the draft Plan would allow over-the-snow motorized use, which means these areas would provide lynx habitat without compacted snow due to motorized use.

Table 34. Summary of Access Availability (by acres and percent of forest) for the KNF

Alternative	Allow Wheeled Motor Vehicle Use	Allow Over-Snow Vehicle Use	Allow Mechanized Use
A	1,677,200 ac (76%)	1,961,200 ac (88%)	2,128,300 ac (96%)
B	1,659,100 ac (75%)	1,865,600 ac (84%)	2,024,500 ac (91%)
C	1,515,400 ac (68%)	1,761,000 ac (79%)	1,924,700 ac (87%)
D	1,817,700 ac (82%)	1,939,700 ac (87%)	2,100,400 ac (95%)

MA direction in the draft Forest Plan that would support expanded use of wildland fire for resource benefit and prescribed fire is included in both the "Fire" and "Vegetation" sections (see draft Plan and Specialist Report for specific Plan elements). These draft Forest Plan elements would help maintain/restore lynx habitat over the life of the Plan.

The increased use of fire, both wildfire and prescribed fire, would maintain or improve the pattern of lynx habitat across the Forest. As described above in the "Forestwide Direction" section, managing for the desired conditions for vegetation (HRV) would likely result in a pattern of lynx habitat similar to what was found historically under natural disturbance processes. MA1 and some of MA2 through 5 provide secure habitat across the Forest and contribute to maintaining lynx habitat.

Effects of Geographic Area Direction

Geographic area direction only applies to Alternatives B, C, and D because the existing Plan does not have direction for GAs or their equivalent.

Geographic area direction that improves or maintains connectivity of lynx habitat includes: GADC-WL-BUL-01, GADC-WL-CLK-03, GADC-WL-FSH-01, GADC-WL-KOO-02, GADC-WL-LIB-01, GADC-WL-TOB-02, and GADC-WL-YAK-01. These areas include linkage areas identified in the NRLMD (USDA Forest Service 2007).

Direction that improves or maintains the vegetative aspect of lynx habitat includes: GADC-VEG-CLK-01. This would provide for more diversity of habitats within the 1910 fire area.

Direction that would result in less extent of compacted snow or less disturbance includes: GADC-WL-BUL-02, GADC-WL-KOO-03, GADC-WL-TOB-01, and GADC-WL-YAK-02.

The GA direction aids in maintaining lynx habitat and connectivity across the Forest (pattern) in those areas where it would have been found under natural disturbance processes (HRV).

Effects to Key Stressors under Forest Service Control

Timber Harvest: The NRLMD applies to the existing Plan. Under Alternatives B, C, and D, FW-STD-WL-01 would be applicable. This standard states that the NRLMD would be applied. The vegetative components of the primary constituent elements of lynx critical habitat would be maintained or improved. In addition to the management direction found in the NRLMD, Alternatives B, C, and D would add another desired condition, FW-DC-WL-01, which provides direction for den sites and would minimize the chance that timber harvest related disturbance at den sites would displace lynx. Additionally, timber harvest would be a tool to achieve the desired conditions for vegetation (FW-DC-VEG-01 through FW-DC-VEG-05, FW-DC-VEG-08, and FW-DC-VEG-11) in the Plan and would maintain or improve lynx habitat. Moving conditions towards HRV in the lower elevation forests would reduce the chance of a large-scale fire, beginning in those non-lynx habitats and moving into lynx habitat. FW-GDL-VEG-03 would retain downed wood, which is necessary for lynx denning habitat.

Fire (prescribed and wildfire): The use of fire to restore ecological processes and maintain/improve lynx habitat is included in the NRLMD and applies to the existing Plan. Alternative B, C, and D would be consistent with the NRLMD with regard to using fire (implemented through FW-STD-WL-01 in the draft Forest Plan). The ecosystems in which lynx live are adapted to stand-replacing fires. That is how lynx habitat is rejuvenated over time and

how habitat mosaics are created. Lynx have evolved with fire as an integral component in shaping habitat. Although fire removes downed wood and potential downed wood (snags), it also creates downed wood and snags. Generally, denning habitat is not limiting for lynx. However, under a scenario where a key piece of denning habitat may need to be protected from a fire, part of FW-DC-FIRE-03 allows for the suppression of undesirable fires where necessary to protect key resources.

Fire Suppression: Fire and fire suppression have had a large impact on the distribution and amount of lynx habitat available on the KNF. Management under the existing Plan includes aggressive fire suppression in many instances, but also the use of fire for resource benefit (see "Fire" resource section of this document). Fire suppression leads to changes in the amount and pattern of lynx habitat across the Forest. Fire is a natural disturbance process that plays a large role in determining the quantity and distribution of lynx habitat. Fire suppression has increased the risk of a large-scale disturbance (fire) converting a broad area to unsuitable habitat in one event. The patch size of such an event would likely be larger than what would have been expected historically.

Allowing fire to play its natural role over time would potentially create smaller scale disturbances and, therefore, a mosaic of different stand ages/structures contributing to future lynx habitat. Alternatives B, C, and D have FW-DC-FIRE-03 that provides direction to allow the increased role of fire in helping trend vegetation towards desired conditions. Those desired conditions are based on HRV where fire was a natural part of the ecosystem. Lynx evolved with those conditions and consequently would have the amounts and arrangements of habitats similar to what they evolved with.

Under the draft Forest Plan there would be varying amounts of predicted active fuels reduction among the action alternatives. Alternative C (15,740 acre/yr) has the most active restoration followed by Alternatives B (15,689 acre/yr), D (14,833 acre/yr), and A (5,294 acre/yr) under constrained budgets. With an unconstrained budget, Alternative B (16,148 acre/yr) has the most active restoration followed by Alternatives C (15,987 acre/yr), D (14,214 acre/yr), and A (5,527 acre/yr). Approximately 10,000 acre/yr of prescribed burning is predicted under the action alternatives, with very little or none in Alternative A. Of the action alternatives, D would be expected to have more regeneration treatments, followed by B and then C. Alternative A (current Forest Plan as implemented) is more likely to result in continued suppression of most fires and, therefore, less passive restoration/maintenance of habitat pattern. The use of wildfire for resource benefit (passive restoration) is more likely in MA1, and Alternative C (342,600 acre) has the most MA1, followed by B (238,000 acre), A (204,300 acre equivalent to MA1), and D (163,900 acre). Fire may also be used more in MA5 compared to MA6, and Alternatives C (477,900 acre) and B (477,500 acre) have more than D (278,000 acre). Both passive and active restoration, and a general trend towards the desired conditions for vegetation under the draft Forest Plan, would aid in creating more resilient and sustainable lynx habitat. Passive restoration is a more realistic option in places such as wilderness areas. Those lower-elevation forests with a greater departure from HRV may require active restoration (mechanical treatments) before fire can be reintroduced to those landscapes. The risk of stand-replacing fire over large scales would be reduced under the action alternatives, thereby allowing patch sizes to better approximate HRV and maintain heterogeneity of stand conditions. Even where lynx habitat is within HRV, restoring lynx habitat that isn't currently providing certain habitat components to HRV would reduce the chance of a large-scale fire starting in the lower-elevation forests and moving into lynx habitat. Implementation of FW-DC-FIRE-03 is useful to maintain/improve lynx habitat conditions and allow fire to play its natural role in the ecosystem.

Further direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01.

Landscape Connectivity: Connectivity of lynx habitat is incorporated into the existing Plan through the NRLMD (USDA Forest Service 2007). In Alternatives B, C, and D, STD-WL-01 applies the NRLMD. FW-DC-WL-17 and FW-GDL-WL-12 through 14 also provide direction relative to connectivity. Crossing structures would be developed through interagency cooperation and NFS lands around those structures would be managed to maintain their function.

The vegetative components of connectivity would be managed according to:

- FW-DC-VEG-01 through FW-DC-VEG-05, FW-DC-VEG-08, FW-DC-VEG-11, FW-GDL-VEG-03, and FW-DC-FIRE-03.

In doing so, the arrangement and amount of lynx habitat, and therefore connectivity, would be similar to conditions that lynx evolved within this ecosystem. Allowing fire to play its natural role would aid in maintaining/restoring connectivity habitat to what lynx evolved with on the Forest.

Geographic area direction that provides for connectivity within the Forest, and to adjacent land ownerships (including Canada) includes:

- GADC-WL-BUL-01, GADC-WL-CLK-03, GADC-WL-FSH-01, GADC-WL-KOO-02, GADC-WL-LIB-01, GADC-WL-TOB-02, and GADC-WL-YAK-01.

Combined, all this direction would provide connectivity within the Forest and to habitats outside the Forest.

Road/Trail Maintenance and Construction: The motorized access management within the Selkirk and Cabinet Yaak Grizzly Bear Recovery Zones EIS and ROD would amend the existing Plan (FSEIS 2011). In Alternatives B, C, and D, FW-STD-WL-02 states that the FSEIS 2011 would be applied. Although this was designed to reduce road related impacts to grizzly bears, benefits would also occur for other species such as lynx. FW-GDL-WL-10 gives direction to retain security habitat for elk, and this would benefit other species such as lynx. The security areas for elk would include areas that are not within the grizzly bear recovery zone but may still be lynx habitat, providing further security habitat that may be suitable for lynx across the Forest. Direction to provide security habitat for lynx and other threatened and endangered species is found in FW-DC-WL-03. The transportation system on the Forest is to have minimal impacts on threatened and endangered species, as directed in FW-DC-AR-07. Management area direction that provides for large remote areas with little human disturbance (wilderness and roadless) include: MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01. Combined, all this direction provides secure habitat for lynx across the Forest.

There would be no difference in the specific roads or trails open to wheeled motorized use between the alternatives. The acres available for cross-country wheeled motorized use would also not change. There is a difference in the acreage where roads/trails may be designated for

wheeled motorized use. Alternative D (1,817,700 acre) would have the most acres available in that regard, followed by Alternatives A (1,677,200 acre), B (1,659,100 acre), and C (1,515,400 acre). The acreage available for over-snow vehicle use would be greatest under Alternative A (1,961,200 acre), followed by Alternatives D (1,939,700 acre), B (1,865,600 acre), and C (1,761,000 acre). Mechanized use would be allowed on more acres in Alternative A (2,128,300 acre), followed by Alternatives D (2,100,400 acre), B (1,865,600 acre), and C (1,924,700 acre). However, not every acre is accessible due to terrain and vegetation.

The more acres available for these type of uses, the greater the chance of disturbance to individual lynx. However, there would be habitat available on the Forest where motorized use would not occur or some uses would be restricted; including wilderness, roadless, and nonmotorized backcountry. Thus, lynx would have acres available with less human presence, with the greatest amount under Alternative C, followed by Alternative B, then D and A.

The NRLMD applies to the existing Plan and includes direction related to roads and recreation, including snow-compacting activities, which are designed to maintain or improve lynx habitat. In Alternatives B, C, and D, FW-STD-WL-01 states that the NRLMD would be applied. In this way one of the primary constituent elements of lynx critical habitat, which is light, deep snow would be maintained.

Recreational Use: The direction listed above for road/trail maintenance and construction would also reduce impacts from recreation. Recreational use is generally dependent on a road and trail system to facilitate access. Although lynx are generally tolerant of human presence, disturbance may be great enough to cause displacement of individual cats in some circumstances. FW-STD-WL-02 and 03, GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01 create and maintain large, remote security habitats that are likely to have a lower amount of recreational use due to the difficulties of access. Therefore, areas with lower recreational use would be available across the Forest for lynx to use.

Mining: The NRLMD applies to the existing Plan and contains direction related to mineral projects in lynx habitat. Alternatives B, C, and D would be consistent with that direction (implemented through FW-STD-WL-01). The NRLMD includes direction on limiting snow compaction and impacts to lynx habitat.

This stressor would generally be mitigated at the project level, such as through the large mitigation plans developed for Montanore, Rock Creek, and Troy Mine. Mitigation may include restrictions on the placement of facilities, the timing of activities, or even the purchase of mitigation lands to offset impacts on NFS lands. Direction in the Plan that would prompt the development of site-specific mitigation includes FW-DC-WL-03 which states that populations of threatened and endangered species trend towards recovery and that habitat is available on NFS lands for occupation. Den sites would be protected through FW-DC-WL-01. Depending on the individual project circumstances, the haul/supply route could have substantial traffic and may impact connectivity. If so, then FW-DC-WL-17 and FW-GDL-WL-12 through 14 would provide direction for maintaining connectivity and applies not only to highways, but also to high-use Forest roads such as a haul/supply route.

Effects of Other Permitted Activities

Effects from Grazing

The NRLMD applies to the existing Plan and contains direction related to grazing in lynx habitat, Alternatives B, C, and D would be consistent with that direction (applied through FW-STD-WL-01). Grazing has limited impacts on lynx habitat on the KNF because of the relatively small amount of grazing that occurs (table K-7 in appendix K of the NRLMD FEIS displays the number of allotments per forest with lynx habitat). Of the 43 remaining allotments on the Forest, 26 are vacant and one is inactive. Twenty-seven allotments contain lynx habitat, of which 17 are active.

The rangeland suitability analysis identified 921,700 acres capable of grazing on the KNF. There are approximately 149,000 acres on the KNF that are suitable for livestock grazing. This represents about seven percent of the KNF, but not all of that is within a lynx analysis unit or even lynx habitat.

Grazing that negatively impacts hardwoods may impact lynx prey species habitat diversity. However, the desired condition in the draft Forest Plan for grazing in Alternatives B, C, and D is that it occurs at sustainable levels while protecting resources such as wildlife habitat and riparian integrity (FW-DC-GRZ-01). Trending towards or maintaining that desired condition would reduce the likelihood of grazing impacting lynx prey habitat under the action alternatives.

Effects from Lands/Special Uses

The NRLMD applies to the existing Plan and contains direction related to special uses in lynx habitat. Alternatives B, C, and D would be consistent with that direction (implemented through FW-STD-WL-01). The NRLMD includes direction on ski area expansion, concentrating uses to reduce snow compaction, and maintaining habitat connectivity. Special uses, such as ski areas, can remove lynx habitat and impact connectivity. On the KNF, there is only one small ski area and the impact on lynx habitat is minimal. Other special uses, such as utility lines and communication towers, occur on the KNF and may be proposed in the future. These can lead to habitat loss. Human disturbance associated with special use permits can cause lynx to avoid an area, although lynx tend to be somewhat tolerant of human presence. FW-DC-WL-01 would minimize the chance of disturbance at den sites from special use projects. To minimize the effects on connectivity, FW-DC-WL-17 and FW-GDL-WL-14 provide direction to maintain or consolidate NFS ownership of lands that provide important connectivity near highway crossing structures. This includes direction designed to maintain or improve lynx habitat that are related to special uses.

Effects from Other Forest Products

The collection of forest products as done currently would continue under Alternative A. The removal of forest products can reduce the quantity or quality of lynx habitat, although these impacts are mitigated on a project basis by limiting the amount and distribution of the product to be removed. For example, commercial post-and-pole and Christmas tree removal (essentially forms of thinning) can degrade habitat for lynx prey species, but by applying direction from the NRLMD ROD the effects to lynx are minimized (Standard VEG S5 in the NRLMD deals with the reduction of winter snowshoe hare habitat). The NRLMD applies to the current Plan, and would be applied to Alternatives B, C, and D through FW-STD-WL-01. The NRLMD discussed that effects of Christmas tree thinning and described the effects as not resulting in a loss of snowshoe hare habitat because the thinning is done on an individual tree basis, particularly

personal-use permits (p. 12 in the NRLMD ROD). The vegetative components of the primary constituent elements of lynx critical habitat would be maintained. Although lynx are somewhat tolerant of human disturbance, the presence of people collecting forest products may cause a lynx to temporarily avoid an area

Affected Environment – Grizzly Bear

Grizzly bear population ecology, biology, habitat description and relationships identified by research are described in the FWS Grizzly Bear Management Plan (FWS 1993), the Interagency Grizzly Bear Committee Guidelines (IGBC 1986), and the Final Supplemental Environmental Impact Statement Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones, USDA Forest Service, Kootenai, Lolo and Idaho Panhandle National Forests (FSEIS) (FSEIS and ROD 2011) (USDA) (2011).

Grizzly bears (*Ursus arctos horribilis*) are habitat generalists, using a variety of habitats including the coniferous forests of northwest Montana and north Idaho. Habitat is generally dictated by food availability and distribution, as well as security from human disturbance and mortality. Because grizzly bears have large home ranges, large areas of habitat are required. Grizzlies occupy low-elevation riparian areas, snow chutes, meadows, and big game winter ranges in the spring and late fall, and move up to higher sub-alpine forests in the summer, early fall and winter (Kasworm et al. 2009, Mace et al. 1996). Natural caves or excavated dens, often above 6,000 feet, are entered after the first snowfall and occupied for four to five months. A majority of their diet is composed of vegetation (forbs, sedges, grasses, roots, berries, pine nuts), but also includes fish, rodents, insects, ungulates, and carrion. Additional information on population ecology, biology, habitat description and relationships are described in the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993a) (Almack 1985, Kasworm et al. 2009, Slone 2007, Volson 1994, as cited in USDA FSEIS 2011).

The USFWS delineated recovery areas for grizzly bears in the Grizzly Bear Recovery Plan (USFWS 1993). The approximately 2,582 square-mile Cabinet Yaak Grizzly Bear Recovery Zone (CYRZ) includes portions of the KNF, IPNF, and Lolo National Forest (Kasworm et al. 2009). A minimum population estimate of 47 bears was made for the CYRZ from 2000 to 2008 with a 78 percent probability of a downward population trend (Kasworm et al. 2009). This included a minimum of 18 individuals in the Cabinet Mountains and 29 individuals in the Yaak portion of the recovery zone[1]. Conversely, rates of increase for the period from 1983 to 1998 suggested an increasing population (Wakkinen and Kasworm 2004). Human caused mortality has been a significant component in these declines and appears to be largely responsible for the decline in the rate of increase (Kasworm et al. 2009). Causes of grizzly bear mortality have generally been due to hunter mistaken identity, defense of life, poaching, and management removal due to food attractants on private land.

The goal for grizzly bear management is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. An integral part of the goal is to implement measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities. This goal is accomplished by achieving a number of measures.

[1] Proctor et al. (2007) reported a population estimate of 20 grizzlies in the Yaak Grizzly Bear Population Unit north of the international border but outside of the official Cabinet-Yaak Recovery Zone. This work was based on his 2005 DNA-based hair snare project.

The Interagency Grizzly Bear Committee Guidelines identified six recovery zones (Cascades, Bitterroots, Selkirks, Cabinet-Yaak, Northern Continental Divide, and Yellowstone) south of Canada where grizzly bears and grizzly habitat are managed for recovery, and within which population parameters are monitored (IGBC 1994, revised 1998). The recovery zones are referred to as ecosystems to emphasize the ecological rather than jurisdictional nature of their boundaries (USDI Fish and Wildlife Service 1993). The CYRZ and Northern Continental Divide Ecosystem recovery zones are within the KNF.

A small portion (roughly three percent of the total acreage) of the Northern Continental Divide Ecosystem is situated in the KNF; however, the majority is in the Flathead National Forest. The ecosystems/recovery zones are also tied to areas in Canada, with the back and forth movement of bears between the two countries.

For analysis and monitoring purposes, grizzly bear habitat within the recovery zones is further separated into BMUs, which approximate the size of a female's home range. Each BMU is monitored for various population and habitat components identified as important for recovery of the species. There are 22 BMUs in the CYRZ, and two in the KNF portion of the Northern Continental Divide Ecosystem.

Past management actions on NFS lands related to motorized access (e.g., timber sales and associated road construction, road maintenance, and watershed improvements through sediment reduction from roads – including road decommissioning) have led to the existing wheeled motorized vehicle route system on the landscape. The FSEIS (USDA 2011) established standards for core, open motorized route density and total motorized route density for each BMU in the recovery zones. Route densities include both roads and motorized trails.

The FSEIS 2011 also established timeframes in which all standards in individual BMUs in the CYRZ would be met. Actual accomplishment dates will depend on management priorities, funding, and the completion of required environmental analyses. Additional information on direction for management of the Selkirk Grizzly Bear Recovery Zone (SRZ) and CYRZ can be found in the FSEIS 2011 and associated documents.

While the focus of the standards for the FSEIS 2011 is the SRZ and CYRZ, grizzly bears occupy additional areas outside the SRZ and CYRZ. These areas are referred to as bears outside of recovery zone. There are four areas (bears outside of recovery zone polygons) on the KNF for the CYRZ (one on the IPNF). Within each polygon, baseline conditions have been established for linear miles of open roads and total roads. The FSEIS 2011 established that there will be no net increase in either open or total road linear miles above these baseline conditions.

Administrative use limitations are applied on individual roads. Direction has been established for the amount of administrative use that may occur on each individual gated road within the recovery zone, based on the bear year (spring, summer, and fall). Each district retains a count of use that occurs by road and reports that information to the USFWS.

Habitat connectivity within and between the SRZ and CYRZ has been identified as a possible factor that influences habitat (Servheen et al. 2003, Proctor et al. 2002 & 2005).

One occurrence of grizzly bear movement between the SRZ and CYRZ has been documented and another SRZ bear is suspected of moving to the Bitterroot ecosystem (Kasworm and Johnson 2008). In addition, occurrences of bear movement between the CYRZ and Northern Continental Divide Ecosystem have been confirmed (ibid). Genetic studies are on-going and at this time

incomplete. These studies have not yet determined the relationship between these three populations.

Habitat security is an important element of grizzly bear management, helping to minimize human-caused bear mortalities. Grizzly bear mortalities, both natural and human-caused, are important factors limiting the growth of bear populations in the CYRZ (USDI 1993). The mortality goal for the CYRZ is zero human-caused mortality (USDI 1993). This goal has not been reached as the number of mortalities has been exceeded since research began in the CYRZ in the early 1980s.

Legal hunting of grizzly bears no longer occurs, but grizzly bear are taken by poachers and occasionally are mistakenly killed during the black bear hunting season. As a result, Montana instituted a mandatory black bear hunter testing and certification program to help educate hunters in distinguishing species and reducing mistaken identity and, therefore, reducing grizzly bear mortalities. Black bear hunting seasons have also been shortened in recent years, reducing the potential for mistaken identity.

A number of measures have been implemented regarding sanitation measures on the KNF, including the installation of bear-resistant food storage bins and bear-resistant garbage containers in several campgrounds and other designated sites. As of 2011, the KNF has a mandatory food storage order to manage attractants in order to reduce the chance of a grizzly-human interaction.

Three human-caused grizzly bear mortalities were recorded for the CYRZ between 1982 and 1986, prior to the application of wheeled motorized vehicle access strategies (FSEIS 2011). During the next 12-year period (1987 to 1998), nine of the twelve grizzly bear mortalities were determined to be human-caused, while 27 of the 39 deaths within the last twelve years (1999 to 2010) were categorized as human-caused (K. Annis pers. comm. 2010, W. Kasworm pers. comm. 2010d, SCYE IGBC 2010 as referenced in USDA FSEIS 2011). As the grizzly bear population increased over the last 29 years, the average number of known grizzly bear mortalities per year and time period, has increased from 0.66 during 1982 to 1986, to 3.25 bears per year during 1999 to 2010[1]. Mortalities resulting from human causes averaged 0.60 bears killed per year during 1982 to 1986, to 2.25 bears killed per year during 1999 to 2010 (ibid). Most human-caused mortalities occurred during the fall season.

As stated in the Grizzly Bear Access Amendment (USDA Forest Service 2011), there is an apparent decreasing trend in mortalities occurring on NFS lands within and around the CYRZ over time. As the overall population increased over the last two decades (i.e., from an estimated 15 bears in 1993 to 47 bears in 2008) the average number of bears that died due to human causes has remained about the same, but the percentage of human-caused mortality occurring on NFS lands has dramatically decreased within each time period. Conversely, there is a corresponding increase in both of these parameters on non-NFS land. Additionally, human-caused mortality in Canada immediately north of the official CYRZ has also increased in terms of the average number of bears killed per year, with at least 21 percent of the mortality occurring there during the last two time-periods under review. Since 1999, 78 percent of the known human-caused grizzly bear mortality has occurred on non-NFS lands in this ecosystem.

[1] Wayne Wakkinen and Wayne Kasworm noted that mortality rates should be examined in context of how the overall population is faring. If the population is expanding then there are scenarios where the current mortality rate could be sustainable (SCYE IGBC 2009 as cited in USDA FEIS 2011).

Human-caused mortality on non-federal lands and in British Columbia contributed to the majority of bear deaths for the CYRZ/SRZ since 1982. To date, 73 percent (67 total deaths) of all documented human-caused grizzly bear mortalities occurred in British Columbia, on private, state, or railroad lands, or areas on the national forest that were outside of the recovery area boundaries. In the Northern Continental Divide Ecosystem, Mace and Waller (1998) found annual mortality rates for grizzly bears using rural areas and the wilderness zone were 21 and 15 times higher, respectively, than for bears using only multiple-use lands. This demonstrates that bear mortality is a function of numerous variables besides the amount and juxtaposition of motorized access alone. Some of these variables include the type and seasonality of hunting seasons, the availability of lethal attractants (human provided (e.g., garbage, agricultural products such as orchards/grain/livestock, or big game carcasses)), and the amount and juxtaposition of private property and associated development. Likewise, Schwartz et al. (2010) found that survival of grizzly bears was best explained by the amount of human development and ungulate hunting that occurred within the home ranges of bears in the Yellowstone ecosystem. Therefore, implementing wheeled motorized vehicle access management standards, even if more restrictive, would not completely remove grizzly bear mortality risk due to the presence of other risk factors such as big game hunting (including ungulate and black bear), sanitation and agricultural food attractants, and human attitudes toward the grizzly bear.

The relationship between grizzly bears and roads has been studied extensively (i.e., Aune and Kasworm 1989, Kasworm and Manley 1990, Mace and Manley 1993, Mace et al. 1996, Mace and Waller 1997, Mattson et al. 1987, McLellan and Shackleton 1988, Wakkinen and Kasworm 1997, Schwartz et al. 2010). Roads can have several effects on grizzly bears, including contributing to direct mortality from vehicle strikes. Of the 92 known human-caused mortalities that occurred within-and-around the recovery zones (CYRZ and SRZ), 70 percent (64 total) occurred near open roads (less than 500 meters), while another 15 percent (14 total) occurred in areas away from open roads (greater than 500 meters). The remaining 15 percent (14 total) human-caused mortalities were not ascribed a known distance from an open road[1] (FSEIS 2011).

As part of an effort to maintain the existing small population of bears in the Cabinet Mountains, four subadult female grizzly bears were captured in British Columbia and released into the Cabinet Mountains from 1990 to 1994 (USDI Fish and Wildlife Service 1990, Servheen et al. 1987 as cited in USDA FEIS 2011). Three of the four bears remained within the area for at least one year. The success of this initial effort resulted in additional augmentations of seven grizzly bears (six females and one male) from 2005-2010 from the North and South Fork of the Flathead River (U.S.) and the Whitefish Mountain Range (Kasworm et al. 2006, Kasworm et al. 2009, Kasworm 2009, and W. Kasworm pers. comm. 2010a, W. Kasworm pers. comm. 2010b as cited in USDA FEIS 2011). Two of the female grizzlies returned to their capture area in the Whitefish Mountains in 2010 (W. Kasworm pers. comm. 2010c as cited in USDA FEIS 2011). Augmented animals had no prior history of conflicts with humans (ibid). The success of the augmentation program is reflected in the increase in the estimated population within the CYRZ since the early 1990s.

Kasworm et al. (2009) also conducted DNA hair-snare work from 2002-2008 in order to examine the fates of the four bears transplanted into the area from the 1990-1994 effort. The results

[1] Less than 1 percent (1 total) of natural mortalities occurred within 500 meters of an open road, while another 41 percent (9 total) occurred at distances greater than 500 meters. However, most (59 percent or 13 total) natural mortalities were of an unknown distance from an open road. A comparison of human-caused versus natural mortality distance from open roads is inappropriate due to the differences in how data was collected for these two categories of mortality data.

indicated that a two year-old bear released into the ecosystem in 1993 produced at least four offspring and two of those female offspring have also reproduced (see Kasworm et al. (2006) and Kasworm et al. (2009) for details on the fate of the augmented grizzly bears through 2008).

Environmental Consequences – Grizzly Bear

Effects of Forestwide Direction

Alternative A – No-action Alternative

Current management of grizzly bear habitat would continue under Alternative A. This includes application of the FSEIS 2011 and the road density and core standards for each BMU. This would result in lower road densities in some BMUs. The FSEIS 2011 also limits linear miles of roads in bears outside of recovery zone. Human-bear conflicts are also reduced through limiting attractants. These efforts have greatly reduced the effects to grizzly bears and would continue to do so under Alternative A.

Most forms of management activities, recreation, or any other human use of the KNF has the potential to disturb bears if a bear is in the vicinity at the time. The likelihood of a human-bear interaction or human activity-causing disturbance to a bear decreases with increasing distance from a road. Therefore, it is useful to have areas such as wilderness, roadless areas, and other places with limited motorized access in order to provide habitat for bears and other wildlife that are sensitive to disturbance.

Alternatives B, C, and D

The vegetative component of habitat for grizzly bears is outside of HRV for the KNF. The draft Forest Plan would trend the KNF towards a desired condition for vegetation based on HRV and potential climate change. The vegetation on the KNF would be more sustainable and resilient to large-scale disturbance, much as it was historically. Trending vegetation nearer to what would have been present historically, to that which grizzlies evolved within this part of their range, including the vegetative component of connectivity, would improve grizzly habitat.

All three action alternatives trend vegetative conditions towards desired conditions (FW-DC-VEG-01 through FW-DC-VEG-05, FW-DC-VEG-08, FW-DC-VEG-11, FW-GDL-VEG-03, and FW-DC-FIRE-03), which are based on HRV and natural disturbance processes. Vegetative conditions, under all action alternatives, would be maintained or improved for grizzly bears in the long-term. The difference between the alternatives is primarily how much vegetative treatment is predicted each year to trend conditions toward the desired conditions for vegetation. Alternative C (15,740 acre/yr) has the most active restoration followed by Alternatives B (15,689 acre/yr), D (14,833 acre/yr), and A (5,294 acre/yr) under constrained budgets. With an unconstrained budget, Alternative B (16,148 acre/yr) has the most active restoration followed by Alternatives C (15,987 acre/yr), D (14,214 acre/yr), and A (5,527 acre/yr). Approximately 10,000 acre/yr of prescribed burning is predicted under the action alternatives, with very little or none in Alternative A. Of the alternatives, C (1,741 acre) would be expected to have more regeneration treatments per year under constrained budgets in the first decade, followed by D (1,660 acre), A (1,641 acre) and then B (1,595 acre). Of the alternatives, D (5,353 acre) would be expected to have more regeneration treatments per year under unconstrained budgets in the first decade, followed by A (4,812 acre), B (3,128 acre) and then C (2,983 acre).

Pattern (size and arrangement of habitat patches) is addressed through the desired conditions for vegetation and fire. It is specifically mentioned in FW-DC-VEG-05. It is also affected by other

direction for vegetation and fire (FW-DC-VEG-01 through FW-DC-VEG-04, FW-DC-VEG-08, FW-DC-VEG-11, FW-GDL-VEG-03, and FW-DC-FIRE-03). The desired conditions are based on HRV and natural disturbance processes, which mean the pattern of grizzly bear habitat across the Forest, would be similar to what would have been present under natural disturbance processes. This is even more likely if FW-DC-FIRE-03 is implemented. Given the predicted amounts of harvest, active restoration would have little impact on habitat pattern at the Forest scale compared to the potential impacts of fire use. The use of fire for resource benefit (passive restoration) has a much greater likelihood of maintaining or improving habitat pattern across the Forest. Alternative A (current Forest Plan as implemented) is more likely to result in continued suppression of most fires and, therefore, less passive restoration/maintenance of habitat pattern. The use of wildfire for resource benefit (passive restoration) is more likely in MA1, and Alternative C (342,600 acre) has the most MA1, followed by B (238,000 acre), A (204,300 acre equivalent to MA1), and D (163,900 acre). Fire may also be used more in MA5 compared to MA6, and Alternatives C (477,900 acre) and B (477,500 acre) have more than D (278,000 acre).

The wilderness, roadless, and other areas with limited motorized access would also contribute to connectivity within the KNF and to adjacent NFS lands and Canada. The desired condition for connectivity (FW-DC-WL-17, FW-GDL-WL-12 through 14) in the draft Forest Plan also includes direction for the KNF to coordinate with other agencies when highways are proposed for construction and reconstruction. Wildlife crossings would be incorporated where necessary and the KNF would manage its lands within ¼ mile of those crossings so that the crossings would not be rendered ineffective. The combination of all these components of connectivity would not only aid in the sustainability of the grizzly bear population, but other native wildlife species in northwest Montana as well. FW-DC-WL-17 would retain future opportunities to provide connectivity, because future projects would maintain or make progress towards this desired condition remain neutral, or only have minor negative effects on progress towards this desired condition over the long-term in order to be consistent with the Plan. Connectivity allows genetic interchange, which is important for smaller populations.

FW- STD-WL-04 would reduce the likelihood of a human-bear conflict due to sanitation issues. Other direction in the Plan that would improve grizzly bear habitat by protecting den sites, limiting disturbance, or improving habitat are: FW-DC-WL-01 through 05, FW-DC-WL-16, and FW-STD-WL-02 through 04, and FW-GDL-WL-01. FW-GDL-WL-15 would use the Interagency Grizzly Bear Committee Guidelines to reduce grizzly/human conflicts.

Effects of Management Area Direction

Alternative A would retain the existing amount of recommended wilderness and nonmotorized areas. Large areas with limitations on motorized use can aid in habitat security and connectivity of grizzly bear populations. Alternative C (1,515,400 acre wheeled motorized, 1,761,000 acre over-snow motorized) would have the least acreage allowing motorized use, followed by Alternatives B (1,659,100 acre wheeled motorized, 1,865,100 acre over-snow motorized), A (1,677,200 acre wheeled motorized, 1,961,200 acre over-snow motorized), and D (1,817,700 acre wheeled motorized, 1,939,700 acre over-snow motorized). All alternatives have the same acreage of wilderness (MA1a, 93,700 acre). Alternative C (214,800 acre) has the most land in recommended wilderness (MA1b), followed by Alternatives B (110,200 acre), A (76,500 acre), and D (36,100 acre). Both MA1a and MA1b do not allow over-snow motorized use.

MA direction that provides connectivity and habitat security for grizzly bears includes:

- MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, and MA5abc-DC-WL-01.

MA direction in the draft Forest Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01.

The increased use of fire, both wildfire and prescribed fire, would maintain or improve the pattern of grizzly bear habitat across the Forest. As described above in the "Forestwide Direction" section, managing for the desired conditions for vegetation (HRV) would likely result in a pattern of grizzly bear habitat similar to what was found historically under natural disturbance processes. It is important to point out that any grizzly bear core habitat identified in MA6 (general forest) has been identified as not suitable for timber production (see glossary); and that any timber harvest or other management activities likely to occur in these areas would be done to meet other resource needs than timber production.

Effects to Key Stressors under Forest Service Control

Attractants: There is currently a mandatory food storage order for the Forest. Additionally, under the action alternatives, FW-STD-WL-04 states that permit and operating plans shall specify sanitation measures included to reduce wildlife/human conflicts by making attractants inaccessible through proper storage and disposal. This would include garbage, food, and livestock carcasses.

Road Impacts: Current management of roads within grizzly bear habitat is guided by the FSEIS 2011. This is also true under Alternatives B, C, and D. Under the action alternatives the following draft Forest Plan direction reduces the possibility of road related impacts by creating security habitat with lower human presence due to lack of motorized access. This security habitat provides areas on the Forest where bears can escape the disturbance associated with roads:

- FW-DC-WL-02, FW-DC-WL-04 and 05, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, MA5abc-DC-WL-01, GADC-WL-KOO-03, GADC-WL-LIB-02 and 03, GADC-WL-TOB-01, and GADC-WL-TOB-03.

Additionally, habitat loss due to roads is lessened (closed roads still exist in some nonmotorized areas). The chance of poaching is less in these areas compared to those with open roads.

FW-STD-WL-02, in particular, is important for minimizing road impacts to grizzly bears because it states that the FSEIS 2011 would be applied. Motorized routes facilitate human access, so limiting the availability of motorized routes providing more habitat areas for bears where the likelihood of human presence is lower. Nonmotorized access can still occur throughout the KNF, and although there is still a chance of human-bear interactions resulting in disturbance to the bears, there is a lower probability due to lower human densities in those areas without motorized routes. There are also wilderness, roadless, and other areas with limited or unlikely motorized use and, therefore, places where disturbed bears can shift their habitat use. FW-DC-WL-17 and FW-GDL-WL-12 through 14 would reduce the impacts of roads on connectivity.

There would be no change in roads or trails open to wheeled motorized use in the alternatives. The acres available for cross-country wheeled motorized use would also not change. There is a

difference in the acreage where roads/trails may be designated for wheeled motorized use. Alternative C (1,515,400 acre wheeled motorized) would have the least acreage allowing wheeled motorized use, followed by Alternatives B (1,659,100 acre wheeled motorized), A (1,677,200 acre wheeled motorized), and D (1,817,700 acre wheeled motorized).

Livestock/Grizzly Bear Interaction: Interagency Grizzly Bear Committee Guidelines would be applied, which includes direction on grazing (FW- GDL-WL-15). The Interagency Grizzly Bear Committee Guidelines also applies under current management. Grazing does not occur on a lot of the Forest, and all grazing permits would have sanitation measures to reduce attractants that would cause a human/livestock/bear conflict (FW- STD-WL-04). FW-DC-GRZ-01 states that grazing occurs at sustainable levels while protecting vulnerable resources, and FW-DC-WL-03 states that recovery of threatened and endangered species is the long-term desired condition. If any livestock/grizzly problems occur in the future, this direction from the draft Forest Plan would aid in resolving the conflict.

Motorized Over-snow Vehicles: This is primarily a concern during spring emergence (essentially the month of April). Alternative A has 1,961,200 acres open to over-snow motorized use. Under the action alternatives, FW-DC-WL-01 states that dens for threatened and endangered species are relatively free of human disturbance when they are in use. With FW-DC-WL-03 recovery of threatened and endangered species is the long-term desired condition. FW-DC-WL-04 also states that low levels of disturbance exist in BMUs to facilitate bear use such as denning. FW-GDL-WL-01 restricts activities during spring emergence where known dens of females with cubs occur. Winter travel planning would occur in the future and would determine where over-snow vehicles are allowed in accordance with the above direction.

Alternative C (1,761,000 acre over-the-snow motorized) would have the least acreage allowing over-the-snow motorized use, followed by Alternatives B (1,865,100 acre over-the-snow motorized), D (1,939,700 acre over-the-snow motorized), and A (1,961,200 acre over-the-snow motorized). All alternatives have the same acreage of wilderness (MA1a, 93,700 acre). Alternative C (214,800 acre) has the most land in recommended wilderness (MA1b), followed by Alternatives B (110,200 acre), A (76,500 acre), and D (36,100 acre). Both MA1a and MA1b do not allow over-the-snow motorized use.

Major Ground Disturbing Activities (Mining): Mines that are currently in operation, or in the planning phases in the CYRZ, have substantial mitigation proposals. This includes the purchase of mitigation lands to offset the loss of habitat through mineral development. FW-DC-WL-01, FW-DC-WL-03, and FW-DC-WL-04 would help drive the development of project-specific mitigation in the future. Additionally, the FSEIS 2011 (applied through FW-STD-WL-02) set access standards that each BMU would trend towards, so mitigation would likely entail offsetting any increases in access and decreases in core habitat. FW-DC-WL-17 and FW-GDL-WL-12 through 14 would reduce the impacts of a high use haul/supply route on connectivity if that was considered an issue.

Effects of Other Permitted Activities

Effects from Fire/Vegetation Management

Alternative A would likely have the most fire suppression. Fire suppression has led to the encroachment of other conifer species into whitebark pine habitat. This leads to the likelihood of whitebark pine being lost to stand-replacing fires or insects. Bears would have to seek out alternate food sources. At lower elevations, fire suppression has contributed to the development

of denser stands that are more susceptible to large-scale disturbance such as insects, disease, or fire. Past timber harvest that focused on larger trees, combined with fire suppression that led to increased fuels and denser stands and retarded the development of large trees, has contributed to the vegetation on the KNF being outside of HRV. A trend toward the desired condition for vegetation (FW-DC-VEG-01 through 06, FW-DC-VEG-10 and 11) in the draft Forest Plan would move stands towards HRV and make vegetation more sustainable and resilient on the KNF. In areas such as wilderness, fire would more likely be allowed to play its historic role. In other areas of the KNF, primarily proposed as MA6 (general forest), active restoration would be useful to reduce fuels before fire could be allowed back onto the landscape in some locations due to safety concerns or risks to property. Allowing fire to play a more natural role in the ecosystem through implementation of FW-DC-FIRE-03 would maintain or improve the vegetative component of bear habitat.

Timber harvest, if done to meet the desired conditions for vegetation (FW-DC-VEG-01 through 06, FW-DC-VEG-10 and 11) in the draft Forest Plan, would aid in restoring the vegetative component of grizzly bear habitat nearer to HRV. As grizzlies evolved with the vegetative conditions found under HRV, the vegetative component of connectivity would be nearer to what was found historically on the KNF. Timber harvest activities can create disturbance and cause grizzlies to avoid the area. Most timber harvest activities would occur on MA6 (general forest) lands, and the other land allocations with lower human presence would still be available for bears to utilize (wilderness, roadless, etc.). The FSEIS 2011 includes direction that timber harvest activities that will occur within multiple watersheds shall be scheduled such that disturbance of grizzly bears resulting from road use is minimized. The appropriate scale for scheduling harvest activities will be determined pursuant to project level consultation. Fire suppression and climate change have made the vegetation on the KNF more susceptible to large-scale disturbance (fire, insects, and disease). Large-scale disturbance would create large patches of homogenous habitat. Moving towards the desired conditions for vegetation as proposed in the draft Forest Plan would make the vegetation more resilient and sustainable; and maintain better habitat diversity and heterogeneity.

Effects from Lands/Special Uses

Current special use permits in grizzly bear habitat include sanitation measures. As with grazing permits, the draft Forest Plan states that special use permits would specify sanitation measures to reduce human/wildlife conflicts (FW- STD-WL-04). Special use permits may cause disturbance to grizzlies due to human activities. This may cause grizzlies to avoid those areas near the special use permit activities. Disturbance would be minimized through implementation of FW-DC-WL-01, FW-DC-WL-04, and FW-STD-WL-02. There would be areas available with a lower likelihood of human disturbance (wilderness, roadless, etc.) for bears. Inventoried roadless areas, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01 create and maintain large, remote security habitats that are likely to have a lower amount of human presence due to the difficulties of access. Special uses can also alter some habitat, such as a ski area or utility corridor. There are no existing proposals that would remove or alter large areas, but any future proposals would be analyzed and mitigated at the project level. FW-DC-WL-01, FW-DC-WL-03 and 04, and FW-STD-WL-02 would drive project design and mitigation at the project level.

Effects from Other Forest Products

The collection of forest products would continue under Alternative A, as well as the action alternatives. Human presence (disturbance) would be the main effect from the collection of other

forest products. Generally, the collection of forest products occurs in close proximity to roads and the density of people engaged in this activity diminishes with increasing distance from a road or trail. Therefore, there would be areas on the Forest that would have very little or no collection of forest products due to limited accessibility. Most disturbances associated with people collecting forest products would generally be near roads and trails. Under the action alternatives, IRAs, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01 create and maintain large, remote security habitats that are likely to have a lower amount of human presence due to the difficulties of access. Alternative C (1,515,400 acre wheeled motorized, 1,761,000 acre over-snow motorized) would have the least acreage allowing motorized use, followed by Alternatives B (1,659,100 acre wheeled motorized, 1,865,100 acre over-snow motorized), A (1,677,200 acre wheeled motorized, 1,961,200 acre over-snow motorized), and D (1,817,700 acre wheeled motorized, 1,939,700 acre over-snow motorized). There could be some loss of resources for bears due to the collection of forest products (mushrooms, berries, etc.), but again, the areas where collection is likely to occur is near roads.

Forest Service Sensitive Species (Terrestrial)

Six bird species and six mammals are listed as Forest Service sensitive species on the KNF. For more detailed information on both the existing condition and environmental consequences for each sensitive species listed below, see the wildlife specialist report.

Affected Environment – American Peregrine Falcon

Upon recovery of the peregrine falcon and in conjunction with the reintroduction program, there has been a continuous increase in the number of breeding birds in the state of Montana and on the Forest. The coordinated 2006 Montana falcon survey documented approximately 67 active nests that fledged 147 young (Sumner and Rogers 2006). The first documented nest in Montana occurred in 1984 (Sumner and Rogers 2006). The first documented falcon nest on the KNF was identified in 1999 (Noxon eyrie) and there are currently five active falcon eyries on or adjacent to NFS lands on the Forest.

On the Forest, cliffs or rock substrates suitable for nesting are found along the main river corridors and adjacent valley bottoms, including the Kootenai, Clark Fork, which are used as feeding sites. However, according to biologists with the Peregrine Fund (Sumner and Rogers 2006), quality potential nesting sites consisting of sheer vertical cliffs adjacent to feeding habitat are rare on the KNF. Natural nesting habitat has not changed significantly since populations crashed and is still largely available.

Environmental Consequences – American Peregrine Falcon

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs related to key stressors under Forest Service control.

Key Stressor(s): Forest Service activities that may have effects on the peregrine falcon include timber harvest, road construction, quarry development, prescribed fire, fire suppression, and human activities that could alter habitat or disturb nesting birds. Nest failure can occur due to human disturbance such as recreational climbing, or industrial activities, such as helicopter use or blasting. Habitat altering activities can

	remove nesting habitat or diminish the suitability of that habitat. Activities that alter habitat for prey species (ex: migratory birds) can also impact peregrine habitat use and may lead to displacement.
Management Direction:	Management direction that would limit disturbance around peregrine nests and would decrease the likelihood of displacement or nest abandonment include: • Goals to manage activities to avoid disturbance to sensitive species that would result in a trend toward federal listing: Wildlife – Goal 2 • Desired Conditions related to sensitive species habitat: FW-DC-WL-01, 07 • Guidelines for avoiding/minimizing disturbance: FW-GDL-WL-01 • Geographic Area direction: GADC-WL-BUL-03 Management direction that would maintain or improve habitat for peregrine prey species include: • Desired conditions: FW-DC-VEG-01 through 08, 10 and 11; FW-DC-FIRE-03; FW-DC-WL-07, 09 through 14. • Forestwide standards: FW-STD-VEG-01 and 02 • Guidelines: FW-GDL-VEG-01 through 06, FW-GDL-WL-05

Affected Environment – Bald Eagle

Bald eagles in Montana are part of the Pacific population segment, which also includes Nevada, California, Oregon, Washington, and Wyoming. The Northwest Montana and northern Idaho portion of the Pacific segment is identified as Zone 7. Bald eagles are found throughout Montana. The bald eagle is a resident species in the forested, mountainous areas of Montana, while other individuals from more northerly latitudes either winter or migrate through the states to more southerly locations (MNHP and MFWP 2011). Residents generally remain in the vicinity of their breeding areas throughout the year, while some, though remaining in the states, may move to the more temperate weather of lower elevations or to other areas with higher concentrations of food (MNHP and MFWP 2011).

In Montana the bald eagle is fairly common and well distributed throughout the state and across the Forest. Nesting activity occurs along all of the major river systems on both private and national forest lands throughout the Forest. Both resident and migratory eagles use the Forest during the winter.

As with recovery elsewhere, the bald eagle use of the Forest for nesting, wintering, and migration increased over the past 3 decades. In Montana, bald eagle nesting territories have increased from a total of 31 in 1980 to 447 in 2007, with 202 in the Montana portion of zone 7 (DuBois 2008), which includes the Forest. In the late 1970s there was a single bald eagle nest known to occur on the KNF, while currently there are 45 known nest territories within the boundaries of the Forest of which 22 are known to occur on NFS lands.

Habitat for bald eagles on the Forest not only involves existing breeding areas (nest territories), but also suitable nesting habitat, and wintering and migration habitat as well. Nesting sites (both current nesting and suitable habitats) are generally located within larger forested areas near large lakes and rivers where nests are usually built in the tallest, oldest, large diameter trees, primarily along the Kootenai and Clark Fork River corridors and associated lakes and reservoirs. Nesting site selection is dependent upon maximum local food availability and minimum disturbance from human activity (Montana Bald Eagle Working Group 1994). The majority of their diet is comprised of fish. Important prey for bald eagles includes; waterfowl, especially in the winter, salmonids, suckers, whitefish, carrion and small mammals and birds (MNHP and MFWP 2011).

Nearly all current nests on the Forest are located within one-quarter mile of and overlook an adjacent water body. The Forest, in concurrence with the FWS have mapped potential nesting habitat along all major river corridors and has maintained mature trees within those areas for current and future use by bald eagles. Suitable unused nesting habitat for bald eagles remains available throughout portions of the Forest and it is likely they will continue to expand. Both resident and seasonal winter use also occurs on the Forest.

Environmental Consequences – Bald Eagle

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service activities that may have effects on bald eagles include timber harvest, road construction, prescribed fire, and fire suppression that could alter habitat or disturb nesting birds. Nest failure can also occur due to human disturbance from recreation, or industrial activities, such as helicopter use or blasting.
Management Direction:	Management direction that would limit disturbance around eagle nests and would decrease the likelihood of displacement or nest abandonment include: • Goals to manage activities to avoid disturbance to sensitive species that would result in a trend toward federal listing: Wildlife – Goal 2 • Desired Conditions related to sensitive species habitat: FW-DC-WL-01, 07 • Guidelines for avoiding/minimizing disturbance: FW-GDL-WL-01; and protecting nest trees/maintaining nest site habitat suitability: FW-GDL-WL-02, 03, 04 Other direction that would improve stand conditions and therefore nesting habitat include: • Desired conditions: FW-DC-VEG-01 through 07, 11; FW-DC-FIRE-03; FW-DC-WL-06, and FW-DC-WL-11, 12.

Affected Environment – Bighorn Sheep

There are four bighorn sheep herds that occur on the KNF: Kootenai Falls (Kootenai Falls hunting district #100), Koocanusa/Ural-Tweed (Ural-Tweed #101), Ten Lakes (Galton Range #102), and Berray Mountain (Cabinet Mountains #123). Two of the herds, Koocanusa/Ural-Tweed and Ten Lakes, are native sheep (MFWP 2010).

Compared to elsewhere in Montana, sheep habitat in northwestern Montana is dominated by timbered stands with shrub communities and very little grass dominated communities. Historically this may have been different, but with active fire suppression over the last several decades, conifer encroachment has occurred on northwestern Montana sheep ranges. Historically under natural disturbance processes, sheep ranges were primarily ponderosa pine/bunchgrass communities (MFWP 2010).

Environmental Consequences – Bighorn Sheep

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Stressors that may occur on NFS lands that could have impacts on bighorn sheep include domestic sheep allotments (however, there are none on the KNF), noxious weeds, fire/fire exclusion, use of domestic sheep/goats for weed treatment, use of pack goats, human disturbance, motorized/nonmotorized routes in key habitat areas.

Management Direction: Active fire suppression over the last several decades has degraded bighorn sheep habitat by allowing conifer encroachment. All three of the action alternatives trend vegetative conditions toward desired conditions:

- Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-05, 10, 11; FW-DC-FIRE-03

Management Area direction that supports the use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01

Management direction for habitat specific to native ungulate species is found at FW-DC-WL-16.

Direction pertaining to treatment of noxious weed infestations would include:

- FW-DC-VEG-10, GADC-WL-CLK-01, GADC-WL-KOO-01, 04

Connectivity of bighorn sheep habitat would be maintained or improved through vegetation and fire desired conditions (mentioned above) but also through:

- FW-DC-WL-17, FW-GDL-WL-12 through 14

Disturbance would be avoided or minimized through implementation of management direction found at:

- FW-DC-WL-01, FW-GDL-WL-01, 08, 09, 11.

No sheep or goat allotments currently exist on the KNF.

FW-DC-WL-16 directs the KNF to coordinate with the State on the management of big game habitat.

Affected Environment – Black-backed Woodpecker

The population size and trends on the KNF of the black-backed woodpecker are unknown. Populations are highly irruptive and population trends are difficult to ascertain. Where bark beetle populations are low black-backed woodpecker populations remain present, but at lower numbers. Where wood boring beetle populations increase to epidemic levels, such as following a wildfire, blowdown, or other disturbance event, black-backed populations increase dramatically.

Samson (2006) in his conservation assessment for the black-backed woodpecker found that there has been a significant increase in the amount of fire throughout Region 1 when he compared the amount of fire between two timeframes 1990-1993 (66,743 acres) and 2000-2003 (1,139,537

acres). On the KNF however, there was a substantial decrease in the acres of insect and disease between these two timeframes. During the mid to late 1970s and the 1980s the mountain pine beetle infested and killed a majority of the lodgepole pine on the Forest, with very large tracts of land that provided habitat for these species, and other woodpecker species as well, for a number of years.

Throughout the northern region (including the Forest) Samson (2006) in his conservation assessment demonstrated that habitat for black-backed woodpecker is well distributed, well connected, and there are no gaps that would limit black-backed woodpecker movements.

Table 35 displays by decade the amount of acres burned on the KNF over the past several decades.

Table 35. Estimated Acres Burned by Decade on the Forest

Decade	Acres Burned
2000 - present	49,800
1990 - 1999	75,000
1980 - 1989	31,800
1970 - 1979	13,100

In each of the past three decades an abundance of habitat in the form of burned forest was available on the Forest. Between 2000 and 2007 approximately 37,248 acres of fire occurred on the KNF with 20,182 in high severity and 17,066 in moderate severity that provided high quality habitat for these species prior to timber salvage. For several years only about 19 percent of the high severity and 8 percent of the moderate severity fire areas were harvested, with large stands of burned forest retained for use by black-backed woodpeckers. Based on Samson's (2006) analysis, the amount of burned forest present on the KNF over the past three decades exceeds the critical habitat threshold required for a minimum viable population of black-backed woodpecker (approximately 29,400 acres required for the regional population).

Wisdom et al. (2000) identified that throughout the interior Columbia Basin there has been a widespread decline (but less severe than the strongest declines identified) in source habitats for species dependent on late successional forest habitats present over broad elevations, which includes the black-backed woodpecker. Analysis conducted for the Forest (see the "Vegetation" section of this document) also identified a fairly significant reduction in late successional forest habitats, especially on the KNF. However, late successional forest habitats are still considered to be well distributed across the Forest. In addition to current late successional stands, the Forest is managing additional lands for their late successional characteristics. The current trend is such that late successional forests are no longer targeted for timber harvest. Over the short and long term natural succession will result in an increase in the amount of lands in the large size class and subsequently in the amount of late successional forest components, such as snags and down wood.

A snag analysis recently conducted for the Forest (Bollenbacher et al. 2009) provided an estimate of the number of snags currently existing throughout the forested portion of the Forest. The analysis compared the amount of snags presently occurring in wilderness/roadless areas versus those outside wilderness/roadless areas. Results of the analysis identified that overall there is an abundance of snags available throughout the Forest to provide habitat for a number of

bird species, including the black-backed woodpecker, during periods when burned habitat is not available. The analysis also identified, however, that areas outside of wilderness/roadless areas have fewer snags per acre than those in wilderness/roadless areas (i.e., in managed lands). As the amount of firewood adjacent to roads accessed by the public continues to diminish; access away from roads to patches of snags, especially in late successional stands, has increased.

Environmental Consequences – Black-backed Woodpecker

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to black-backed woodpecker habitats include timber harvest (salvage logging), fire suppression, removal of fire killed/insect infested trees, conversion of mature and late successional forest to young stands without decayed trees, human disturbance near nest sites
Management Direction:	Management direction that would move vegetative conditions toward desired conditions that would benefit the black-backed woodpecker: • Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-07, 11; FW-DC-FIRE-03; FW-DC-TBR-01. Management direction for habitat specific to black-backed woodpecker is found at FW-GDL-WL-01, which includes timing restrictions and distance buffers around nests. Disturbance is also reduced through Wildlife Goal 2 and FW-DC-WL-01. Management direction to maintain some burned, unlogged habitat for species such as black-backed woodpecker includes: • FW-DC-WL-14; FW-GDL-WL-05 Direction in the Plan to maintain snag habitat is found at: • FW-DC-VEG-07; FW-GDL-VEG-04, 05; and FW-DC-WL-12

Affected Environment – Common Loon

Historically in Montana, loons were believed to have nested throughout the western half of the state where suitable habitat was found, while the current breeding range is primarily restricted to lower elevation forested glacial lakes in the northwest corner of the state. The primary nesting habitat is restricted to lakes in the Blackfoot, Flathead, and Kootenai River drainages, with some breeding on the east side of Glacier National Park, Yellowstone National Park, and on the Blackfeet Indian Reservation. On the KNF, common loon nesting and use is fairly common and well distributed. Use includes stopovers during migration, nesting and rearing, and foraging. The major use areas include lakes in the Yaak River Valley, the Tobacco Valley, Lake Koocanusa, and the Thompson Chain of Lakes.

Water quality is an important habitat feature for breeding loon success. Loons are visual predators; therefore, clear water is crucial for foraging efficiency. Loons nest in close proximity to the water's edge and prefer small islands, floating bog mats, and marshy hummocks (Evers 2004). Nest sites are generally located within 4 feet of the water's edge and sites are selected that provide shelter from wind, cover, view of open water, and near a drop off steep enough for underwater approach. Once the eggs have hatched and the young are ready to leave the nest, the

family moves to a nursery area, an area protected from wind, waves, and other loons with shallow water. Loons feed mostly on small fish such as yellow perch and various minnow species. Other aquatic organisms may also be consumed.

The northwestern portion of Montana supports the highest density of nesting common loons in the lower 48 states west of the Mississippi River (Bissell 2005). Based on coordinated total counts of common loons in mid July over the last six years, Montana supports an average of 62 breeding pairs that successfully raise an average of 43 chicks each year. In addition, surveyors counted an average of 48 single or non-breeding adult loons. Total midsummer loon counts since 1999 have averaged 217.

Based on the last ten years of loon day counts (1994-2004) the total number of adult loons appears to have initially increased and then remained relatively stable over the last six years with some degree in fluctuation in numbers (Bissell 2005). Some of this increase is attributed to an increase in survey efforts. Chick production has varied widely over the last five years, particularly in comparison to the first five years (1994-2004). Based on this data, the population appears to be stable (Bissell 2005).

The KNF survey data (Bissell 2005) suggests a population of 19 breeding pairs and up to 40 single birds using lakes within the exterior boundary of the Forest. The Montana Loon Society (1998 pg 2) loon count data for the Forest also shows a stable adult population, with chick production consistent from year to year.

Environmental Consequences – Common Loon

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to the common loon include water level fluctuations, human disturbance of nest sites, development and access.
Management Direction:	Management direction for habitat specific to the common loon is found at FW-GDL-WL-01, which includes timing restrictions and distance buffers around nests. FW-DC-WL-01 states that sensitive species nest sites are relatively free of human disturbance. Timber harvest that includes helicopter logging would be likely to disturb loons. Additional management direction applicable to loon habitat would be FW-DC-WL-10 (aquatic/riparian species find a mosaic of aquatic and riparian habitats and a low level of disturbance exists in these areas). INFISH management direction in the Plan would aid in maintaining water levels and quality and would maintain/improve loon habitat (FW-STD-RIP-03).

Affected Environment – Fisher

It is believed that fishers were extirpated from their range in Montana by the 1920s as a result of fur trapping, predator poisoning, and habitat alteration (Vinkey 2003). No fishers were harvested in the state from 1929-1959, suggesting they were extirpated. Historical data on fisher on the KNF is very limited. Introductions occurred into Montana in 1959/1960 including the Purcell

Mountains on the KNF. Fishers were re-introduced to the Cabinet Mountains, between 1989-1991, with the release of 110 animals from Minnesota and Wisconsin (Roy 1991, Heinemeyer 1993). The current population status of fishers on the KNF is unknown.

Vinkey et al. conducted research on the distribution and lineage of fisher in Montana; part of which was conducted in the Cabinet Mountain region of the Forest, as well as throughout western Montana (2001-2003). DNA analysis for fisher in Montana (Vinkey et al. 2003) suggests that fisher populations in the state have multiple origins reflecting the history of translocations and the influence of native populations. This analysis also indicated that fisher may not have been extirpated from Montana. West central Montana fisher populations show evidence of isolation and distinctiveness suggesting that they are descended in part from remnant native populations (Vinkey 2003).

Samson (2006a) in his conservation assessment estimated the critical habitat threshold for a minimum viable population of fisher for the Northern Region. For his assessment Samson estimated that the amount of habitat needed for a minimum viable population of fisher is 100,077 acres (approximately 405 km2). Based on an estimate of the amount of habitat available (Bush and Lundberg 2008), the Northern Region (2,293,408 acres) easily provides enough habitat to support a minimum viable population of fisher. In fact, habitat estimates (Bush and Lundberg 2008) identify that habitat in the Northern Rocky Mountain Ecological Province and in eight of the twelve national forests in the Northern Region (including the KNF) exceed the amount of habitat needed to support a minimum viable population of fisher.

Environmental Consequences – Fisher

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to fisher include timber harvest and fire (prescribed and wildfire).
Management Direction:	Management direction that would move vegetative conditions toward desired conditions that would benefit the fisher: • Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-09, 11; FW-DC-FIRE-03. Direction in the Plan to maintain snag and downed wood habitat is found at: • FW-DC-VEG-07, 08; FW-GDL-VEG-03 through 06; and FW-DC-WL-12 and 13. Management direction that would protect den sites with timing restrictions and distance buffers is found at FW-GDL-WL-01. Direction that also reduces disturbance includes Wildlife Goal 2 and FW-DC-WL-01.

Affected Environment – Flammulated Owl

There are no population trends for flammulated owls in either Montana or the Forest. Surveys on the KNF, including those conducted by the Avian Science Center (2008); as well as those conducted by the Forest itself, identify that flammulated owls are fairly common and well distributed across the Forest. Flammulated owls have been documented on all five ranger districts on the Forest. Of 159 points surveyed by the Avian Science Center (2008) owls were

detected at 31 points (19.5 percent), the highest percent of points on which owls were detected across the northern region. It is recognized that this is only a one year survey; however, owls are routinely recorded during surveys on the Forest. Suitable habitat also exists in other portions of the Forest, including some areas where no flammulated owl surveys have been done and it is possible that flammulated owls occupy those habitats as well. Although no nests have been found on the Forest, repeated positive responses to surveys suggest that flammulated owl nesting is occurring.

Samson (2006a) in his conservation assessment estimated the critical habitat threshold for a minimum viable population of flammulated owls for the Northern Region. For his assessment, Samson estimated that the amount of habitat needed for a minimum viable population of flammulated owls is 4,700 acres (approximately 19 mi^2). Based on the estimate of the current amount of habitat available (Bush and Lundberg 2008), the Northern Region provides more than enough habitat to support a minimum viable population of flammulated owls. In fact, habitat estimates (Bush and Lundberg 2008) for the Northern Rocky Mountain Ecological Province and for eleven of the twelve national forests in the Northern Region (including the KNF) exceed that required to support a minimum viable population of flammulated owls.

Environmental Consequences – Flammulated Owl

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to flammulated owl include fire (prescribed and wildfire), road maintenance/construction, recreational use, fire suppression, human disturbance during breeding, loss of mature and late successional dry pine forest, reduced number of snags, impact to riparian areas that would include loss of deciduous trees for foraging and nesting, loss of downed wood, selective timber harvest, and intensive grazing.
Management Direction:	Management direction that would move vegetative conditions toward desired conditions that would benefit the flammulated owl: • Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-08; FW-DC-VEG-11, FW-DC-FIRE-03. Management direction that would move habitat conditions towards HRV, make stands more resilient to disturbance, and maintain/improve snag habitat: FW-STD-VEG-01; FW-GDL-VEG-01, 02 04, 05; FW-DC-WL-09, 10, 11, 12. Management direction for habitat specific to the flammulated owl is found at FW-GDL-WL-01, which includes timing restrictions and distance buffers around nests. FW-DC-WL-01 states that sensitive species nest sites are relatively free of human disturbance. Wildlife Goal 2 also provides direction to reduce disturbance. Management direction that addresses grazing can be found at FW-DC-GRZ-01 (grazing should occur at sustainable levels while protecting vulnerable resources such as wildlife habitat).

Affected Environment – Gray Wolf

Gray wolf populations were extirpated from the western U.S. by the 1930s. Wolves began to successfully re-colonize northwest Montana, including the KNF in the early 1980s. By 1995, there were 6 wolf packs in northwest Montana. Sime et al. (2011) shows that within the Northern Rocky Mountain (NRM) distinct population segment in 2010 there were 1,651 wolves (566 in Montana, 705 in Idaho, 343 in Wyoming, 16 in Washington, and 21 in Oregon – table 4b in Sime et al. 2011) and 111 breeding pairs (35 in Montana, 46 in Idaho, 27 in Wyoming, 2 in Oregon, and 1 in Washington – table 4b in Sime et al. 2011) The NRM population first met recovery goals in 2002 and those goals have continued to be met in each of the past nine years. Figures 32 and 33, display the trend in wolf populations by state and by recovery area.

Wolf numbers in the Montana portion of the central Idaho experimental population area were at 122 animals in 2010. There were also 118 wolves in the Montana portion of the Greater Yellowstone Experimental Area, and 326 wolves in the Montana portion of the Northwest Montana Recovery Area. There were 108 packs in Montana, of which 34 met the definition of a breeding pair (Sime et al. 2011, table 1).

Figure 34 displays the wolf packs in the Northwest Montana Wolf Recovery Area, including the KNF (Sime et al. 2011).

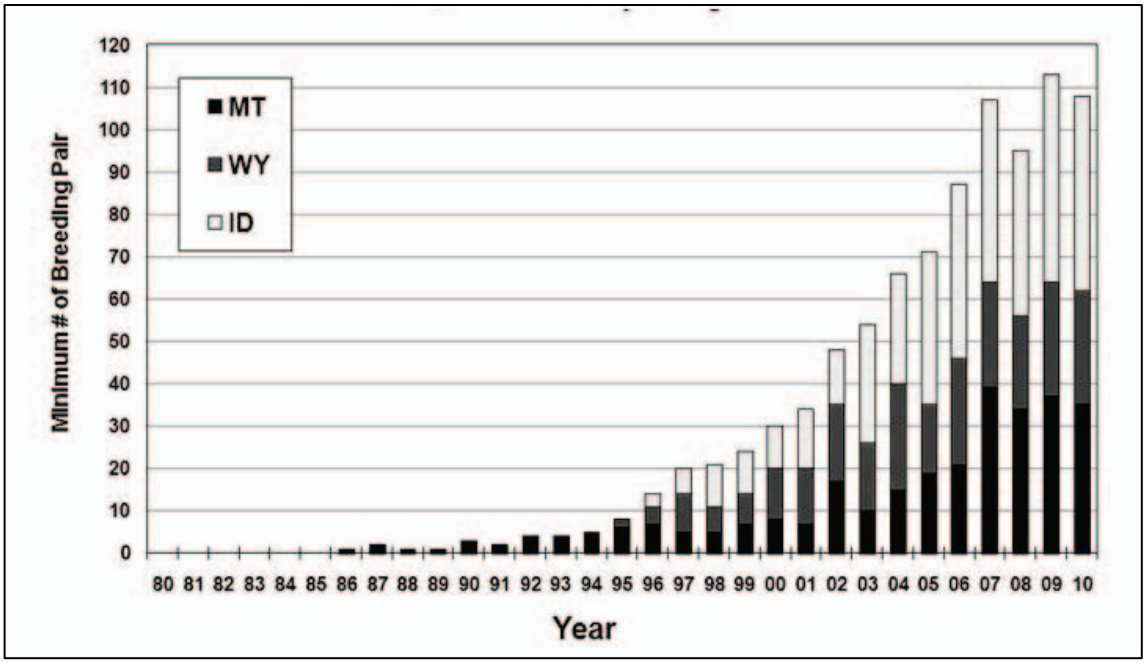


Figure 32. Northern Rocky Mountain Breeding Pair Trends by State 1980-2010 (Sime et al. 2011)

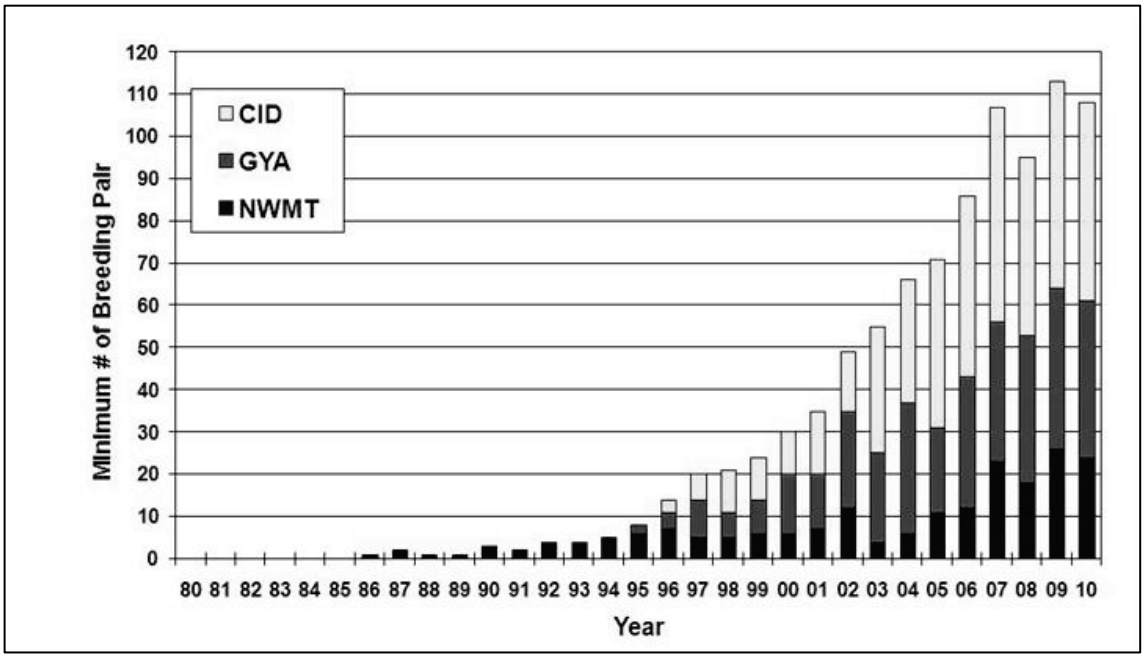


Figure 33. Northern Rocky Mountain Breeding Pair Trends by Recovery Area 1980-2010 (Sime et al. 2011)

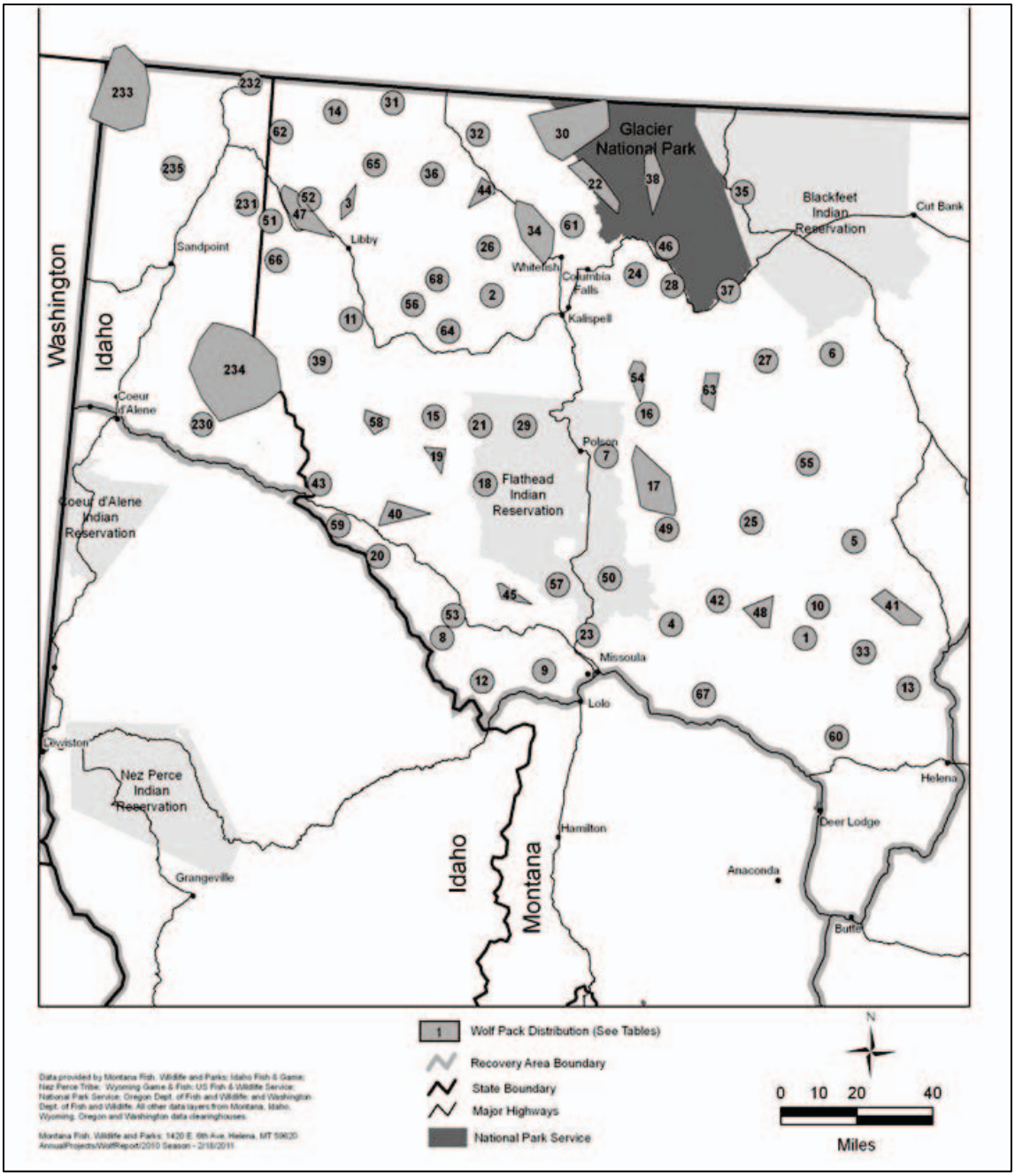


Figure 34. Wolf Packs in the Montana Portion of the Northwest Montana Wolf Recovery Area (Sime et al. 2011)

Environmental Consequences – Gray Wolf

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Forest Service management activities that may have effects to gray wolf include timber harvest and fire (prescribed and wildfire), human access to dens and rendezvous sites, and road access.

Management Direction: Management direction that would move vegetative conditions toward desired conditions that would benefit the gray wolf:

- Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-09, 11; FW-DC-FIRE-03.

Direction in the Plan related to ungulate habitat:

- FW-DC-WL-08 (wolves would find an abundance of big game for prey); FW-DC-WL-16 (ungulate habitat managed in coordination with state); FW-DC-VEG-01, 02, 04, 05, 11; FW-DC-FIRE-03.

Ungulate security habitat Plan direction:

- FW-GDL-WL-08 and 09, and disturbance during the birthing period is minimized by FW-GDL-WL-11; FW-DC-WL-02, FW-DC-WL-04 and 05, FW-DC-WL-08, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, MA5abc-DC-WL-01, GADC-WL-CLK-02, GADC-WL-FSH-02, GADC-WL-KOO-04, GADC-WL-LIB-02 and 03, GADC-WL-TOB-01 and 03.

Plan direction within GAs that maintains or improves the vegetative aspect of wolf/big game habitat across the Forest (pattern) includes:

- GADC-VEG-CLK-01, GADC-WL-CLK-01, GADC-VEG-FSH-01, GADC-WL-FSH-03, GADC-VEG-KOO-01, GADC-WL-KOO-01, GADC-WL-KOO-04, GADC-VEG-LIB-03, and GADC-VEG-TOB-02.

Management direction that would protect den sites with timing restrictions and distance buffers is found at FW-GDL-WL-01;
Direction in the Plan related to human access which would reduce the possibility of disturbance around dens and rendezvous areas by creating security habitat with lower human presence due to lack of motorized access:

- Wildlife Goal 2, FW-DC-WL-01 and 02, FW-DC-WL-04 and 05, FW-DC-WL-08, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, MA5abc-DC-WL-01, GADC-WL-CLK-02, GADC-WL-FSH-02, GADC-WL-KOO-04, GADC-WL-LIB-02 and 03, GADC-WL-TOB-01 and 03.

Affected Environment – Harlequin Duck

Harlequins are known or suspected to use eight streams for breeding across the KNF. These are found in the Yaak, Kootenai, and Clark Fork River basins. They are also suspected of breeding in a number of additional streams. In addition to breeding streams, there are several staging areas where harlequin ducks have been observed gathering prior to moving into breeding habitat.

In Montana, estimates for the number of breeding pairs range from 110 to 150-200 (Reichel and Genter 1995). The current breeding pair population on the KNF is approximately 30 pairs. Single adult birds are also part of the total population, but their numbers are not known.

Harlequin ducks use clear, fast flowing rivers and streams for breeding; diving to river bottoms to pick larval insects from rocky substrates. After breeding, individuals migrate to the coasts of North American and Greenland. Four habitat characteristics were noted at more than 50 percent of harlequin duck observations in the Tetons (Wallen 1987 as cited in MFWP 2005): 1) streamside perennial shrub vegetation; 2) meandering (braided) channel types; 3) more than

three loafing sites/10 m; and 4) areas unused by humans. Harlequins prefer stream size of second order or greater, stream gradients between one percent and seven percent, and some areas of shallow water (riffles) (PIF 2000). They also prefer clear water, with gravel to boulder size substrate. Harlequins feed primarily on crustaceans, mollusks, insects, and a few small fishes (NatureServe 2011).

Suitable habitat, although uncommon, is fairly well distributed across the Forest. In many instances the confluence of these streams with the major river systems are situated on private lands and have been developed. In the 1970s and early 1980s large wood was removed from many of the streams on the Forest, which may have been a factor in use by harlequin ducks. However, large wood has been put back into many of those streams either as a result of restoration or from natural events. Overall, habitat for harlequin ducks has not changed significantly on NFS lands on the Forest.

Environmental Consequences – Harlequin Duck

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Forest Service management activities that may have effects to harlequin duck include loss or degradation of habitat that eliminate or reduces cover and food supply, disturbance at the nest site or of nesting colonies, water level fluctuations, wetland contamination/pesticide reduction of favored insect foods.

Management Direction: Management direction that would address habitat degradation:

- FW-DC-AR-07 (transportation system that is environmentally compatible and has minimal impacts on resources such as sensitive species).

Direction in the Plan related to fire, which has the potential to affect harlequin habitat:

- FW-DC-VEG-01 through 05; 11 FW-DC-FIRE-03.

Management direction that would protect nest sites with timing restrictions and distance buffers is found at FW-GDL-WL-01.

Much of the direction in the Plan under Watershed, Soil, Riparian and Aquatic Resources would maintain or improve riparian areas and consequently harlequin habitat.

- FW-DC-WTR-01, FW-DC-AQH-01, FW-DC-AQS-01

Grazing can alter riparian habitat:

- FW-DC-GRZ-01 (desired condition that grazing would occur at sustainable levels that protect vulnerable resources, which would include riparian areas).

Mineral development, special uses, and lands projects can reduce habitat quality and quantity:

- FW-STD-RIP-04 (mine waste and mining facilities should be located outside Riparian Conservation Areas).

Management direction addressing disturbance:

- Incorporation of the Grizzly Bear FSEIS 2011; FW-GDL-WL-01 (timing restriction and distance buffers); FW-DC-WL-01, 10 (direction to minimize disturbance)

Affected Environment – North American Wolverine

The wolverine is one of several species of carnivores that occur on the Forest. In the contiguous United States the wolverine is listed as State endangered in Washington, designated a protected nongame species in Idaho and Wyoming and in Montana it is a regulated furbearer (USDI 2008, p. 12938). In Montana wolverines occur throughout the western one third of the state and considered fairly well distributed throughout their range in the state. On the Forest observations are concentrated in the Northwest Peaks, Ten Lakes, and Cabinet Mountains portions of the Forest.

Due to their large home range size and habitat needs, this species is rare and uncommon and most likely always has been. Habitats within the areas wolverine are known to inhabit are the least modified by human activities, due to their remote, steep, and harsh environments (Sallabanks 1996). Wilderness and roadless lands account for much of the areas wolverines are known to use, although it is unknown if this is due to avoidance of people, or that wolverine tend to choose areas that are not conducive to human development (Copeland et al. 2007).

Environmental Consequences – North American Wolverine

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Forest Service management activities that may have effects to wolverine include loss of habitat (timber harvest and fire (prescribed and wildfire)), loss of connectivity, disturbance leading to displacement (particularly denning habitats and active den sites)

Management Direction: Management direction that would move vegetative conditions toward desired conditions that would benefit the wolverine:

- Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-08, 11; FW-DC-FIRE-03.

Management direction addressing disturbance:
Incorporation of the Grizzly Bear FSEIS 2011; FW-GDL-WL-01 (timing restriction and distance buffers); FW-DC-WL-01, 10 (direction to minimize disturbance).
Direction in the draft Forest Plan related to human access that would drive project design or mitigation to reduce disturbance, and increase/maintain security and connectivity:

- Wildlife Goal 2, FW-DC-WL-01 through 05, FW-DC-WL-08, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA5abc-DC-WL-01, GADC-WL-BULL-01 and 02, GADC-WL-CLK-02, GADC-WL-FSH-02, GADC-WL-KOO-04, GADC-WL-LIB-02 and 03, GADC-WL-TOB-01 and 03, GADC-WL-YAK-01 and 02

MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and

MA6-GDL-FIRE-01. This is useful to maintain/restore wolverine and ungulate habitat in the long-term.

In addition to the desired conditions for vegetation and the benefits for ungulate habitat, additional direction in the draft Forest Plan that maintains/improves ungulate habitat includes:

- FW-DC-WL-16, FW-GDL-WL-08 through 11, GADC-WL-CLK-01 and 02, GADC-WL-FSH-02 and 03, GADC-WL-KOO-01 and 04, GADC-WL-LIB-02 and 03.

Affected Environment – Northern Bog Lemming

In the lower 48 states (NatureServe 2011) only a few relict populations are known to occur; other than Montana; bog lemmings are known from four locations in Idaho and eight in Washington, all from within 80 km of the Canadian border (Reichel and Corn 1997). Habitat in the form of bogs and fens exist elsewhere on Forest and it is possible that bog lemmings occur elsewhere.

Currently, the total number of known bog lemming sites in Montana is 18, the most sites in any of the lower 48 states (MFWP 2005). The Montana Natural Heritage Program (1992, 1993) have trapped a total of 32 sites on the Forest and found lemmings in five locations, with the majority of known occurrences in a single drainage (Sunday Creek) (Reichel 1993, 1994, Reichel and Corn 1997). The Sunday Creek drainage provides a complex of approximately 25 habitat patches for lemmings and lemmings in this drainage are considered to be a meta-population (Reichel and Corn 1997). A lemming was also observed in Horse Lakes but none were caught in traps. Lemmings on the Forest are all a great distance apart and they may be disjunct populations (Reichel and Corn 1997).

Environmental Consequences – Northern Bog Lemming

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Forest Service management activities that may have effects to northern bog lemming include fire (prescribed and wildfire), livestock grazing, long-term fire suppression, pesticide use, road and right-of-way construction, especially if affects hydrologic function, human disturbance (on bogs and wet meadows).

Management Direction: Management direction that would move vegetative conditions toward desired conditions that would benefit the northern bog lemming:

- Desired Conditions related to sensitive species habitat: FW-DC-VEG-01 through FW-DC-VEG-09, 11; FW-DC-FIRE-03.

Management direction that would reduce disturbance includes Wildlife Goal 2, FW-DC-WL-01, and FW-GDL-WL-01.

Direction to protect peatlands can be found several places within the draft Forest Plan:

- FW-DC-WTR-01, FW-DC-WTR-02, FW-DC-RIP-06, and FW-GDL-RIP-05 (sets up buffer up to 600 feet around peatlands). FW-DC-RIP-06 discusses the importance of the surrounding upland areas and that they are to be managed as to maintain the peatlands.

- FW-GDL-RIP-05 sets a buffer up to 600 feet around peatlands to protect soil, vegetation, and water chemistry/flows of the peatlands.
- FW-DC-AR-07 states that the transportation system has minimal impacts on sensitive species, watersheds, aquatic species, and other resources.

MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01. This is useful to maintain/restore the uplands that surround bog lemming habitat.

Under the action alternatives, FW-DC-GRZ-01 states that grazing would occur at sustainable levels while protecting vulnerable resources.

Affected Environment – Townsend's Big-eared Bat

Numerous surveys have been conducted throughout the Forest in conjunction with the state agencies and portions of the Forest was included as part of a regional survey effort (Hendricks et al. 1995, 1996 and Hendricks and Maxell 2005). Information on source habitats and special habitat features are described in Wisdom et al. (2000). Management for bats is tiered to the Townsends Big-Eared bat species conservation assessment and conservation strategy for Idaho (Pierson et al. 1999), the Montana Bat Management Plan (Schwab and DuBois 2006). Additional information and management direction is found in various databases such as Bat Conservation International.

Surveys (Hendricks and Maxell 2005) conducted on the KNF identified that bats were detected in most habitat types, from early seral "disturbance" sites in recent clearcuts and burns to mature and late successional stands, in ponderosa pine and riparian sites at low elevation to Engelmann spruce and subalpine fir at moderate elevation. Riparian, "disturbed," and late successional/mature sites accounted for over 72 percent of the 188 sites sampled with bat detectors (Hendricks et al. 1996). However, bat activity occurred much more frequently in late successional/mature forest (71.4 percent) than in "disturbed" forest stands (46.7 percent of sites).

There are very few natural caves on the Forest (only one cave is known on the KNF: Kenelty cave). Abandoned/inactive mines are scattered throughout the Forest. Not all of these sites are suitable for roosting activities, but the possibility exists that some of them do and may currently provide habitat for bats. Rock/talus slopes are present throughout the Forest, especially along the river and stream systems and many of the larger lake and wetland areas. Use of snags, bridges, buildings, and rock crevices are available throughout the Forest and provide habitat for roosting and foraging. No occupied key roosting habitat in the form of caves, tunnels, and abandoned buildings is known to exist on the KNF. There are few documented hibernacula and maternity roosts in Montana and none for the KNF (Hendricks and Maxell 2005). In Montana four maternity colonies of Townsend's big-eared bats have been found in natural caves and one in an abandoned mine. Suitable roost sites, especially maternity roosts, probably limit distribution of this species.

A snag analysis recently conducted for the Forest (Bollenbacher et al. 2009) provides an estimate of the number of snags currently existing throughout the forested portion of the Forest. The

analysis compared the amount of snags in wilderness/roadless areas versus those outside wilderness/roadless areas. Based on that analysis there is an abundance of snags throughout the forested portion of the Forest, both inside and outside the wilderness/roadless areas. The analysis also identifies, however, that areas outside of wilderness/roadless areas have fewer snags per acre than those in wilderness/roadless areas, especially in the larger (>15 inch dbh) size classes.

Schwab and Dubois (2006) described the main threats to bats in Montana. Bats are vulnerable to habitat loss, and disturbances can cause habitat displacement or abandonment of roosting, hibernation, or maternity sites. This can occur from the removal or degradation of suitable habitat conditions due to timber harvest or fire, or from human disturbance.

Environmental Consequences – Townsend's Big-eared Bat

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service activities that may have effects on bats include timber harvest/vegetation management, prescribed fire, and human disturbance of roosting sites, especially hibernacula and maternity sites.
Management Direction:	Management direction that would protect abandoned mines/caves and building that are used by bats and would decrease the likelihood of displacement or abandonment include: Goals to manage activities to avoid disturbance to sensitive species that would result in a trend toward federal listing: Wildlife – Goal 2 Desired Conditions related to sensitive species habitat: FW-DC-WL-01, 15 Guidelines for avoiding/minimizing disturbance: FW-GDL-WL-01, 06, 07 Direction in the Plan that maintains snag habitat includes: Desired conditions:FW-DC-VEG-07, FW-DC-WL-12 Guidelines: FW-GDL-VEG-04, 05

Management Indicator Species (MIS)

The 1982 planning procedures require both the selection of management indicator species (MIS) during development of forest plans (36 CFR 219.19(a), 1982), and that reasons for species selection be clearly stated. Criteria are to include those species whose population changes are believed to indicate the effects of management activities (36 CFR 219.19(a) (1), 1982).

Though required under the NFMA, the MIS concept is not universally accepted and is difficult to use. The assumption that MIS can be used to describe effects on a broader group of species has been challenged since the 1982 Planning Rule was adopted. Criticisms of this assumption include the following arguments:

- Members of the same guild are not alike in the ways they use habitat for various purposes. The presence of one species may in fact exclude another that is very similar in resource exploitation (Schoener 1983).
- Although members of a guild may exploit the same environmental resources, each species, by definition, has unique characteristics and behaviors. This makes extrapolation from one

species to another difficult or impossible. For example, in an analysis of 19 bird species, population responses of component species in four of five guilds did not exhibit parallel trends, and even the direction of change was inconsistent (Mannan et al. 1984).

- Animals may change their behavior and use habitat differently between seasons or in different parts of the species' range. This complicates the building of guilds and makes identification of a representative species uncertain in the absence of local studies (Verner 1984).
- Population density of a particular species may be limited by habitat, predation, disease, weather, and/or other factors. Thus, habitat trend may not accurately predict population trend. Interactions between multiple management activities may make the response of a species difficult to interpret (Landres et al. 1988, Patton 1987).

In summary, the response of animals to their environment is not a simple relationship. It is unlikely that one species could very precisely reflect the response of another species or group of species (Morrison et al. 1998).

This argument, however, does not negate the use of MIS as a method to test the assumptions that if habitat is managed a certain way, MIS populations will respond in a certain way. Instead, it cautions against extrapolating from the measured response of a particular MIS to predict similar changes in populations of other species.

Management indicator species chosen for the KNF are elk and a landbird assemblage (insectivores) (see table 36). These species were chosen because they represent an issue or concern on the KNF. Elk security habitat was a concern, especially given the importance of this species for hunting. Elk is an indicator for elk security, not for any other species or habitat. A landbird assemblage (insectivores) was chosen to aid in analyzing the effects of moving towards the desired conditions for vegetation. This assemblage is used as an indicator for progress towards the desired conditions for vegetation, not to represent other species or habitat needs.

These MIS are to be used to compare alternatives in this draft EIS and analyze effects. Although several individual species are listed under the landbird assemblage, effects would be analyzed for the assemblage in general and not the individual species. These MIS, elk and insectivores, were not selected because of a viability concern. Additionally, viability of these MIS would not be analyzed in future projects. See the table below for the rationale for MIS selection.

Table 36. Management Indicator Species for the Kootenai National Forest

Species	Habitat Association	Indicator	Rationale for Selection
Rocky Mountain Elk	Forested stands (cover), and grasslands/shrub (forage)	Security Areas (Acres); summer and winter motorized access.	Elk are of high social importance and are sensitive to road densities .Management activities that impact road use/densities can alter security habitat. MFWP monitors the population. Monitoring of security habitat is feasible through remote sensing (ex: travel route GIS layers).
Landbird Assemblage (insectivores)	Varies: open forest structures, mature forests, and snags	Varies: open forests/openings, burned forests, mature forests, snags	Due mainly to fire suppression the Forest is outside of HRV. Moving towards the desired conditions for vegetation would restore or maintain habitat for some species of insectivores. Population monitoring could be done through Region 1 landbird monitoring supplemented by Forest efforts.

Rocky Mountain Elk

Rocky Mountain elk are a hunted species with secure populations. Montana has a rich tradition of big game hunting, and has earned a well-deserved reputation for having some of the best big game hunting in North America. Elk have high economic and social values and is a large contributor to the quality of life in Montana.

Elk are habitat generalists and occupy open to dense forests interspersed with grassland or shrubland openings. Lower elevation winter range with good cover and forage or browse is important to elk. Habitat that reduces vulnerability to hunting, severe winter weather, and predators is also important.

When dealing with elk security, road construction associated with timber sales is the single most important forest action with potential to adversely affect elk security and unroaded hunting opportunity. Timber harvest can also affect elk security by reducing hiding cover. Once an area is roaded, it may lose its ability to sustain mature bulls even if the roads are closed; and in some cases, obliterated. Closed roads provide access routes for hunters into areas that would otherwise be secure (Hillis et al. 1991). Once access is established and hunters discover large bulls, they develop an established pattern that can last well past the life of the road, particularly if outfitters establish use of the area. This is true even for temporary roads that remain on the landscape during hunting season.

Security areas also become less functional as hunting pressure increases regardless of available access and forest cover. This results from increasing demand for unroaded recreation and also as a result of hunters trying to avoid areas of higher pressure.

A large portion of lands identified as big game winter range have also been delineated as WUI. For example, on the KNF over 55 percent of the winter range is also in the WUI. Current management in the WUI emphasizes a reduction in fire risk and an increase in human safety. This generally involves a reduction in tree densities, snags, and fuels (including down wood). In some cases, such as within a certain distance from a home or community, management to reduce fire risk and improve conditions for human safety are not necessarily compatible with big game requirements for winter range. However, it is recognized that the priority in those areas closest to homes and communities is human safety and a reduction in fire risk, while outside of those areas management for both is considered more compatible.

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to elk include timber harvest, fire (prescribed and wildfire), long-term fire suppression, activities that reduce the amount of security during the big game hunting season, noxious weeds, and access management.
Management Direction:	Much of the Forest already provides security habitat for elk. Approximately 70% of the planning subunits meet the 30% threshold for security habitat. The Grizzly Bear Access Amendment (USDA Forest Service 2011) is incorporated into the draft Forest Plan and all alternatives. The effects would therefore be the same for all alternatives. Implementation would improve security habitat for not only grizzly bears, but for elk as well.

- Connectivity would be also improved by: GADC-WL-CLK-03, GADC-WL-FSH-01, GADC-KOO-02, GADC-WL-LIB-01, GADC-WL-TOB-02, and GADC-WL-YAK-01.

Management direction that would move vegetative conditions toward desired conditions that would benefit elk:

- Desired Conditions related vegetation and fire: FW-DC-VEG-01 through FW-DC-VEG-06, 10, 11; FW-DC-FIRE-03.

MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01.

To reduce the impacts of timber harvest on elk security habitat:

- FW-GDL-WL-10

Under the action alternatives, FW-DC-GRZ-01 states that grazing would occur at sustainable levels while protecting vulnerable resources.

Noxious weeds are limited/reduced through:

- FW-DC-VEG-10, FW-OBJ-VEG-02, GADC-VEG-FSH-01, GADC-WL-FSH-03, GADC-VEG-KOO-01, GADC-WL-KOO-04, GADC-VEG-LIB-03, and GADC-VEG-TOB-02. This improves forage conditions not only in security areas, but across the Forest.

To provide for elk security and minimize disturbance:

- FW-GDL-WL-08, 09, 10, 11

Landbird Assemblage (Insectivore)

The insectivore assemblage would be a MIS for vegetative change associated with timber harvest and fuels reduction. This MIS would be used to analyze progress towards the desired conditions for vegetation. This assemblage consists of olive-sided flycatcher, dusky flycatcher, Hammond's flycatcher, chipping sparrow, and hairy woodpecker; all of which were detected on the Forest during the Landbird Monitoring Program conducted by the Avian Science Center (http://globe.gcs-holdings.net/avian/GoogleMap.aspx?project=LBMP). A review of the literature shows that landbirds can have varied responses (densities) to thinning and burning treatments such as those that would be expected in order to move towards the desired conditions for vegetation (Gaines et al. 2007, Gaines et al. 2010, Saab et al. 2007). Hammond's flycatcher was included because it uses mature coniferous forests, and the hairy woodpecker was included because it uses snags for foraging and nesting.

Chipping sparrow, hairy woodpecker, Hammond's flycatcher, olive-sided flycatcher, and dusky flycatcher population biology, ecology, habitat description and relationships are described in the Birds of North America Online database (http://bna.birds.cornell.edu/bna). Additional information is provided at the NatureServe database (http://www.natureserve.org/explorer/index.htm).

What population data that is available through breeding bird surveys is found at: http://rmbo.org/pif_db/laped/query.aspx. Population trend data is available at: http://www.mbr-pwrc.usgs.gov/bbs/specl07.html. The LandBird Monitoring Program

(http://www.birdsource.org/LBMP/ and http://globe.gcs-holdings.net/avian/GoogleMap.aspx?project=LBMP) that covered Region 1 of the Forest Service began collecting point-count data. A newer version of this monitoring program has recently begun and can be built upon in the future to establish trends for the Forest.

The following information came from the NatureServe database (http://www.natureserve.org/explorer/index.htm) and the Birds of North America Online database (http://bna.birds.cornell.edu/bna).

The chipping sparrow prefers open, coniferous woodlands, edges near openings, and early successional forests with shrubs. They feed in low vegetation or on the ground for insects and the seeds of grasses and annuals.

The hairy woodpecker uses coniferous forests, including mature forests, along with edges and burned areas. They utilize cavities in snags for nesting. They primarily feed on insects found on the surface or subsurface of trees.

The Hammond's flycatcher uses mature coniferous forests that contain canopy openings. They primarily capture aerial insects by flycatching.

The olive-sided flycatcher uses open coniferous forests, edges near openings, or early successional forests if they contain residual conifers or snags to provide singing and foraging perches. They primarily capture aerial insects by flycatching.

The dusky flycatcher uses open coniferous forests, open areas with scattered trees, and brushy areas. They primarily capture aerial insects by flycatching.

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s):	Forest Service management activities that may have effects to the landbird assemblage (insectivores) include timber harvest (loss of snags and large trees), fire (prescribed and wildfire), long-term fire suppression, road maintenance and construction (habitat loss, facilitates firewood harvest and loss of snags), recreational use (habitat loss or disturbance).
Management Direction:	Management direction that would move vegetative conditions toward desired conditions that would benefit the landbird assemblage (insectivores): • Desired Conditions related vegetation and fire: FW-DC-VEG-01 through FW-DC-VEG-08, 10, 11; FW-GDL-VEG-03 through 06, FW-DC-FIRE-03. MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes: • MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01. This is useful to maintain/restore landbird habitat. GA direction that assists in trending towards the desired conditions for vegetation and fire includes:

- GADC-VEG-CLK-01, GADC-VEG-FSH-01, GADC-VEG-KOO-01, GADC-VEG-LIB-03, and GADC-VEG-TOB-01.

Under the action alternatives, FW-DC-GRZ-01 states that grazing would occur at sustainable levels while protecting vulnerable resources.

These insectivores are not dependent on old growth. However, for those species that use mature forests, old growth can contribute to available habitat:

- FW-STD-VEG-01 and 02, FW-GDL-VEG-01 and 02

Additional direction in the Plan that would benefit members of this group by maintaining or improving habitat include:

- FW-DC-WL-09 through 14, FW-GDL-WL-05

Incorporation of the Grizzly Bear FSEIS 2011 sets road density standards, minimizing habitat effects and disturbance associated with roads:

- FW- STD-WL-02

Migratory Birds

On January 10, 2001, President Clinton signed an Executive Order (13186) titled "Responsibilities of Federal Agencies to Protect Migratory Birds." The executive order states that environmental analysis of Federal actions, required by NEPA or other established environmental review processes, evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.

A MOU between the Forest Service and USFWS was signed in late 2008 (USDA and USFWS 2008) (FS Agreement #08-MU-1113-2400-264). The MOU outlines the responsibilities for both parties regarding migratory birds, including the Forest Service's responsibilities regarding consideration of migratory birds in NEPA projects. The MOU was used to help guide the development of this effects analysis.

A recent report issued by several organizations and Federal agencies summarized the general condition of birds across the US (NABCI 2009, 2011). It painted a picture of declines in multiple species across a variety of habitats. Climate change was one of the contributing factors to these declines, and is likely to continue impacting birds into the future. As the climate warms, breeding seasons and migrations are being altered. These activities may become out of sync with prey abundance, and climate change may also impact where and when those food items are available. This reinforces the need to have resilient habitat that is better able to handle climate change.

In 2008 the USFWS released a report titled "Birds of Conservation Concern" in which they listed species of concern by Bird Conservation Regions (USFWS 2008). That report helps focus conservation effort on the species that need it. The Forest lies within bird conservation region 10 (Northern Rockies). Table 37 lists the species of concern for that Bird Conservation Regions, not all of which are found on the Forest.

Table 37. Listed are the Birds of Conservation Concern for the Bird Conservation Region that overlaps the Forest (Bird Conservation Region 10 = Northern Rockies)

Common Name	Scientific Name	Is the Forest w/in the Range of Species?*
Bald Eagle	*Haliaeetus leucocephalus*	Y
Black Rosy-Finch	*Leucosticte atrata*	N
Black Swift	*Cypseloides niger*	Y

Common Name	Scientific Name	Is the Forest w/in the Range of Species?*
Brewer's Sparrow	*Spizella breweri*	Y
Calliope Hummingbird	*Stellula calliope*	Y
Cassin's Finch	*Carpodacus cassinii*	Y
Ferruginous Hawk	*Buteo regalis*	Y
Flammulated Owl	*Otus flammeolus*	Y
Lewis's Woodpecker	*Melanerpes lewis*	Y
Loggerhead Shrike	*Lanius ludovicianus*	Y
Long-Billed Curlew	*Numenius americanus*	Y
McCown's Longspur	*Calcarius mccownii*	N
Olive-Sided Flycatcher	*Contopus cooperi*	Y
Peregrine Falcon (b)	*Falco peregrinus*	Y
Sage Sparrow	*Amphispiza belli*	N
Sage Thrasher	*Oreoscoptes montanus*	N
Swainson's Hawk	*Buteo swainsoni*	Y
Upland Sandpiper	*Bartramia longicauda*	Y
White-Headed Woodpecker	*Picoides albolarvatus*	Y
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Y
Willow Flycatcher	*Empidonax traillii*	Y
Yellow-Billed Cuckoo	*Coccyzus americanus*	N

b = breeding
*NatureServe: Explorer http://www.natureserve.org/explorer/index.htm on 9/20/10 or KIPZ MIS Process and AMS Technical Report in the project record; Includes accidental, migratory, or transient occurrences.

Four of these species are additionally analyzed elsewhere in this document: bald eagle, peregrine falcon, flammulated owl, and olive-sided flycatcher.

The KNF is within the Partners in Flight Montana Conservation Plan (PIF 2000a). These conservation strategies are recommendations to use in management but they are not binding requirements. However, they provide a way to categorize and analyze important migratory bird habitat and species. The use of these plans supports the goal of maintaining long-term sustainability of migratory bird species and their habitats as specified by the Executive Order and Migratory Bird Treaty Act of 1918. Table 38 describes the Partners in Flight priorities by habitat and species and indicates whether the KNF is within the range of the species or not.

Table 38. Partners in Flight Priority Habitats/Species for Montana (PIF 2000a)

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Grassland			
Mixed Grass Prairie	Mountain plover	I	N
	Burrowing owl	I	Y
	Sprague's pipit	I	N
	Baird's sparrow	I	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
	Ferruginous hawk	II	Y
	Long-billed curlew	II	Y
	Lark bunting	II	Y
	Grasshopper sparrow	II	Y
	McCown's longspur	II	N
	Chestnut-collared longspur	II	N
	Northern harrier	III	Y
	Short-eared owl	III	Y
	Bobolink	III	Y
Intermountain Grasslands	Columbian sharp-tailed grouse	II	Y
Shrubland			
Sagebrush Shrubsteppe	Sage grouse	I	N
	Loggerhead shrike	II	Y
	Brewer's sparrow	II	Y
	Sage thrasher	III	N
	Lark sparrow	III	Y
Montane Shrubland	Calliope hummingbird	II	Y
	Nashville warbler	III	Y
	MacGillivray's warbler	III	Y
	Lazuli bunting	II	Y
	Common poorwill	III	N
	Green-tailed towhee	III	N
	Clay-colored sparrow	III	Y
Forest			
Dry Forest	Flammulated owl	I	Y
	Lewis's woodpecker	II	Y
	Blue grouse	III	Y
	Chipping sparrow	III	Y
	Cassin's finch	III	Y
	Red crossbill	III	Y
Cedar Hemlock	Brown creeper	I	Y
	Vaux's swift	II	Y
	Winter wren	II	Y
	Chestnut-backed chickadee	III	Y
	Golden-crowned kinglet	III	Y
	Varied thrush	III	Y
Burned Forest	Black-backed woodpecker	I	Y
	Olive-sided flycatcher	I	Y
	Three-toed woodpecker	II	Y
	Townsend's solitaire	III	Y
Moist Douglas-fir / Grand fir	Northern goshawk	II	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
	Williamson's sapsucker	II	Y
	Sharp-shinned hawk	III	Y
	Pileated woodpecker	II	Y
	Plumbeous/Cassin's vireos	III	N/Y
	Townsend's warbler	III	Y
Whitebark pine	Clark's nutcracker	III	Y
Aspen	Ruffed grouse	II	Y
	Red-naped sapsucker	II	Y
	Ovenbird	III	Y
Wet Subalpine fir (spruce/fir)	Great gray owl	III	Y
	Boreal owl	III	Y
Limber Pine / Juniper	N/A		
Dry Subalpine fir /Lodgepole pine	N/A		
Riparian			
Riparian Deciduous Forest (Cottonwood/Aspen)	Interior least tern	I	N
	Barrow's goldeneye	II	Y
	Hooded merganser	II	Y
	Bald eagle	II	Y
	Black-billed cuckoo	II	N
	Yellow-billed cuckoo	II	N
	Red-headed woodpecker	II	N
	Cordilleran flycatcher	II	Y
	Veery	II	Y
	Red-eyed vireo	II	Y
	Killdeer	III	Y
	Eastern screech owl	III	N
	Western screech owl	III	Y
	Downy woodpecker	III	Y
	Least flycatcher	III	Y
	American redstart	III	Y
	MacGillivray's warbler	III	Y
	Orchard oriole	III	Y
Riparian Shrub	Willow flycatcher	II	Y
	Rufous hummingbird	III	Y
	Gray catbird	III	Y
	Warbling vireo	III	Y
	Song sparrow	III	Y
Hardwood Draws	Swainson's hawk	III	Y
Riparian Coniferous Forest	Harlequin duck	I	Y
	Hammond's flycatcher	II	Y
	American dipper	III	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Wetlands			
Prairie Pothole	Piping plover	I	N
	Horned grebe	II	Y
	White-faced ibis	II	Y
	Marbled godwit	II	Y
	Franklin's gull	II	Y
	Forster's tern	II	Y
	Black tern	II	Y
	Clark's grebe	III	N
	Black-crowned night heron	III	N
	Black-necked stilt	III	Y
	Willet	III	N
	Wilson's phalarope	III	Y
	LeConte's sparrow	III	Y
	Nelson's sharp-tailed sparrow	III	N
Intermountain Valley Wetlands	Common loon	I	Y
	Trumpeter swan	I	N
	Common tern	II	Y
	American bittern	III	Y
	Yellow-headed blackbird	III	Y
Irrigation Reservoirs >640 ac	Caspian tern	II	Y
	American white pelican	III	Y
Irrigation Reservoirs <640 ac	Transient shorebirds	II	Y
High Elevation Wetlands	N/A		
Unique Habitats	Peregrine falcon	II	Y
	Black swift	II	Y
	Black rosy finch	II	N
	White-tailed ptarmigan	III	Y
	Chimney swift	III	N
	Red-winged blackbird	III	Y
	Brewer's blackbird	III	Y

*NatureServe: Explorer http://www.natureserve.org/explorer/index.htm on 9/20/10 or KIPZ MIS Process and AMS Technical Report in the project record; Includes accidental, migratory, or transient occurrences.

Several of these birds are additionally analyzed elsewhere in the document: flammulated owl, chipping sparrow, black-backed woodpecker, olive-sided flycatcher, Hammond's flycatcher, common loon, harlequin duck, and peregrine falcon.

Most of the habitats found on the Forest host one or more species of migratory birds. Generally speaking the birds arrive in the spring to set up territories for breeding purposes. Young are raised and fledged by mid-summer. Most species leave the Forest by mid- to late summer.

Table 39 displays the dominant vegetation types for the KNF. There is some overlap in categories and, therefore, some double-counting. For example, some acres counted as "riparian" would also be counted under the other forested types. Additionally, specific tree species may be found in more than one category, although for the purpose of display they were placed in only one category. Tree species may also be found in several other forest types. For example, aspen is displayed as a separate category, although aspen can be found in smaller quantities scattered throughout the other forested types.

Table 39. Dominant Vegetation Type for the KNF based on FIA Subplots, Vegetation Response Units, VMP Organized to Approximate the PIF Priority Habitats. Percentages and Acreages do not Tally to 100% due to Rounding and Overlap between some of the Categories Leading to Double-Counting

Dominant Vegetation Type	Estimated % of KNF	Estimated Acres
Dry forest (ponderosa pine / Douglas-fir)	29	643,845
Lodgepole pine	15	328,794
Cedar / western hemlock	6	130,038
Subalpine fir (spruce/fir)	20	441,198
Moist grand fir	4	83,520
Aspen/birch/cottonwood	1	13,744
Misc. forest (alpine larch, mountain hemlock, western larch, white pine, intolerant mix)	17	374,256
Whitebark pine	<1	8,458
Waterbodies (lakes, ponds, reservoirs, marsh, swamp, river)	<1	5,177
Riparian (INFISH)	12	257,082
Grassland	2	48,598
Shrubland	4	96,658
Burned forest	<1	8,246*
Non vegetation	1	13,315

*Recently burned, un-harvested acres based on 2003-2009 fires and 2003-2010 harvest. For species such as the black-backed woodpecker, recently burned forests are the most suitable habitat.

The habitat requirements of the species listed above, as well as range information, can be found online at NatureServe Explorer's database: http://www.natureserve.org/explorer/index.htm. Population estimates can be found on the Partners in Flight online database: http://rmbo.org/pif_db/laped/.

Effects Related to Key Stressors under Forest Service Control

The draft Forest Plan provides the following management direction (goals, desired conditions, objectives, standards and guidelines), for all action alternatives which would apply to future activities forestwide, and within MAs.

Key Stressor(s): Forest Service management activities that may have effects to migratory birds include timber harvest (loss of snags and large trees), fire (prescribed and wildfire), long-term fire suppression, road maintenance and construction (habitat loss, facilitates firewood harvest and loss of snags), recreational use (habitat loss or disturbance).

Management Direction:

Management direction that would move vegetative conditions toward desired conditions that would benefit migratory birds:

- Desired Conditions related vegetation and fire: FW-DC-VEG-01 through FW-DC-VEG-08, 10, 11; FW-GDL-VEG-03 through 06, FW-DC-FIRE-03.

MA direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes:

- MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01. This is useful to maintain/restore migratory bird habitat.

GA direction that assists in trending towards the desired conditions for vegetation and fire includes:

- GADC-VEG-CLK-01, GADC-VEG-FSH-01, GADC-VEG-KOO-01, GADC-VEG-LIB-03, and GADC-VEG-TOB-01.

Under the action alternatives, FW-DC-GRZ-01 states that grazing would occur at sustainable levels while protecting vulnerable resources.

These migratory birds are not dependent on old growth. However, for those species that use mature forests, old growth can contribute to available habitat:

- FW-STD-VEG-01 and 02, FW-GDL-VEG-01 and 02

Additional direction in the Plan that would benefit members of this group by maintaining or improving habitat include:

- FW-DC-WL-09 through 14, FW-GDL-WL-05

Incorporation of the Grizzly Bear FSEIS 2011 sets road density levels and would minimize habitat and disturbance effects related to roads:

- FW- STD-WL-02

Environmental Consequences – Effects of Proposed Alternatives and Management Area Direction on Terrestrial Wildlife Habitat and Species

Alternative A – No-action Alternative

This alternative represents no change from current condition. Effective fire suppression since the 1930s, the introduction of white pine blister rust, timber harvest, and the building of roads are the major causes of deviation from historic disturbance and vegetation patterns. These changes from historic conditions lead to further changes in disturbance and succession processes, making it difficult to provide for a sustainable ecosystem.

Vegetation treatments (per Spectrum model) would total about 5,300 acres/year in the first decade with a constrained budget and about 5,500 acres/year for the first decade with an unconstrained budget. Alternative A treats the least amount of acres for vegetation condition.

Direction to maximize growth and yield through short rotations, a high use of regeneration harvest, and intensive timber management is unattainable because of other resource management constraints and public values. Management areas 11, 12, 14, 15, 16 and 17 are suitable for timber production. Tentatively suitable acres total 1,711,800. There are 972,500 acres where

management precludes timber production as an objective; which leaves 739,300 acres, or 33 percent, of the KNF lands suitable for timber production.

Existing MAs are impractical for the use of wildland fire for multiple use objectives as well as for prescribed fires. Generally, the only management choice available with natural, unplanned fire is to respond with suppression tactics.

Certain forest cover types are not as well represented as they were historically. There has been a shift from late and early succession forest to a more uniform mid-succession forest (see "Vegetation" section of this document). The size of uninterrupted blocks of forest is smaller than it was historically and current direction for some habitats may not be adequate for species needing those habitats (e.g., snags, down wood).

Alternative A would retain the existing amount of recommended wilderness and nonmotorized areas. Large areas with limitations on motorized use can aid in providing security for wildlife.

The acreage in IRAs would be the same (approximately 638,000 acres). Under the 1987 Plan, IRAs fall into all MA categories.

The 1987 Forest Plan contains a number of plan components that address items related to forest structure. Some of these components are associated with the desire to have diverse age classes of forest stands for the purpose of maintaining the viability of all species (e.g., forestwide goal #7) or sufficient snags and replacement snags for snag-dependent species (e.g., forestwide goal #8 and wildlife and fish objective, p. II-7). There is some forestwide direction related to old growth (e.g., forestwide wildlife and fish objective p. II-7, forestwide standard, p. II-22) as well as an entire management area (MA13) assigned to old growth. The old growth related MA contains a goal of maintaining a minimum of 10 percent of each of the drainages in old growth, with the type of old growth representing the major habitat types and species. Lastly, that MA contains numerous standards for old growth that relate to what kind of activities may or may not occur in old growth stands and what kind of fire suppression activities and strategies should be taken.

Under current management (Alternative A), the percentage of the Forest with high snag densities would increase over the next five decades. The percentage of the Forest with 10-plus snags per acre, in the 10-20 inch dbh range, would increase from approximately 73 percent in decade 1 to 81percent in decade 5 with an unconstrained budget and 73 percent to 83 percent with constrained budgets. The percentage of the Forest with 4-plus snags/acre in the >20 inch dbh range would increase from approximately 12 percent in decade 1 to 39 percent in decade 5 with an unconstrained budget and 11 percent to 39 percent with constrained budgets.

Alternatives B, C, and D

Similar to old growth, each action alternative includes management direction related to maintaining coarse woody debris and logs, as well as snags (FW-GDL-VEG-03, 04, 05 and 06) (see table 40).

For Alternative B and C, the percentage of the Forest with 10-plus snags per acre in the 10-20 inch dbh range would increase from approximately 73 percent in decade 1 to 82 percent in decade 5 with an unconstrained budget and 74 percent to 85 percent with constrained budgets. The percentage of the Forest with 4-plus snags per acre in the >20 inch dbh range would increase from approximately 11 percent in decade 1 to 39 percent in decade 5 with an unconstrained budget and 12 percent to 41 percent with constrained budgets.

For Alternative D, the percentage of the Forest with 10-plus snags per acre in the 10-20 inch dbh range would increase from approximately 73 percent in decade 1 to 79 percent in decade 5 with an unconstrained budget and 73 percent to 84 percent with constrained budgets. The percentage of the Forest with 4-plus snags per acre in the >20 inch dbh range would increase from approximately 11 percent in decade 1 to 38 percent in decade 5 with an unconstrained budget and 11 percent to 40 percent with constrained budgets.

Table 40 shows the direction from the draft Forest Plan related to snag densities.

Table 40. Recommended Snag and Snag Recruitment Levels to Retain (where they exist) after Vegetation Management Activities (including post harvest activities), by Harvest Type

Dominance Group	Biophysical Setting	Snags ≥ 15"+ DBH	Live Trees ≥ 15.0" DBH
Ranges per acre where treatments result in a seed/sap size class (regeneration harvest)			
All except lodgepole pine	Warm/Dry	1.5 – 3.5	1.5 – 4.0
	Warm/ Moist	3.5 – 8.5	1.5 – 4.5
	Subalpine	4.0 – 5.5	1.5 – 2.5
Lodgepole pine	All	0.5 – 1.5	0.5 - 1.0
Ranges per acre where treatments result in a small or medium size class (commercial thin)			
All except lodgepole pine	Warm/Dry	0.5 – 2.5	9.5 – 16.5
	Warm/Moist	3.0 – 7.5	10.0 – 20.5
	Subalpine	3.0 – 4.5	10.0 – 13.0
Lodgepole pine	All	0.5 – 1.5	4.0 – 7.0
Ranges per acre for treatments in the large size class (improvement cut)			
All except lodgepole pine	Warm/Dry	2.0 – 5.0	22.0 – 30.5
	Warm/Moist	3.5 – 13.0	31.0 – 54.0
	Subalpine	5.5 – 8.5	29.5 – 36.5

Effects of Management Area Direction

Table 41 displays the acres by management area allocation for each alternative. The primary difference between the action alternatives is how much vegetative treatment is predicted each year to trend conditions toward the desired conditions for vegetation. Alternative C (15,740 acre/yr) has the most active restoration followed by Alternatives B (15,689 acre/yr), D (14,833 acre/yr), and A (5,294 acre/yr) under constrained budgets. With an unconstrained budget, Alternative B (16,148 acre/yr) has the most active restoration followed by Alternatives C (15,987 acre/yr), D (14,214 acre/yr), and A (5,527 acre/yr). Approximately 10,000 acre/yr of prescribed burning is predicted under the action alternatives, with very little or none in Alternative A. Of the action alternatives, D would be expected to have more regeneration treatments, followed by B and then C.

Table 41. Management Area Acres, by Alternative, for the Kootenai National Forest

Management Area		Alternative			
		A	B	C	D
1a	Designated Wilderness	93,700	93,700	93,700	93,700
1b	Recommended Wild.	76,500	110,200	214,800	36,100
1c	Wild Study Area	34,100	34,100	34,100	34,100
2	Wild and Scenic	38,132	47,300	45,100	50,200
3	Special Areas	15,900	31,600	30,500	31,700
4	RNAs		8,400	8,400	8,400
5a	Nonmotorized year round	343,800	227,600	336,700	112,600
5b	Motorized year round		163,800	121,200	47,900
5c	Nonmotorized summer/Motorized winter		86,100	20,000	117,500
6	General Forest		1,403,900	1,302,200	1,674,500
7	Primary Recreation Areas		12,400	12,400	12,400
Percent MA1b (recommended Wild)		3.4%	5.0%	9.7%	1.6%
Percent MA5 (backcountry)			21.6%	21.6%	12.5%
Percent MA6 (general forest)			63.3%	58.7%	75.5%
Percent suitable for timber production		33%	36%	34%	38%

Management area direction in the Plan that supports expanded use of wildland fire for resource benefit and prescribed fire includes: MA1a-DC-VEG-01, MA1a-DC-FIRE-01, MA1a-GDL-FIRE-01 and 02, MA1b-DC-VEG-01, MA1b-DC-FIRE-01, MA1b-DC-GDL-FIRE-01 and 02, MA1c-DC-VEG-01, MA1c-DC-FIRE-01, MA1c-GDL-FIRE-01 and 02, MA2-DC-FIRE-01, MA2-DC-VEG-01 and 03, MA2-GDL-FIRE-01 and 02, MA5abc-DC-VEG-01, MA5abc-DC-FIRE-01, MA5abc-GDL-FIRE-01, and MA6-GDL-FIRE-01. This is useful to maintain/restore native wildlife habitat in the long-term.

The increased use of fire, both wildfire and prescribed fire, would maintain or improve the pattern of native wildlife habitat across the Forest. MA1, and some of MA2 through 5, provides secure habitat across the Forest and contributes to maintaining that component of habitat. Managing for the desired conditions for vegetation (HRV) would likely result in a pattern of native wildlife habitat similar to what was found historically under natural disturbance processes.

Disturbance mainly occurs near roads and trails. Alternative C (1,515,400 acre wheeled motorized) would have the least acreage allowing motorized use, followed by Alternatives B (1,659,100 acre wheeled motorized), A (1,677,200 acre wheeled motorized), and D (1,817,700 acre wheeled motorized). The difference is primarily due to the differing acreages in recommended wilderness (MA1b).

All alternatives have the same acreage of wilderness (MA1a, 93,700 acre). Alternative C (214,800 acre) has the most land in recommended wilderness (MA1b), followed by Alternatives B (110,200 acre), A (76,500 acre), and D (36,100 acre). Wilderness areas (MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01), IRAs, and other nonmotorized areas (FW-STD-WL-02 and 03, FW-GDL-WL-10, MA3-DC-WL-01, and MA5abc-DC-WL-01) contribute to potential habitat with lower human disturbance.

All of the action alternatives have more acres in the wild and scenic river (eligible wild, scenic, and recreational rivers) categories. Alternative D (50,200 acre) has the most land allocated to MA2, followed by Alternatives B (47,300 acre), and C (45,100 acre), and A. Wild and Scenic River designation may improve or maintain habitat conditions for some native species. The likelihood of human disturbance is lower in those areas with limited wheeled motorized use.

Effects of Proposed Management Activities on Terrestrial Wildlife Habitat

Effects from Fire/Vegetation Management

Alternative A would likely have the most fire suppression. Fire suppression has led to the encroachment of other conifer species into whitebark pine habitat. This leads to the likelihood of whitebark pine being lost to stand-replacing fires or insects. At lower elevations, fire suppression has contributed to the development of denser stands that are more susceptible to large-scale disturbance such as insects, disease, or fire. Past timber harvest that focused on larger trees, combined with fire suppression that led to increased fuels and denser stands and retarded the development of large trees, has contributed to the vegetation on the KNF being outside of HRV. A trend toward the desired condition for vegetation (FW-DC-VEG-01 through 06, FW-DC-VEG-10 and 11) in the proposed Plan would move stands towards HRV and make vegetation more sustainable and resilient on the KNF. In areas such as wilderness, fire would more likely be allowed to play its historic role. In other areas of the KNF (primarily proposed as MA6 (general forest)), active restoration would be useful to reduce fuels before fire could be allowed back onto the landscape in some locations.

Effects from Grazing

Grazing that negatively impacts hardwoods may impact prey species habitat diversity (e.g., for lynx). However, the desired condition in the proposed Plan for grazing in Alternatives B, C, and D is that it occurs at sustainable levels while protecting resources such as wildlife habitat and riparian integrity (FW-DC-GRZ-01). Trending towards or maintaining that desired condition would reduce the likelihood of grazing impacting habitat under the action alternatives.

Effects from Lands/Special Uses

Current special use permits in grizzly bear habitat include sanitation measures to reduce human/wildlife conflicts (FW- STD-WL-04). Special use permits may cause disturbance to grizzlies and other wildlife species due to human activities (see “Key Stressors” for the various species, listed above). This may cause some wildlife to avoid those areas near the special use permit activities. Disturbance would be minimized through implementation of FW-DC-WL-01, FW-DC-WL-04, and FW-STD-WL-02. There would be areas available with lower likelihood of human disturbance (wilderness, roadless, etc.) for bears and other wildlife. Roadless areas, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01 create and maintain large, remote security habitats that are likely to have a lower amount of human presence due to the difficulties of access. Special uses can also alter some habitat, such as a ski area or utility corridor. There are no existing proposals that would remove or alter large areas, but any future proposals would be analyzed and mitigated at the project level.

The NRLMD (USDA Forest Service 2007) includes direction on ski area expansion, concentrating uses to reduce snow compaction, and maintaining habitat connectivity. Special uses, such as ski areas, can remove lynx habitat and impact connectivity. On the KNF, there is only one small ski area and the impact to habitat is minimal. Other special uses, such as utility

lines and communication towers, occur on the KNF and may be proposed in the future. These can lead to habitat loss. Human disturbance associated with special use permits can cause some species to avoid an area. FW-DC-WL-01 would minimize the chance of disturbance at den sites from special use projects. To minimize the effects on connectivity, FW-DC-WL-17 and FW-GDL-WL-14 provide direction to maintain or consolidate NFS ownership of lands that provide important connectivity near highway crossing structures.

Effects from Other Forest Products

The collection of forest products would continue under Alternative A, as well as the action alternatives. Human presence (disturbance) would be the main effect from the collection of other forest products. Generally, the collection of forest products occurs in close proximity to roads and the density of people engaged in this activity diminishes with increasing distance from a road or trail. Therefore, there would be areas on the Forest that would have very little or no collection of forest products due to limited accessibility. Under the action alternatives, IRAs, FW-STD-WL-02 and 03, FW-GDL-WL-10, MA1a-DC-WL-01, MA1b-DC-WL-01, MA1c-DC-WL-01, MA3-DC-WL-01, and MA5abc-DC-WL-01 create and maintain large, remote security habitats that are likely to have a lower amount of human presence due to the difficulties of access. Those areas (wilderness, roadless, etc.) would provide habitat where the likelihood of human presence would be lower. Alternative C (1,515,400 acre wheeled motorized, 1,761,000 acre over-snow motorized) would have the least acreage allowing motorized use, followed by Alternatives B (1,659,100 acre wheeled motorized, 1,865,100 acre over-snow motorized), A (1,677,200 acre wheeled motorized, 1,961,200 acre over-snow motorized), and D (1,817,700 acre wheeled motorized, 1,939,700 acre over-snow motorized). There could be some loss of resources for wildlife due to the collection of forest products (mushrooms, berries, etc.), but again, the areas where collection is likely to occur is near roads.

Cumulative Effects

In general, cumulative effects are assessed for the Forest and adjacent lands within three miles of the Forest boundary. The period considered for this analysis is the anticipated life of the Plan, 10 to 15 years.

All the action alternatives would contribute toward maintaining or improving habitat for threatened, endangered, candidate, and sensitive species. Timber harvest occurring on private or State lands, could impact habitat quality for a number of species.

Past mining, utility corridor construction, and other land uses on all ownerships may all decrease habitat to varying extents. Grazing has occurred and would continue to take place on lands belonging to various entities. Private land development, water diversion, and surface water development could lead to degradation or loss of some terrestrial species habitat.

Ski area expansion, utility corridor construction, private land development, water development, and mining are all possible future effects that could impact habitat or cause disturbance.

The Montana State Wildlife Conservation Strategy would improve habitat for a variety of species, and when utilized on non-NFS ownerships should compliment habitat improvement/maintenance on NFS lands.

Fuels reduction efforts are possible on all land ownerships, in particular where they are near residences. If these are done in such a way that they restore habitat that has been degraded by

fire suppression, then habitat can be improved or maintained. If not, then habitat can be lost and connectivity impacted.

Climate change could change the amount and quality of habitat. Changes in precipitation and temperature may reduce some habitats. The exact extent of the potential impacts is unknown.

Recreation is likely to increase on all land ownership types, if for no other reason than human population growth. This would increase human disturbance and increase the likelihood of motorized use degrading some habitats (e.g., peatlands, bogs) on non-NFS lands.

Winter travel planning efforts would likely change the amount of winter security habitat and extent for snow compaction.

Air Quality

Introduction

This report discloses the affected environment and environmental consequences to air quality that would result from implementing different programmatic level management strategies for the KNF. More specifically, the focus of this discussion is on smoke and how the various alternatives could affect smoke production through the use of prescribed fire, the use of wildfire for multiple objectives, or emissions from unwanted wildfires. Although there are other potential sources of air pollution from management activities that occur on the KNF (e.g., road dust, mining operations, emissions from logging equipment and recreational vehicles), smoke is the most substantial issue. Smoke can create public health issues as well as reduce the ability to view the scenery on the Forest. However, as discussed in the "Fire" and forest "Vegetation" sections of the draft EIS, there is strong need to use fire to maintain and restore the fire-adapted ecosystems on the KNF and as a tool to reduce hazardous fuels in the WUI.

Legal and Administrative Framework

Law and Executive Orders

- **The Federal Clean Air Act (CAA) of 1955 (as amended in 1967, 1970, 1977, and 1990):** The Act is a legal mandate designed to protect public health and welfare from air pollution. Although this policy creates the foundation for air quality regulation, states and counties are often responsible for implementation of the air quality standards. The task of identifying National Ambient Air Quality Standards (NAAQS) is assigned by the Clean Air Act to the EPA. The EPA evaluates and updates these standards every five years. For the state of Montana, the Montana Department of Environmental Quality (MT DEQ) both enforces these standards and is allowed to identify stricter regulations (National Wildfire Coordination Group, 2001).

The EPA defines 6 of 33 known air pollutants as criteria pollutants for which NAAQS are set. The most common violation of a NAAQS from smoke is that of the $PM_{2.5}$ standard. Wildfires are considered a naturally occurring event from which smoke impacts may not be prevented. For natural events, state DEQ's are required to have Natural Emergency Action Plans that identifies procedures such as notifying the public of health impacts of smoke and how to decrease and/or minimize exposure. Prescribed fires that are ignited by land managers are considered anthropogenic and, therefore, subject to regulation.

Table 42 displays the NAAQS for the six criteria pollutants identified by EPA:

Table 42. National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour	None	
	35 ppm (40 mg/m^3)	1-hour		
Lead	0.15 µg/m^3	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	53 ppb	Annual (Arithmetic Average)	Same as Primary	

	Primary Standards		Secondary Standards	
Pollutant	Level	Averaging Time	Level	Averaging Time
	100 ppb	1-hour	None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual (Arithmetic Average)	Same as Primary	
	35 µg/m^3	24-hour	Same as Primary	
Ozone	0.075 ppm (2008 std	8-hour	Same as Primary	
	0.08 ppm (1997 std)	8-hour	Same as Primary	
	0.12 ppm	1-hour	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour
	0.14 ppm	24-hour		
	75 ppb	1-hour	None	

From http://www.epa.gov/air/criteria.html

Areas where NAAQS are frequently met, or exceeded, are considered areas of non-attainment by the EPA. To prevent NAAQS violations, Montana has designated these areas and other areas of concern as Impact Zones. In accordance with the Interim Policy, Montana also has a smoke management plan which provides some flexibility should a NAAQS violations occur due to smoke. The combination of actions a state takes to regulate smoke, track and monitor pollutants, and enforce violations are known as a state implementation plan.

The Clean Air Act Amendment of 1977 designates mandatory visibility protection of Class I Airsheds which include wilderness areas established before 1977 that are greater than 5,000 acres. The Wilderness Act of 1964 mandates that the Forest Service preserves and protects the natural condition of designated wilderness areas (regardless of Class I designation), including the intrinsic wilderness value of air quality.

Currently the Forest Service participates in an organization known as the Montana-Idaho Airshed Group for prescribed burns within the state of Idaho. Group members submit prescribed burns to the smoke management unit for daily, site-specific approval. The smoke management unit is responsible for making sound and timely decisions to maximize the amount of smoke being put in the air (acres burned) and minimizes adverse air quality impacts based on individual airsheds throughout Montana and Idaho. Adherence to the Montana/Idaho Airshed Group Operating Guide is the current accepted smoke management plan for the State of Idaho.

In addition, air quality is addressed for every prescribed burn in the individual prescribed fire plan. The Forest Service Handbook requires a documented burn plan that contains all of the elements outlined in the 2008 Interagency Prescribed Fire Planning and Implementation Procedures Guide. This guide prompts the burn plan author to address all laws and regulations concerning smoke management as well as the potential for localized nuisance smoke impacts.

In 1998 the EPA released the *Interim Air Quality Policy on Wildland and Prescribed Fires* (Interim Policy). The document was published with the intent of integrating two public policy goals, "(1) to allow fire to function, as nearly as possible, in its natural role in maintaining healthy wildland ecosystems, and (2) to protect public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility." This document recognizes the

goal of the National Fire Plan (1995, revised in 2001) to implement fuel reduction projects in the WUI and return fire to landscapes, and the impacts this will have on air quality.

Wildfire smoke can produce three of six criteria pollutants the EPA has set maximum standards for to protect human and environmental health. These include carbon monoxide, particulate matter, and volatile organic compounds that can produce ground-level ozone (http://www.epa.gov/air/ozonepollution/). Seventy percent of smoke emissions are made up of small particulate matter ($PM_{2.5}$ or particulate matter smaller than 2.5 micrometers) which has been proven to cause adverse health effects in humans (http://www.epa.gov/pm/health.html). Because of this, wildfire smoke from naturally ignited fire and prescribed fire poses a potential health threat to the public. Another smoke emission that poses health risks to humans is carbon monoxide, which can cause short-term health related problems for firefighters. Carbon monoxide rapidly mixes with surrounding air at short distances from a burn area and, therefore, poses little to no risk to the general public (Sandberg and Dost 1990). Ground-level ozone, although not a direct product of smoke emissions is a concern due to its effect on lung function and plant growth.

The small size of $PM_{2.5}$ makes these particles highly efficient at scattering light, causing visibility issues, and contributing to what the EPA has called "Regional Haze." The Regional Haze Rule, promulgated by the EPA in 1999, addresses improving visibility in Class I airsheds such as wilderness areas and National Parks. Regardless of whether smoke violates air quality standards, localized impacts of burning can cause visibility issues on public roadways. Nuisance smoke is defined by the EPA (1990) as the amount of smoke in the ambient air that interferes with a right or privilege common to members of the public, including the use or enjoyment of public or private resources.

In Montana, the Forest Service is required to annually obtain an open burning permit from MT DEQ in order to conduct prescribed burning statewide. In addition, the Forest Service participates in an organization known as the Montana-Idaho Airshed Group for prescribed burns within the state of Montana. Group members submit prescribed burns to the smoke management unit for daily, site-specific approval. The smoke management unit is responsible for making sound and timely decisions to maximize the amount of smoke being put in the air (acres burned) and minimizes adverse air quality impacts based on individual airsheds throughout Montana and Idaho. During the Fall burning season (September – December), the smoke management unit coordinates with MT DEQ on burn approvals. During the winter season (December – February), the smoke management unit is not in operation; however, burning can potentially take place with special approval from MT DEQ. Montana DEQ also requires burners to use Best Available Control Technology. Their policy defines Best Available Control Technology as: those techniques and methods of controlling emission of pollutants from an existing or proposed open burning source which limit those emissions to the maximum degree which the Department of Environmental Quality determines, on a case-by-case basis, is achievable for that source, taking into account impacts on energy use, the environment, and the economy and any other costs, including the cost to the source.

For Lincoln County Montana, special rules have been implemented concerning air quality. A special permit as well as daily burn approval must be granted from the Libby Air Quality District. These special regulations exist to protect the Libby and Eureka Impact Zones.

Key Indicator

- Ambient air quality and visibility.

Methodology and Analysis Process

A qualitative assessment of smoke emissions and consequences to ambient air quality and visibility was used as the indicator for effects to air quality. The actual quantitative smoke that would be produced by each alternative and the impacts on air quality are too variable to accurately predict. Potential emissions from unwanted wildfires are difficult to predict as they would vary depending upon site-specific vegetation and fuels conditions, ignitions, weather, and available suppression resources. Emissions from the use of prescribe fire and the use of wildfire for multiple objectives is also difficult to predict quantitatively. Therefore, the comparison of alternatives is based on a qualitative assessment of the relative amounts and timing of smoke that may be emitted by the alternatives.

Affected Environment (Existing Condition)

Because the area contained within the KNF boundary is relatively rural, non-forest pollution sources, such as industry and heavy automobile traffic, have not greatly impacted air quality. Industrial sources of pollution within the Forest may include timber and mining operations. Dust from forest roads may also contribute to fine particulates in the air. Contributions from forest operations are generally minimal and have not been shown to contribute to NAAQS violations. Voluntary smoke management from forest industry, state, and federal partners has helped prevent NAAQS violations and reduced nuisance smoke.

Areas of concern within the Forest include the impact zones of Eureka and Libby. Libby is also classified as a non-attainment area for the $PM_{2.5}$ annual standard (see figure 35). Impact zones are created for populated areas where air quality concerns to public health arise as NAAQS are sometimes exceeded or close to exceeding. Areas of population generally exist in valley bottoms where mixing and dispersion of air is reduced. Sources of pollution within these impact zones, including smoke, are closely monitored and regulated.

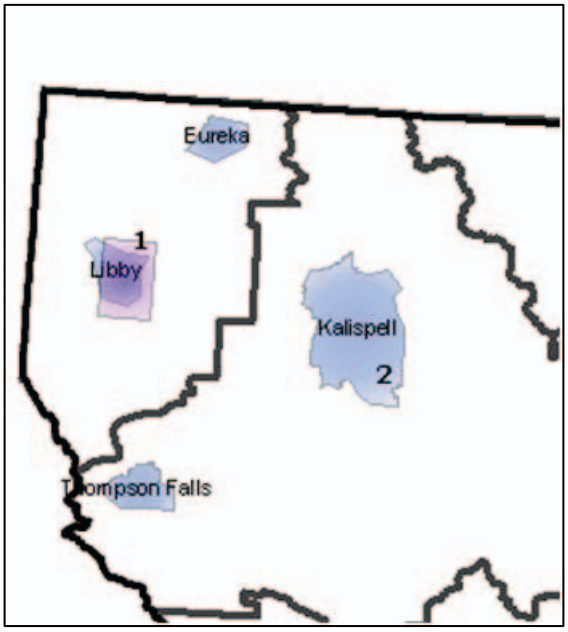


Figure 35. Western Montana Airsheds and Impact Zones taken from the MT/ID Airshed Group 2010 Operations Guide

The MT DEQ has a network of air quality monitors throughout the state. Real-time data is tracked to identify times of poor air quality and notify the public of potential concerns. The MT/ID Airshed Group accesses this information in making burn approval decisions.

Because of the health impacts caused by wildfire smoke, the Northern Rockies Coordinating Group created the *Montana-Idaho Interagency Smoke Management Strategy for the Mitigation of Public Health and Welfare Impacts Caused by Smoke from Unplanned Ignitions* (2010). Although this document is not intended to be legally enforceable, the Integration Strategy is meant to communicate roles and responsibilities (for land managers as well as others), inform the public, identify coordination activities, provide lessons learned and examples of good smoke management, and provide for future revision.

Visibility monitoring is done through the Interagency Monitoring of Protected Visual Environments Network, which exists through cooperation efforts from the EPA, state regulatory agencies, and federal land managers. This monitoring network establishes current air quality conditions for Class I areas and tracks progress towards the national visibility goal outlined in the Clean Air Act. The interagency monitoring of protected visual environments provides a standardized system to identify long-term trend and determine the types of pollutants and sources responsible for visibility impairments (http://vista.cira.colostate.edu/improve/Overview/Overview.htm).

Region 1 of the Forest Service currently has what is called the "USFS R1 Air Quality Monitoring Plan" (USDA Forest Service 1997). Monitoring protocols for air quality related values for Class I areas and wilderness air quality values are defined and documented. Part of the monitoring plan includes participation in the Interagency Monitoring of Protected Visual Environments Network.

Environmental Consequences

Management Direction

All of the alternatives contain essentially the same Forest Plan direction regarding the desire and need to meet Federal, State, and local air quality standards and direction. The 1987 Forest Plan contains forestwide objectives (page II-6) and standards (Air Quality standard #13) and the action alternatives contain forestwide desired conditions (FW-DC-AQ-01) and guidelines (FW-GDL-AQ-01) that are similar in nature. Therefore, the direction that is specific to air quality in the various alternatives would have similar consequences. That is, the direction is designed to meet applicable laws and regulations.

The management direction that could have consequences to smoke production includes direction that would affect how much prescribed fire would occur, how much wildfire is managed for multiple objectives, and how much unwanted wildfire may occur. The alternatives do contain plan components related to fire that could influence these elements and they are summarized below.

General Effects

Because prescribed fire smoke is closely regulated by the smoke management unit, any additional prescribed fire acres would have to be accomplished on burn days where smoke dispersion is good and the Impact Zones are not affected.

The Cabinet Mountain Wilderness within the KNF boundary is classified as a Class I Airshed. Smoke from prescribed fire, wildfires being managed for multiple objectives and unwanted wildfires all may cause visibility impairments.

Smoke from unwanted wildfires is predicted to remain the same across all the alternatives, including the no-action alternative. The difference in smoke inputs during wildfire season would be due to the contribution of the smoke from allowing wildfires being managed for multiple objectives. Because wildfire being managed for multiple objectives is still considered a natural event, smoke from these events are currently un-regulated by MT DEQ. The effects of the added smoke input to the airshed during the summer may or may not be adverse. Because managing wildfire for multiple objectives is most suitable for backcountry areas away from human populations; air quality effects should be minimal to public health.

The different alternatives have varying levels of emphasis on managing wildfire for multiple objectives. Because of this, the effect on air quality may differ between the alternatives. Alternative C places the greatest influence on natural disturbance processes, including wildfire. Based on this goal, this alternative could potentially create the greatest amount of smoke. Alternative D places management emphasis on active management, including timber harvest. Although backcountry areas would still encourage managing wildfires for multiple objectives, the acreage of the backcountry MA is slightly reduced which could reduce the amount of acres burned. In terms of air quality affects, Alternative B lies somewhere between C and D. Not as much emphasis is placed on natural disturbances as Alternative C; however, the opportunity for managing wildfire for multiple objectives under this alternative in terms of backcountry acres is greater than Alternative D.

Smoke produced from managing wildfire for multiple objectives will vary spatially and temporally. The decision to manage a wildfire for multiple objectives affects many resources, including air quality. Despite the lack of specific air-quality regulations on wildfires that are managed for multiple objectives, consideration is given to the effect the fire will have on air quality during the decision process. Working with the MT DEQ and avoiding decisions that will cause health and welfare concerns to the public will minimize the effects of managing wildfires for multiple objectives on air quality.

Cumulative Effects

Air quality is a complex issue. Inputs of pollutants into an airshed can be from automobile exhaust, industry, dust from driving on dry roads or wind events, wood stoves, agricultural burning, and wildland fires. The range of sources of these pollutants, climatology, and topography all influence air quality conditions at any given location. The air quality on the KNF is affected by actions occurring hundreds of miles away, such as agricultural burning and/or tilling (Hammer 2003). If a neighboring national forest chooses to manage a wildfire for multiple objectives, this decision may have air quality impacts on the KNF and vice versa.

In the case of managing a wildfire for multiple objectives, the Forest Service may choose to allow the fire to burn and perform a natural role, regardless of whether initial attack fire resources have the ability to suppress the ignition. Certain circumstances will limit the KNF from managing fires for multiple objectives, including air quality. While there is not specific regulation addressing wildfires, the MT DEQ still maintains the authority to enforce NAAQS, including stopping land managers from allowing a fire to burn during times of poor air quality.

Human Uses and Designations of the Forest

This section includes the following resources:

- Access and Recreation
- Lands/Special Uses
- Roadless Areas
- Designated Wilderness, Wilderness Study Area, Recommended Wilderness
- Wild and Scenic Rivers
- Research Natural Areas
- Special Areas
- Cultural Resources
- Tribal Interest and Treaty Rights

Access and Recreation

Introduction

The focus of outdoor recreation management is to provide a wide range of environmentally sustainable opportunities in natural settings in order to meet the needs and desires of visitors. People have always enjoyed relatively free access to recreation opportunities on federal public lands, although recreation was not a high priority when the country first began to set aside national forests. Recreation use was present at that time, but it was an unstated secondary benefit, enjoyed by a relative few. However, since the end of World War II, demand for outdoor recreation on public land has grown. This section covers: Developed Recreation, Dispersed Recreation, Special Use Permits, Scenery Management, and Travel Management on Roads and Trails.

Access, using roads and trails, is associated with virtually every activity that takes place on the KNF. Roads and trails accommodate many purposes such as: outdoor recreation, fire suppression, livestock and wildlife management, transport of natural resources such as logs and minerals, firewood gathering, private in-holding access, electronic site and utility corridor maintenance, and managing and monitoring forest resources.

Modes of vehicle travel on the Forest include: large commercial trucks, cars, pickups, four-wheel drive vehicles, over-snow vehicles, off-road vehicles (e.g., motorcycles, ATVs), mountain bikes, and wheelchairs. Other non-vehicular travel modes include cross-country/back-country skiing, dog sledding, horseback riding, and hiking.

These various forms of travel may occur on designated paved, aggregate, or native surface roads, and trails managed for motorized and/or nonmotorized use.

Legal and Administrative Framework

Law and Executive Orders

- **Organic Administration Act of June 4, 1897 (30 Stat. 11, as amended):** This act authorizes the establishment of national forests.
- **Multiple-Use Sustained-Yield Act of June 12, 1960 (P.L.86-517, 74 Stat.215):** This act provides direction to the NFS lands to provide access and recreation opportunities. The act states, “The policy of Congress is that national forests are established and administered for outdoor recreation…”
- **Term Permit Act of March 4, 1915 (P.L. 63-293, Ch. 144, 38 Stat. 1101, as amended; 16 U.S.C. 497):** This act provides direction to the NFS lands to authorize occupancy for a wide variety of uses through permits not exceeding 30 years.
- **National Forest Roads and Trails Act of October 13, 1964 (P.L. 88-657, 78 Stat. 1089, as amended):** This act declared that an adequate system of roads and trails be constructed and maintained to meet the increasing demand for recreation and other uses. This act authorizes road and trail systems for the national forests. It authorizes granting of easements across NFS lands, construction and financing of maximum economy roads (FSM 7705), and imposition of requirements on road users for maintaining and reconstructing roads, including cooperative deposits for that work.

- **The Wilderness Act of September 9, 1964 (16 U.S.C. 1131(note), 1131-1136):** This act establishes the National Wilderness Preservation System to be administered for the "…use and enjoyment of the American people…"
- **Land and Water Conservation Fund Act of 1965 (P.L. 88-578, 78 Stat. 897 as amended; 16 U.S.C. 460l-4(note); 460l-4 thru 6a, 460l-7 thru 460l-10, 460l-10a-d, 460l-11):** "The purposes of this act are to assist in preserving, developing, and assuring accessibility to all citizens of the United States of America…such quality and quantity of outdoor recreation resources…providing funds for:" 1. States for acquisition, planning, and development of recreation facilities and; 2. Federal acquisition and development of certain lands and other areas.
- **Highway Safety Act of September 9, 1966 (P.L. 89-564, 80 Stat. 731, as amended):** This act authorizes state and local governments and participating federal agencies to identify and survey accident locations; to design, construct, and maintain roads in accordance with safety standards; to apply sound traffic control principles and standards; and to promote pedestrian safety.
- **Architectural Barriers Act of August 12, 1968 (P.L. 90-480, 82 Stat. 718 51 U.S.C. 4151-4154, 4154a, 4155-4157):** This act establishes additional requirements to ensure that buildings, facilities, rail passenger cars, and vehicles are accessible to individuals with disabilities. It covers architecture and design, transportation, and communication elements of recreational site planning and development.
- **Wild and Scenic Rivers Act of October 2, 1968 (P.L. 90-542, 82 Stat. 906, as amended):** This act establishes a National Wild and Scenic Rivers System with three classes of river systems: wild, scenic, and recreation. The purpose of the act was to protect the river "…for the benefit and enjoyment of present and future generations."
- **National Trails System Act of October 2, 1968 (P.L. 90-543, 82 Stat.919, as amended):** This act establishes the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.
- **Federal Aid Highway Act of 1968, as amended (23 U.S.C. 109(a) and (h), 144, 151, 319, and 351):** Establishes the National Bridge Inspection Standards (23 CFR Part 650, Subpart C) and the requirement that each state have a current inventory of bridges on all public roads, including NFS roads open to public travel (FSM 1535.11).
- **Rehabilitation Act of September 26, 1973 (P.L. 93-112, Title V, 87 Stat. 390, as amended; 29 U.S.C. 791, 793-794, 794a, 794b):** This act requires that programs and activities conducted by federal agencies and by entities that receive funding from, or operate under a permit from, federal agencies provide an equal opportunity for individuals with disabilities to participate in an integrated setting, as independently as possible. The only exception to the requirement is when the program would be fundamentally altered if changes were made solely for the purpose of accessibility.
- **Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (P.L. 93-378, 88 Stat. 476, as amended):** This act declares (per Sec. 10) that "…the installation of a proper system of transportation to service the NFS ….shall be carried forward in time to meet anticipated needs on an economical and environmentally sound basis…"
- **Federal Land Policy and Management Act of October 21, 1976 (P.L. 94-579, 90 Stat. 2742, as amended):** This act declares (per Sec. 102) that "…the public lands be managed in a manner that…will provide for outdoor recreation and human occupancy and use."

- **Surface Transportation Assistance Act of 1978 (P.L. 95-599, as amended). Supersedes the Forest Highway Act of 1958:** Authorizes appropriations for forest highways and public lands highways. Establishes criteria for forest highways; defines forest roads, forest development roads and forest development trails (referred to as "NFS roads" and "NFS trails" in Forest Service regulations and directives); and limits the size of projects performed by Forest Service employees on forest roads. Establishes the Federal Lands Highway Program.
- **Rails to Trails (National Trails System Improvements Act of October 4, 1988 (P.L. 100-470, 102 Stat. 2281; 16 U.S.C. 1241(note); 12 U.S.C. 1248(note))):** This act was enacted to facilitate the development of trail systems by federal, state, or local governments on railroad rights-of-way that may be suitable for trail use when such rights-of-way are abandoned.
- **Federal Cave Resources Protection Act of November 18, 1988 (P.L. 100-691, 102 Stat. 4546; 16 U.S.C. 4301 note, 4301 to 4309):** This act was enacted to secure, protect, and preserve significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people.
- **Ski Fees, Omnibus Parks and Public Lands Management Act of November 12, 1996 (Pub. L. 104-333, div. I, Title VII, Sec. 701, 110 Stat. 4182; 16 U.S.C. 497c):** Section 701 of this act:
  - Establishes a system to calculate fees for ski area permits issued under the National Forest Ski Area Permit Act of 1986 (16 U.S.C. 497b);
  - Provides for holders of ski area permits issued under other authorities to elect this permit fee system (FSH 2709.11, sec. 38.03a);
  - Includes provisions concerning compliance with NEPA when issuing permits for existing ski areas (FSM 2721.61f and FSH 2709.11, sec. 41.61b); and
  - Withdraws leasable and locatable minerals, subject to valid existing rights (FSH 2709.11, sec. 41.61c).
- **Secure Rural Schools and Community Self-Determination Act of October 30, 2000 (P. L. 106-393, 114 Stat. 1607; 16 U.S.C.500 note):** This act provides provisions to make additional investments in, and create additional employment opportunities through, projects that improve the maintenance of existing infrastructure, implement stewardship objectives that enhance forest ecosystems, and restore and improve land health and water quality.
- **Federal Lands Recreation Enhancement Act of December 8, 2004 (P.L. 108-447, as amended)**: This act gives the Secretaries of Agriculture and Interior the authority to establish, modify, charge, and collect recreation fees at federal recreational lands where a certain level of amenities have been developed.
- **Omnibus Public Land Management Act of March 30, 2009 (P.L. 111-11, Title V, Section 5205):** This act designated the Pacific Northwest National Scenic Trail including the section that crosses the KNF.
- **Executive Order 11644 (as amended):** Establishes policy and procedure "…that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands."
- **Executive Order 12862:** Setting Customer Service Standards requires information about quantity and quality of recreation visits for national forest plans.

Code of Federal Regulations (CFR)

- **36 CFR 212 –** Travel Management
- **36 CFR 219 –** Planning
- **36 CFR 251 –** Land Uses
- **36 CFR 261 –** Prohibitions
- **36 CFR 290 –** Cave Resources
- **36 CFR 291 –** Occupancy and Use of Developed Sites and Areas of Concentrated Public Use
- **36 CFR 293 –** Wilderness-Primitive Areas
- **36 CFR 294 –** Special Areas
- **36 CFR 297 –** Wild and Scenic Rivers

Key Indicators

- Percent of the Forest and location of areas where roads and trails may be designated for wheeled motor vehicle use;
- Percent of the Forest and location of areas where over-snow vehicle use is allowed;
- Percent of the Forest and location of areas where mechanized use is allowed;
- Percent of the Forest and location managed in the various recreation opportunity spectrum (ROS) classes; and
- Percent of the Forest managed for various scenic integrity objectives categories.

Methodology and Analysis Process

For comparative purposes each alternative is analyzed for the total number of acres, by MA allocation, where wheeled motor vehicle use may be designated, and over-snow vehicle use is allowed, or mechanized use is allowed.

Each MA is identified as to whether wheeled motor vehicle use, over-snow vehicle use, or mechanized use is allowed. GIS is then used to calculate the cumulative acres for that MA across the Forest. The cumulative acres for all of the MAs within each alternative are then calculated.

Likewise, each alternative is analyzed for the total number of acres and percentage of the Forest managed in various ROS classes and categories of scenic integrity objectives. Each MA includes direction for the ROS class and scenic integrity objectives that is most appropriate for management of that area of the Forest.

Affected Environment (Existing Condition)

Transportation System

Across the KNF there are approximately 7,900 miles of road under Forest Service jurisdiction. Additional miles of roads cross the Forest, but are managed and administered by other jurisdictions such as state, county, or private.

National Forest System roads are an infrastructure capital investment that support forest management activities and are considered physical assets. Since the end of WWII an extensive system of roads has been constructed and has continual management and maintenance needs.

The direction for effective and efficient management of NFS roads is founded in laws, regulations, and agency directives.

One part of that direction is management objectives be established for all roads. These management objectives take into consideration: MA direction; needs for coordination of uses; access management, and the design, operation, and maintenance criteria for NFS roads.

In order to develop road management objectives a variety of descriptive conditions are used. The more prominent ones are:

- **Functional Class –** The way a road services land and resource management needs, and the character of service it provides.
  - **Arterial –** A road that provides service to large land areas and usually connects with other arterial roads or public highways.
  - **Collector –** A road that serves smaller areas than an arterial road and usually connects arterial roads to local roads or terminal facilities.
  - **Local –** A road that connects a terminal facility with collector roads, arterial roads, or public highways and usually serves a single purpose involving intermittent use.

This branching system of arterial, collector, and local roads, is the network that provides access to NFS lands. Generally, most arterial and collector roads are aggregate surfaced; and some have a paved surface, while most local roads are native surfaced. Table 43 displays the miles by functional class.

Table 43. Summary of KNF Roads by Functional Class

Functional Class	Miles
Arterial	324
Collector	2,269
Local	5,269
Not assigned	32
Total	**7,894**

Source: Infra: Travel Routes 5/2010

- **Traffic Service Level –** Describes the significant traffic characteristics and operating conditions for a road.
  - **Level A –** Free flowing, mixed traffic; stable, smooth surface. Provides safe service to all traffic.
  - **Level B –** Congested during heavy traffic, slower speeds and periodic dust; accommodates any legal size load or vehicle.
  - **Level C –** Interrupted traffic flow, limited passing facilities, may not accommodate some vehicles. Low design speeds. Unstable surface under certain traffic or weather.
  - **Level D –** Traffic flow is slow and may be blocked by management activities. Two-way traffic is difficult; backing may be required. Rough and irregular surface. Travel with low clearance vehicles is difficult. Single purpose facility.

Table 44 displays the miles by traffic service level.

Table 44. Summary of KNF Roads by Traffic Service Level

Traffic Service Level	Miles
Level A	24
Level B	143
Level C	1,909
Level D	5,201
Not assigned	617
Total	**7,894**

Source: Infra: Travel Routes 5/2010

- **Operational Maintenance Level –** The maintenance level currently assigned to the road considering today's needs, road condition, budget constraints, and environmental concerns; in other words, it defines the level to which the road is currently being maintained.
  - **Level 5 –** Assigned to roads that provide a high degree of user comfort and convenience.
  - **Level 4 –** Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.
  - **Level 3 –** Assigned to roads open for and maintained for travel by a prudent driver in a standard passenger car.
  - **Level 2 –** Assigned to roads open for use by high clearance vehicles.
  - **Level 1 –** Assigned to roads that have been placed in storage (greater than one year) between intermittent uses. Basic custodial maintenance is performed. Road is closed to vehicular traffic.

Table 45 displays the miles of roads by operational maintenance level. Figure 36 displays the operational maintenance level by district.

Table 45. Summary of KNF Roads by Operational Maintenance Level

Operational Maintenance Level	Miles
Level 5	69
Level 4	125
Level 3	1,504
Level 2	1,940
Level 1	4,240
Not assigned	16
Total	**7,894**

Source: Infra: Travel Routes 5/2010

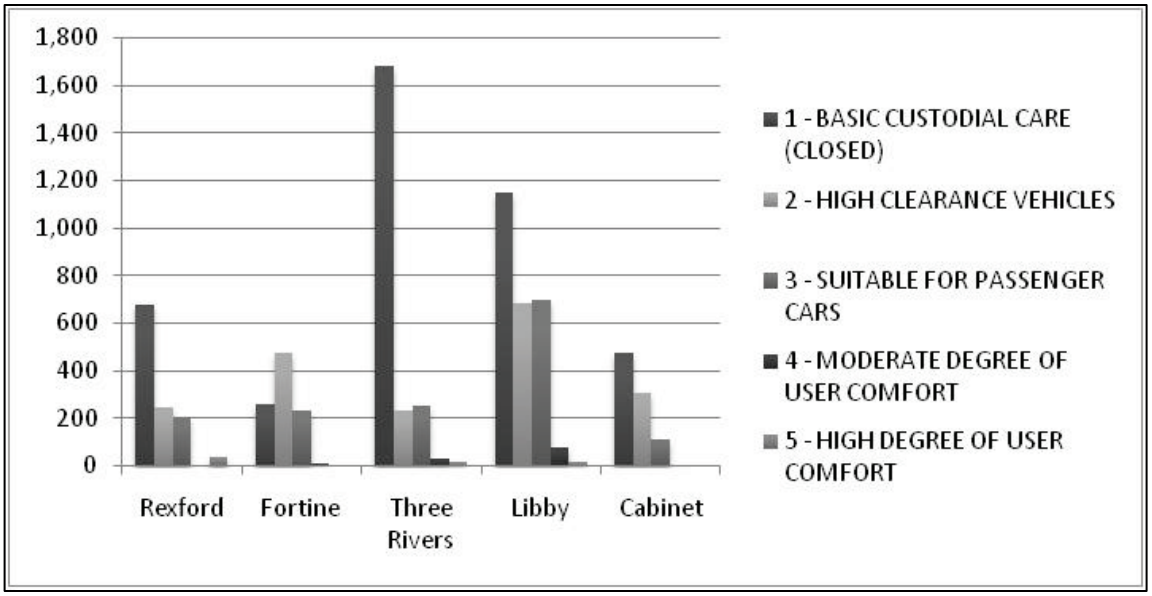


Figure 36. Operational Maintenance Level by District

As a result of financial limitations, and requirements to meet other resource objectives, the trend has been to progress toward fewer miles of NFS roads on the KNF. Over the last 15 to 20 years, the KNF has decommissioned approximately 980 miles of road.

The KNF has also been treating roads and putting them into what is termed "intermittent stored service." These roads have been identified as needed (generally within the next 10 to 20 years) as NFS roads and are treated to reduce the risk of undesirable resource impacts. Over the last 15 to 20 years the KNF has put about 283 miles of NFS roads into intermittent stored service.

The site-specific types, quantities, and distribution of motorized access on the KNF continue to be determined at the district level through the NEPA process and identified on maps and associated legal orders.

Travel Management

Roads, trails, and areas provide a wide spectrum of diverse opportunities to travel to, in and through the KNF. The Forest Service approaches access and travel management with the recognition that it affects every program we have and every person we serve. The overarching aim is to seek a balance of access opportunities on NFS lands while considering resource needs and user safety.

For example, wilderness areas provide a primitive, nonmotorized experience. Campgrounds on the other hand, with high levels of development, are at the other end of the spectrum. Where the various opportunities are located, and the types of uses allowed, are factors that influence the kind of experiences to expect. Whether a road, trail, or an area is open to motorized use, and time of year when they are open, are important considerations regarding travel management on the KNF.

Roads, trails, and areas where wheeled motor vehicle use is allowed are identified on the KNF motor vehicle use map(s) (MVUM). A motor vehicle use map shows those roads, trails, and areas designated for motor vehicle use, under 36 CFR 212.51 for the purpose of enforcing the prohibition at 36 CFR 261.13. Any wheeled motor vehicle use occurring on other than those

roads, trails, and areas as shown on the MVUMs is prohibited and subject to fine and/or imprisonment. The MVUMs are subject to annual review and reissuance.

At this time, over-snow vehicle use is managed differently from wheeled motor vehicle use. There is no over-snow vehicle use map used to designate where and when over-snow vehicle use is allowed. Under the 1987 Forest Plan, over-snow vehicle use (generally December 1 – April 30) is allowed anywhere it is not expressly prohibited with a legal order (36 CFR 261.50). Legal orders currently in effect prohibit over-snow vehicle use on approximately 1,054 miles of NFS roads and approximately across 257,900 acres of NFS lands. The areas where over-snow vehicle use is prohibited are: designated wilderness, recommended wilderness, and other area closures for semi-primitive nonmotorized recreation and big game winter range.

At this time, mechanized use is managed the same as over-snow vehicle use. There is no mechanized use map used to designate where and when mechanized use is allowed. Under the 1987 Forest Plan, mechanized use is allowed anywhere it is not expressly prohibited with a legal order (36 CFR 261.50). The only area where mechanized use is prohibited is designated wilderness (e.g., Cabinet Mountains Wilderness).

Roads

The current status for motorized access on NFS roads is summarized in table 46. The table displays the total miles of road, whether they are designated for motorized use, and whether they are designated yearlong or seasonally. The KNF currently has about 3,553 miles of NFS roads designated for either yearlong or seasonal motor vehicle use. These roads are available for use by highway legal vehicles that meet State legal requirements.

Table 46. Summary of KNF Roads by Travel Management Status

Total Miles of Road	Miles of Roads Designated Yearlong for Motorized Use	Miles of Roads Designated Seasonally for Motorized Use	Miles of Roads where Nonmotorized Use is Allowed
7,894	2,832	721	7,894

Source – Infra: Travel Routes 5/2010

All roads on the KNF allow for nonmotorized use. The only exception is road 401 in the Rainy Creek drainage which is closed to all traffic for health and safety reasons. The actual ability to use roads by nonmotorized means may be limited due to vegetation. Many roads on the KNF have been in maintenance Level 1 for many years and have re-vegetated to the point where even walking along the road prism is challenging.

Trails

Table 47 displays the miles of trails by season of use (summer or winter) and whether the trail is managed for motorized or nonmotorized use.

Table 47. Summary of KNF Trails by Season and Managed Use

Miles of Summer Trails Managed for Motorized Use	Miles of Summer Trails Managed for Nonmotorized Use	Miles of Winter Trails Managed for Motorized Use	Miles of Winter Trails Managed for Nonmotorized Use
147	1,487	268	16

Source – Infra: Travel Routes 5/2010

Areas

Two areas on the Kootenai allow for cross-country motorized use: the Douglas Hill off highway vehicle area (approx. 200 acres) and the Lake Koocanusa drawdown area (approx. 3,600 acres). Both of these areas are located on the Rexford Ranger District. Other than these two areas, wheeled motorized use is only allowed on those roads and trails as designated on the Forest MVUMs.

In winter (generally December 1 – April 30) with adequate snow cover, the Forest is generally open to over-snow vehicle use. The areas not available are the Cabinet Mountain Wilderness, the currently recommended wilderness areas, and several areas managed for nonmotorized recreation and wildlife winter range protection. Of the 2,219,000 acres of the KNF, approximately 1,961,000 acres have no prohibition on over-snow vehicle use. Not all of the areas available to over-snow vehicles are actually used. Vegetation and topography are often influencing factors for this type of use.

Road Maintenance

Road maintenance is accomplished by the Forest Service and cooperation with other agencies and private concerns. In some cases, maintenance responsibilities are exchanged with other jurisdictions through maintenance agreements when such actions create efficiencies for both parties. Roads under road maintenance agreements with other agencies, local governments, or private organizations, are maintained according to the terms of the agreement; however, this level of maintenance may not meet established agency-set standards. For cost-share roads, maintenance is commensurate with commercial uses of the road. Because jurisdiction of forest roads sometimes shifts to county or state agencies, road maintenance responsibilities are not static.

The Forest's ability to maintain the road system is dependent on a number of factors, including:

- Total miles of open roads;
- Allocated funding for road maintenance;
- Miles maintained through commercial activities such as timber sale contracts;
- Allocated funding for road projects to support other resources;
- Assigned operational maintenance levels;
- Resource protection needs; and
- Use levels and season of use.

Road maintenance budgets fluctuate from year to year. However, traffic volumes on the Forest open road system have risen. Commercial user contributions to road maintenance have declined. This affects both recurrent maintenance, such as seasonal blading, and deferred maintenance, such as long-term surface replacement. Depending on the amount and type of traffic, the expected life of an aggregate surface can be 10 to 25 years when adequate maintenance is

performed. Currently there are about 1,400 miles of aggregate surfaced road on the KNF. Assuming an average life of 20 years, the Forest would be re-surfacing approximately 70 miles per year.

Funding has been well below that needed to annually maintain the entire road system at operational maintenance level standards. Annual accomplishment reports indicate that on average the KNF has been able to maintain, on an annual basis, approximately 20 percent of the open roads on the Forest (see table 48). As a result, roads are maintained on a priority basis. User safety, resource protection, and mission needs are used to prioritize roads for maintenance.

Table 48. Average Annual Road Maintenance Accomplished

Miles of Open Roads (Op. ML 2,3,4, &5)	Miles Maintained to Standard	% Maintained to Standard
3,670	750	20

Source – Road Accomplishment Reports from 2007-2009

Roads meeting identified long-term needs but not short-term needs are often placed in a Level 1 maintenance category. This level usually involves physical closure of the road for a period of one year or longer (but not decommissioning), and these roads are not open for motor vehicle use until needed again.

Recreation

The KNF finalized its Recreation Facility Analysis Report in September of 2007 and developed a Recreation Niche Statement with public involvement. The niche serves as the vision for the Forest's recreation program and to ensure unique attributes are maintained for future generations. The following is the KNF recreation niche:

Vast by Nature, Un-crowded by Design

> Bordering Canada and nestled in the mountainous terrain of NW Montana, the KNF holds impressive forests, wildlife and landscapes, including striking cliffs, spires, river canyons, and the magnificent peaks of the Cabinet Mountains Wilderness and Whitefish Range. This vast un-crowded landscape has been the lifeblood for many people's for thousands of years and continues to foster a pioneer spirit passed down through generations.
>
> These ties to the land and history are the foundation for interpretation and education for new and traditional visitors. Water, in all forms, has played a significant role in shaping recreation with reservoirs, rivers, waterfalls, glacial lakes, and snow providing a variety of year round day-use activities.

Outdoor recreation is the fastest growing use within the national forests and grasslands, a use expected to increase in the future. The latest National Visitor Use Monitoring was completed in 2007 on the KNF (NVUM Summary Report January 2009). This monitoring program provides reliable information about recreation visitors to NFS managed lands at the national, regional, and forest level. National Visitor Use Monitoring is a recreation sampling system that provides statistics on recreation use.

Visitation is estimated through a combination of traffic counts and surveys of exiting visitors, and provides a snapshot of estimated use. Visitation estimates for 2007 on the KNF is 919,300 national forest visits. Over 72 percent of these visits were from people who lived within 100 miles of the Forest. Those visitors participated in the activities shown in table 49 during their visit, and indicated what their primary activity was.

Most of the visits to the Forest are day visits. The average visit to the KNF lasts about 10 hours; however, over half of the visits to this Forest last less than five hours. Less than ten percent of the visits involve recreating at more than one location on the Forest. Because of the local nature of the visiting population, frequent visitors are quite common. More than 38 percent of all visits are made by people who visit more than 50 times per year. Conversely, only about 25 percent of the visits are made by people who visit, at most, five times per year.

Hunting (23.9 percent) is the most common primary activity on the KNF, followed by viewing scenery (14.2 percent), hiking/walking (11.3 percent) and driving for pleasure (10.2 percent). Driving for pleasure is an activity that is engaged in for almost half of all visits. Hiking and the two viewing activities are participated in on over 40 percent of visits. About one-third of visits report using a scenic byway while on the Forest.

Table 49. Visitor Participation by Recreation Activity on the KNF (FY 2007)4

Activity	% of Visitors Who Participated in this Activity[1]	% Who said it was their Primary Activity[2]	Average Hours Spent in Primary Activity[3]
Backpacking	3.4	0.0	
Bicycling	6.7	1.3	5.5
Camping in Developed Sites	8.1	1.2	33.6
Downhill Skiing or Snowboarding	1.1	0.4	4.4
Driving for Pleasure	49.3	10.2	2.1
Fishing	18.9	8.8	3.5
Gathering Forest Products mushrooms, berries, firewood	16.5	8.6	3.4
Hiking or Walking	44.7	11.3	2.8
Horseback Riding	0.9	0.1	4.3
Hunting	28.2	23.9	7.5
Motorized Trail Activity	1.4	0.0	
Motorized Water Travel	6.1	1.4	9.5
Nature Study	6.1	0.0	
No Activity Reported	1.1	1.1	
Nonmotorized Water Travel	6.2	3.3	2.1
OHV Use	1.0	0.1	37.9
Other Motorized Activities	0.0	0.0	36.0
Other non-Motor Activity (swim, etc.)	10.9	4.7	2.3
Picnicking	10.7	1.5	4.3
Primitive Camping	4.0	0.7	42.5
Relaxing	26.5	4.1	7.4
Resort Use	1.0	0.0	48.0

Activity	% of Visitors Who Participated in this Activity[1]	% Who said it was their Primary Activity[2]	Average Hours Spent in Primary Activity[3]
Snowmobile Travel	1.9	1.2	4.0
Viewing Natural Features (scenery)	40.9	14.2	3.8
Viewing Wildlife, Birds, Fish, etc	46.3	2.3	3.1
Visiting a Nature Center	4.0	0.1	1.3
Visiting Historic/Prehistoric Sites	4.2	0.3	4.8
X-C Skiing, Snow Shoeing	3.1	0.0	

1 Survey respondents could select multiple activities so this column may total more than 100%.

2 Respondents were asked to select one activity as their main one; some selected more than one, so this column may total more than 100%.

3 Computed only for those who indicated the activity was the main activity on their visit.

4 Participation data is from KNF National Visitor Use Monitoring results (2009).

With increased use, recreationists are vying for quality recreation space, which may sometimes overlap in the same area at the same time. This can manifest itself in conflicts between recreationists that use nonmotorized and those that use motorized modes of travel. Recreation conflicts occur when a user participating in one recreation activity negatively impacts the recreation experience of another user.

Although conflicts occur, overall satisfaction with KNF recreation management remains high as shown in table 50 from the 2009 National Visitor Use Monitoring Survey.

Table 50. Percent Satisfaction Index1 Scores from Recreation Users

Items Rated	Satisfied Survey Respondents (%)		
	Developed Sites[2]	Undeveloped Areas (GFAs)	Wilderness
Developed Facilities (includes restroom cleanliness and facility condition)	78.2	71.1	58.9
Access (includes parking availability, parking lot condition, road condition and trail condition)	79.9	75.5	95.7
Services (includes availability of information, signage, employee helpfulness)	65.0	51.0	60.4
Perception of Safety	94.5	96.6	100.0

1 This is a composite rating. It is the proportion of satisfaction ratings scored by visitors as satisfied or very satisfied. It is computed as the percentage of all ratings for the elements within the grouping that are at or above the target level, and indicates the percent of all visits where the person was satisfied with agency performance.

2 This category includes both Day Use and Overnight Use Developed Sites. Data from KNF National Visitor Use Monitoring results (2009).

Recreation Settings

The Forest Service uses ROS to describe different recreation experiences using setting, activities, and experience. There are five ROS classes which apply to the KNF: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, and rural.

In 1987, the KNF did not quantify how many acres on the Forest were available in the different ROS classes. Instead, the various MAs were identified as being appropriate for a range of the ROS classes.

Current inventoried ROS maps are primarily based on existing closure areas, the KNF MVUMs for summer ROS classifications, and the winter groomed snowmobile route system for winter ROS classifications. The *Recreation Opportunity Spectrum (ROS) Inventory Mapping Protocol-December 2003* was used for this analysis. Summer ROS is defined as May 1 through December 1, and winter ROS as December 2 through April 30.

ROS classes were mapped for summer and winter seasons to address the issue of motorized and nonmotorized opportunities. Hunting season is included in the summer season, although additional areas are closed to wheeled motor vehicle use during hunting season. The inventoried ROS summer and winter classifications are displayed in table 51.

Table 51. Forestwide Inventoried Recreation Opportunity Spectrum (ROS) Area, 2010

ROS Class	Percent of Area	
	Summer	Winter
Primitive	10%	5%
Semi-Primitive Nonmotorized	57%	14%
Semi-Primitive Motorized	10%	67%
Roaded Natural[1]	23%	13%
Rural[1]	<1%	2%

1 Inventoried Rural ROS classes are more appropriately classified as Roaded Natural. Some areas mapped as Rural, but do not contain other characteristics of the Rural ROS Class such as highly developed opportunities, facilities for large numbers of visitors than other areas. Rural ROS on the KNF is confined to Turner Mountain Ski Area and the two marinas on Lake Koocanusa. The remaining rural acres are included in the Roaded Natural ROS Class percent of area

The ROS provides a framework for analyzing changes to recreation settings as a result of potential management activities under each alternative. The ROS can be used to estimate changes to recreation settings and opportunities resulting from potential development activities. The potential effects of possible management actions on recreation settings and experiences are represented in the estimated ROS inventory shifts under each alternative.

Developed Recreation Sites

Generally, developed recreation sites have kept pace with changing demands and expectations and, for the most part, are met. Developed recreation facilities include a variety of distinctly defined areas, where facilities have been developed for concentrated public use either by the Forest Service or private parties. Redesign and reconstruction of developed sites has been ongoing with primary changes focused on updating campgrounds for RV use, improving accessibility, and improving services such as potable water and sanitation. In some cases, expansions have occurred to increase capacity. Reservation systems, host programs, and fee programs have helped keep pace with the changing demands and expectations.

Developed recreation facilities have been constructed to offer recreation experiences, protect resources, or otherwise manage concentrations of visitor use. These facilities range from a complete campground with water systems, toilets, and fully developed sites; to a simple bulletin

board or parking barrier at a parking lot. The KNF manages a wide array of developed recreation sites, as do most other national forests across the country.

The KNF currently has 77 publicly managed recreation sites (Development Level 2 to 5) and 59 privately managed recreation sites or opportunities, as shown in table 52 and 53. A developed site is designed and engineered to provide user comfort with some level of investment, such as toilets, tables, or fire rings.

These numbers have changed little from what was in place when the Forest Plan was completed in 1987. The exception to this is the development of several boat launch sites in the last 10 years. The current capacity of publically developed recreation sites is just over 650,000 people during the managed season (typically Memorial Day through Labor Day).

Table 52. Publically Developed Recreation Sites: Number and Capacity

Sites - Publicly Developed	Number of Sites	Capacity PAOT[1]	Capacity – Managed Season (PAOT[1] x days in season)
Boat Launch	17	1,000	168,800
Cabin and Lookout Rentals	11	57	11,200
Family Campgrounds	36	2,600	312,800
Group Sites or Picnic Areas	9	1,000	128,900
Swimming Areas	4	340	33,610
Total Public Developed	**77**	**4,997**	**655,310**

Source – Infra: Recreation Sites 3/2011
1 – Persons At One Time (PAOT)

Persons At One Time is the number of people who can occupy a developed recreation site, and is the basis for design of the site. Occupancy rates have generally increased over time as more recreationists are using the same number of developed recreation sites. However, the distribution of recreation use across the Forest has changed from 1987 to 2010.

Use at campgrounds along rivers such as Bull River and Yaak River have increased by six to seven percent. Use at destination lake campgrounds such as McGregor Lake and North Dickey Lake have increased by 25 to 26 percent. Use along Lake Koocanusa was high in the 1990s primarily due to fishing. In recent years the fisheries has decreased and the level of the lake has not reached full pool, leaving some recreation sites without access to the water during part of the year, resulting in a decrease in use.

Use at some sites along Lake Koocanusa has decreased from 1988 to 2010, the exception being northern sites such as Rexford Bench boat launch which have increased. Occupancy at several sites forestwide over the last three to five years has reached upwards of 60 percent including: Dorr Skeels (campground, boating, and swimming), North Dickey Lake (campground, boating, and swimming), North Shore (campground and boating), and Rexford Bench (campground and boating).

Redesign and reconstruction of developed sites has been ongoing with primary changes focused on updating campgrounds for RV use, improving accessibility, and improving services such as potable water and sanitation. In some cases, expansions have occurred to increase capacity.

Reservation systems, host, volunteer, and fee programs have helped keep pace with the changing demands and expectations.

Dispersed Recreation

There is difficulty in meeting the array of expectations for dispersed recreation, and resources and management capability have not kept pace with the change and increase in demand. Dispersed recreation occurs on areas of the Forest outside of developed sites or general forest areas where recreation facilities, if present, are primarily for resource protection. Dispersed sites have little to no investment, with rustic or rudimentary improvements (barriers or signs) provided for resource protection. Visitors often seek these less developed settings to get away from crowds and are an important component of the Forests recreation niche. More people, doing more things, over larger and more diverse areas, challenge the Forest's ability to effectively manage all the various uses.

Over 300 dispersed sites have been inventoried. Currently, these sites include: camping areas, day use areas, boating areas, rock climbing areas, and trailheads. Inventory of dispersed sites on the Forest is an on-going effort.

As roads, trails, and areas are restricted or closed to motorized travel, motorized use shifts from these areas and results in increases on those roads, trails, and areas that remain open to motorized use where a similar experience can be found. A sense of loss of freedom has occurred from the reduction of traditionally open roads available for motorized access. For example; the goal to ensure threatened and endangered species security has required the Forest to adapt to evolving requirements, resulting in increases in access restrictions generating a strong reaction from forest users who are dissatisfied with the reduction in open roads available for their use.

Nonmotorized user concerns revolve around conflicts with motorized users. These concerns include: noise, the smell of exhaust, dust, safety issues, wildlife displacement and harassment, and resource damage (Final Off-Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment January 2001).

A study of Montana residents' trail use by the Institute for Tourism and Recreation Research was conducted in 1994 (Harris and McCool 1994). The study was designed to be representative of the entire Montana population and included participants who engaged in walking for pleasure/day hiking, driving vehicles off-road for recreation, backpacking, and using ATVs and motorcycles off-road. Forty-five percent of the respondents agreed that conflicts on trails are relatively minor, while 15 percent disagreed. Less than two percent of the respondents reported conflict with others during their most recent trail experiences.

In all cases, motorized users were more likely to say their activity was compatible with day hiking and backpacking. Backpackers and day hikers found other nonmotorized activities to be most compatible with their activities.

Recreation Special Use Authorizations

The national forests also offer recreation opportunities in partnership with commercial and non-commercial entities by granting special use authorizations or entering into partnership agreements. These partnerships help provide recreational opportunities on national forests that the Forest Service does not directly provide. Table 53 displays the current Recreation Special Uses permitted on the KNF.

Table 53. Privately Developed Recreation Sites on the KNF

Privately Developed	# of Permits or Agreements
Groomed Cross Country Ski/Shelter	1
Groomed Snowmobile Area/Shelter	4
Marina	2
Marina	2
Organization Camp	2
Outfitter and Guide	37
Park, Playground	2
Recreation Events (vary from year to year)	4
Ski Area	1
Target Range	4
TOTAL Private Developed	**59**

Source: US Census Bureau State and County Quick Facts Website for Montana

Scenery/Landscape Management

As area populations increase, so does visitation to area national forests. Driving for pleasure and viewing scenery have become some of the most popular national forest activities from National Visitor Use Monitoring Survey data. Visitors expect a certain level of “naturalness” in the recreation and tourism settings they pursue. Even individuals who have never visited the KNF expect a certain level of “natural intactness” in these landscapes. This natural beauty contributes to their sense of well-being and quality of life. The Forest’s landscapes also serve as a backdrop to rural communities. The scenery contributes to community sense of place and quality of life for residences.

National forest visitors are attracted to a variety of areas for the natural character they possess. Visitors and residents value the forested backdrops that frame the surrounding communities. The transportation network and associated use areas provide visitors with scenic routes and vantage points to experience the region's vast expanse of rugged backcountry.

The KNF has a variety of landscape character types created by glaciers, rivers, continental uplifting, and mass wasting. The Forest contains many areas of outstanding scenic beauty unique to the Northern Rocky Mountain Region. The American public generally recognizes the scenic resources of NFS lands as valuable public assets that should be protected and managed for the enjoyment of future generations. Most landscapes on the KNF contain some degree of alteration from past human activities, including fire, mining, logging, and ranching, even though many of these changes are not readily visible to most forest visitors. The most visible effects to scenery from past human activities have generally been caused by the removal of vegetation, creating patterns that contrast with the natural forms, lines, colors, and textures of the natural landscape. Forest vegetation management is generally done via timber sales or prescribed burning. Other activities that require alteration of landforms often result in more permanent changes to the landscape. Examples of these types of activities include: roads, trails, utilities, mines, reservoirs, communication sites, and gravel pits. Structures such as power lines, communication sites, buildings, fences, and other structures located on NFS lands also have potential to be noticed and create negative visual changes.

National forest travel routes have been evaluated for the estimated level of public concern for alterations to the landscape. Travel routes classified as concern Level 1 (including those routes

that are designated state scenic highways or national forest scenic byways) indicate that the public is most concerned about alterations; concern Level 3 indicates the least concern. In evaluating landscape visibility, landscape managers have recognized that "distance" is one of the primary perceptual factors for determining whether alterations are visually noticed. Foreground distance zones reveal even the subtlest alterations; background distance zones are typically able to absorb greater alterations, provided color contrasts are minimized.

Landscape management is used to meet people's scenery expectations for the management of national forest landscapes. To ensure that scenic integrity is maintained, six levels of scenic integrity objectives have been established, derived from the landscape's attractiveness and the public's expectations or concerns. Each scenic integrity objective depicts a level of scenic integrity used to direct landscape management: very high (unaltered), high (appears unaltered), moderate (slightly altered), low (moderately altered), and very low (heavily altered).

Generally, landscapes that are most attractive (as classified by scenic attractiveness class) and are viewed from popular travel routes (as classified by concern level) are assigned higher scenic integrity objectives. The methodology for establishing scenic integrity objectives is provided in Agriculture Handbook 701. Below is the current inventory of acres and percentage of scenic integrity objectives (table 54).

Table 54. Current Inventory of Scenic Integrity Objectives

Scenic Integrity Objective	Acres	% of Forest
Very High	245,590	11%
High	680,863	31%
Moderate	1,032,187	47%
Low	260,896	11%
Very Low	0	0%
TOTAL	**2,219,536**	**100.00%**

In some landscapes, human influence is evident through changes in vegetation patterns, landform alterations, or the introduction of structural elements. For the most part, national forest landscapes in the planning area remain natural-appearing in character, with many of the valued landscape attributes still intact. Most of the human-influenced alterations affecting landscape scenic integrity are where vegetation management activities have occurred.

Environmental Consequences

Transportation System

The 1987 Forest Plan and ROD anticipated an increase in the first decade in the total number of miles of NFS roads from 6,200 miles to about 8,600 miles, with an eventual total of 10,050 miles by the end of the second decade.

The 1987 Forest Plan projected 314,000 acres of the roadless areas outside of wilderness would remain roadless and would be managed for semi-primitive and primitive recreation opportunities. In addition, the Plan stated another 126,000 acres of roadless areas allocated to other resource management goals would provide additional semi-primitive recreation opportunities until development activities occur. The demand for roadless recreation

opportunities (including wilderness) was estimated to be 65,000 Recreation Visitor Days in the first decade.

The 1987 Plan stated that existing developed recreation facilities would be expanded if demand increases beyond the capacity of the existing facilities. In addition, it stated that with state, county, and local ski club cooperation, there would be an increase in the amount of groomed cross-country ski trails and snowmobile trails. No new facilities are proposed for construction in this alternative. No existing facilities are proposed for reconstruction or decommissioning in this alternative. This alternative does not propose to expand existing groomed routes for either cross-country skiing or for snowmobile use. Any of these activities would only be considered at the project level.

For all action alternatives new road construction (permanent or temporary) would not be allowed in MA1a, 1b, 1c, 3 (Botanical, Zoological, and Historic Special Areas), and 4. New road construction would be allowed under certain conditions in MA2 (Eligible Wild Rivers), MA5a, 5b, and 5c. New road construction would be allowed in MA2 (Eligible Scenic, and Recreational Rivers), MA3 (Recreational, Geological, and Scenic Special Areas), MA6, and MA7. Forestwide direction in the various resource sections would apply to road construction. Only a minimal amount of new road construction is anticipated under the alternatives because of limited development and budgets. Under Alternatives B, C, and D the number of miles of NFS roads may decrease because these alternatives would include an objective to decommission or place into intermittent stored service 150 to 350 miles of road over the life of the Plan (FW-OBJ-AR-03).

Because MA allocations would change by alternative, the areas where road construction may occur would vary. Table 55 summarizes, on a forestwide basis, how the alternatives vary. Alternative D has the greatest percentage of the Forest allowing road construction while Alternative C has the least.

As described in the “Affected Environment” section, there are currently about 7,894 miles of NFS roads on the KNF. This is a result of road construction work over the last 100 years and road decommissioning work done over the last 15 to 20 years. Given the backlog of decommissioning work yet to be completed and that additional roads may be identified as not being needed, it is possible that the total number of miles of NFS roads will continue to be reduced as the Forest moves toward the road network needed for safe and efficient travel and for administration, utilization, and protection of NFS lands.

Table 55. Summary of Road Construction Opportunities (by acres and percent of Forest)

	Road Construction Allowed	Road Construction Allowed w/Conditions	Road Construction Not Allowed
Alt. A	1,652,400 ac. (75%)	316,200 ac. (14%)	251,500 ac. (11%)
Alt. B	1,477,600 ac. (67%)	477,500 ac. (21%)	264,000 ac. (12%)
Alt. C	1,373,800 ac. (62%)	477,900 ac. (21%)	368,500 ac. (17%)
Alt. D	1,751,200 ac. (79%)	278,000 ac. (12%)	189,800 ac. (9%)

Travel Management

Wheeled Motorized Use of Roads and Trails: Since there are no proposed changes to their current designated status, the number of miles of roads available for wheeled motor vehicle use

would be the same for all alternatives. When considering the number of acres where wheeled motor vehicle use would be allowed, it must be remembered that this refers only to those acres in MAs where roads or trails may exist and be designated for such use. Management areas where wheeled motor vehicle use may be designated are MA2, MA3, MA5b, MA6, and MA7. As shown in table 56, Alternative C would result in the least amount of acres where roads and trails could be designated for wheeled motor vehicle use; whereas Alternative D would allow about 299,000 acres more where roads and trails could be designated for wheeled motor vehicle use. This is because of the greater number of acres of recommended wilderness in Alternative C than in Alternative D. Alternatives A and B are relatively the same in the number of acres where roads and trails could be designated for wheeled motor vehicle use (about 25,000 acres difference between the two) and lie about midway between Alternatives C and D.

Cross Country Travel: Currently, the KNF allows cross-country wheeled motor vehicle use in only two areas on the Forest (Douglas Hill and Koocanusa drawdown areas), totaling approximately 3,800 acres. On the rest of the Forest, wheeled motor vehicle use is only allowed on those roads and trails as designated on the Forest MVUMs. The number of acres available for cross-country wheeled motor vehicle use (3,800 acres) is the same for the four alternatives since there are no proposed changes to the areas currently designated for that use.

Over-snow Vehicle Use: Under Alternative A, approximately 257,900 acres are prohibited from over-snow vehicle use. The areas where over-snow vehicle use is prohibited are: designated wilderness, recommended wilderness, and other area closures for semi-primitive nonmotorized recreation and big game winter range. Under the action alternatives, over-snow vehicle use is prohibited in MAs 1a (designated wilderness), 1b (recommended wilderness), and 4 (RNAs).

Under Alternatives B, C, and D, there is a direct effect to the number of acres available for over-snow vehicle use based on the amount of recommended wilderness (MA1b) and established/recommended research natural areas (MA4). Some areas currently closed will remain closed under all alternatives. Areas that are currently without closures to over-snow vehicle use and that are allocated to recommended wilderness (MA1b) or research natural areas (MA4), will have a legal order prohibiting over-snow vehicle use (as per 36 CFR 212.81, and 36 CFR 261.14) issued in conjunction with the ROD for the final Forest Plan.

As shown in table 56, Alternatives B, C, and D would result in a reduction in the number of acres available for over-snow vehicle use from current. Alternative C would result in the greatest reduction (approximately 9 percent from current conditions, whereas Alternative D would result in the least reduction (approximately 1 percent from current).

Mechanized Use: Under the 1987 Plan, mechanized use is allowed everywhere on the KNF except for designated wilderness (Cabinet Mountain Wilderness). Under the action alternatives, mechanized use is prohibited in MAs 1a (designated wilderness), 1b (recommended wilderness), and 4 (RNAs). Acres allocated to MA1a remain constant for all alternatives.

There is a direct effect to the number of acres available for mechanized use based on the amount of MA1b and MA4. Areas that are currently without closures to mechanized use that are allocated to to recommended wilderness (MA1b) or RNAs (MA4), will have a legal order prohibiting mechanized use (as per 36 CFR 261.55(c)) issued in conjunction with the ROD for the final Forest Plan. As shown in table 56 alternatives B, C, and D would result in a reduction in the number of acres available for mechanized use. Alternative C would result in the greatest reduction (approximately 9 percent from current conditions), whereas Alternative D would result in the least reduction (approximately 1 percent from current).

Table 56 Summary of Access Availability of Alternatives (by acres and percent of Forest)

	Allow Wheeled Motor Vehicle Use	Allow Over-snow Vehicle Use	Allow Mechanized Use
Alt. A	1,677,200 ac. (76%)	1,961,200 ac. (88%)	2,128,300 ac. (96%)
Alt. B	1,659,100 ac. (75%)	1,865,600 ac. (84%)	2,024,500 ac. (91%)
Alt. C	1,515,400 ac. (68%)	1,761,000 ac. (79%)	1,924,700 ac. (87%)
Alt. D	1,817,700 ac. (82%)	1,939,700 ac. (87%)	2,100,400 ac. (95%)

Road Maintenance

Road and trail maintenance (both recurrent and deferred) will continue to occur. Physical conditions will continue to be addressed through maintenance activities and be based on public health and safety, resource protection, and mission priorities. Annual operating budgets and supplemental funding will likely fluctuate with the result that maintenance accomplishments will vary from year to year.

The condition (e.g., drivability) of roads may vary between alternatives. This is mainly a result of the variability of road maintenance work that might be accomplished under the four alternatives. Since Alternative C has the least amount of acres allocated to general forest (MA6), fewer road maintenance activities may be accomplished because commercial use is expected to be less, requiring less road maintenance. Under Alternative D, which has the most acres allocated to general forest, more commercial use might be expected and may result in the greatest amount of road maintenance.

Routine road maintenance work (brushing, blading, ditch, and culvert cleaning, etc.) is periodically performed on approximately 3,650 miles of maintenance Level 2, 3, 4, and 5 roads and in most cases they are kept in a drivable condition for their designed use. The approximately 4,240 miles in maintenance Level 1 however, do not receive routine maintenance work. The drivability of these maintenance Level 1 roads can be expected to continue to diminish as roads re-vegetate.

Recreation Setting

Management area allocations will affect recreation visitation and use, to some extent, in each alternative. The quantity, quality, and distribution of recreation opportunities depend on the mix of ROS classes available. Management area desired conditions for ROS classifications are displayed in tables 57 and 58 for alternative comparison. There are also desired conditions for ROS classes and management at the geographic area level which will help manage the recreation opportunities and maintain a broad range of recreation experiences at that level.

The ROS classifications reflect the overall theme and character expressed by the mix of MA allocations in each alternative; as such, the setting, facilities, and character of recreation varies by alternative. Alternative C reflects additional wilderness and nonmotorized backcountry settings. Alternative D reflects more emphasis on development and active management. Alternative B, the proposed action, falls between C and D.

Table 57. Percentage Summer Recreation Opportunity Spectrum by Alternative

Summer ROS Class	Percentage of KNF Forest Acreage by Alternative			
	A[1]	B	C	D
Primitive	10%	4.6%	4.6%	4.6%
Primitive/Semi-Primitive Nonmotorized		19.8%	26.5%	12.7%
Semi-Primitive Nonmotorized	57%	2.3%	2.3%	2.3%
Semi-Primitive Motorized		8.7%	6.7%	3.4%
Semi-Primitive Motorized/Roaded Natural	10%	2.0%	2.0%	2.0%
Roaded Natural/Rural	23%	62.6%	57.9%	75.0%
TOTAL	**100%**	**100.0%**	**100.0%**	**100.0%**

1 -The 1987 Forest Plan did not have ROS acres, but general categories by MA,

Table 58. Percentage Winter Recreation Opportunity Spectrum by Alternative

Winter ROS Class	Percentage of KNF Forest Acreage by Alternative			
	A	B	C	D
Primitive	5.0%	4.6%	4.6%	4.6%
Primitive/Semi-Primitive Nonmotorized		15.9%	25.5%	7.4%
Semi-Primitive Nonmotorized	13.5%	.8%	.8%	.8%
Semi-Primitive Motorized	66.7%	14.1%	9.2%	10.3%
Semi-Primitive Motorized/Roaded Natural		2.0%	2.0%	2.0%
Roaded Natural/Rural	14.7%	62.6%	57.9%	74.9%
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Recreation may affect the natural setting (depending on facilities), site mitigations, user behaviors, user densities, site capability, design, and many other factors. Visitor use is expected to continue to increase, regardless of alternative selected. Management actions can be taken to maintain a mix of ROS settings as described in the “Management Area Desired Condition” section of the Plan. Management actions might include restrictions or limitation on use, such as seasonal or year-long closures.

As part of forest plan revision, roadless areas are analyzed and some are recommended for new wilderness or additions to existing wilderness. In addition, the proposed alternatives describe desired conditions for areas closed or open to winter and summer motorized uses (MA5a, MA5b, and MA5c). Most of these MAs (5a, 5b, and 5c) are comprised of roadless areas. Management area allocations of roadless areas vary according to alternative themes. The MVUMs designate routes open to wheeled motor vehicle use. Additional site specific travel planning will determine specific routes where motorized use is allowed within the ROS opportunities.

Dispersed Recreation

Effects to dispersed recreation is indirectly covered under the “Travel Management” section, described by the difference in acres available for wheeled motorized use, allowed over-snow vehicles use, and allowed mechanized use (table 56). The number of miles of roads and trails available for wheeled motor vehicle use is the same for the four alternatives since there are no

proposed changes to their current designated status for use (see table 46 and 47). The number of acres available for cross-country wheeled motor vehicle use is the same for the four alternatives since there are no proposed changes to the areas currently designated for that use.

The difference where wheeled motor vehicle use may be allowed (where roads or trails ***may*** exist and be designated for such use) effects where potential dispersed use could occur. Alternative D provides the most area (82 percent), followed by A (76 percent), B (75 percent), and C with the least area (68 percent).

Scenery/Landscape Management

The quality of the visitor experience may be affected by the condition of the forest environment encountered, depending on the number and types of manmade activities and the degree of deviation from the landscape's inherent natural condition that has taken place. Each alternative will affect landscape character to varying degrees over time based on the amount of change from the natural condition that is allowed.

Alternatives C and B enhance or protect the inherent naturalness of scenic landscapes on the highest number of acres. These alternatives are most likely to provide the greatest public benefits and develop the most appreciation from a scenic resources standpoint.

Scenery is an integral component of all national forest settings and must be considered in the analysis for all activities on NFS land. Each site-specific project must be analyzed in detail to determine compliance with Forest Plan direction and determine if mitigation measures are required.

Scenic integrity objectives have a range from very high to low. The scenic integrity objectives for each alternative (see table 59) are based on the theme of the alternative and the mix of MAs in each alternative. Scenic class and existing scenic integrity level inventories were merged to create the composite scenery base map. Each MA has a range of proposed scenic integrity objectives as a guideline. These ranges are set to be compatible with the desired condition for the MA. The proposed scenic integrity objective categories vary by alternative based upon the allocation of the MAs.

Table 59. Percentage of KNF by Scenic Integrity Objective Category

Scenic Integrity Objective	Percentage of KNF Forest Acreage by Alternative[1]			
	A[1]	B	C	D
Very High	11%	12.9%	17.5%	9.6%
High	31%	.1%	.1%	.1%
High/Moderate		23.9%	23.9%	15.1%
Moderate	47%	.7%	.7%	.7%
Moderate/Low	11	0%[2]	0%[2]	0%[2]
High to Low		62.4%	57.8%	74.5%
TOTAL	**100%**	**100.0%**	**100.0%**	**100.0%**

1 -Alternative A (No-action – 1987 Forest Plan) does not have Scenic Integrity Objectives established using the Scenery Management System. When the 1987 Plan was completed, Scenery was described using the Visual Management System (USDA Forest Service 1977) with areas of the Forest classified using Visual Quality Objectives.

2 -Turner Mountain Ski Area (MA7) is the only area that has this scenic integrity objectives classification (Moderate/Low) and totals 852 acres.

Developed Recreation

Alternative A – No-action Alternative

Of the 77 developed recreation sites listed in table 52 on the KNF, all are managed under MA6 under the 1987 Plan. MA6 encompasses approximately 3,570 acres. The 1987 Plan stated that existing developed recreation facilities would be expanded if demand increases beyond the capacity of the existing facilities (p. II-6). The existing Plan provides sideboards for recreation, wildlife and fish, range, timber, soil/water/air, riparian, minerals/geology, lands, facilities, and fire within these areas (Plan, pp. III-17 through III-19). In general, any activity in the developed recreation areas is done to enhance a natural appearing environment and provide opportunities for social interchange between users.

Other developed recreation sites occur in many of the other MAs in the 1987 Plan and are still managed under most of the same principles that guide MA6.

Alternatives B, C, and D

Under Alternatives B, C, and D, 10 developed recreation sites would be managed under MA7 (Primary Recreation Areas). MA7 encompasses about 15,800 acres and includes lands associated with Lake Koocanusa and Turner Mountain Ski area.

The desired condition in MA7 is to maintain and improve these recreation sites (MA7-DC-AR-01). Existing developed recreation facilities will be upgraded as funding becomes available; however, many of the existing facilities are outdated. For example, parking spurs in many of the KNF campgrounds are too short for modern recreational vehicles and trailers. Another example of outdated facilities includes doorways on some older toilets that are too narrow for wheelchairs. Unfortunately, any need for additional facilities is overshadowed by a shortfall in maintenance and rehabilitation funds for existing facilities and the high cost of construction around the Forest. As funds have become available, the trend has been to devote resources to upgrading the larger developed recreation sites that receive high levels of use. This trend is expected to continue.

MA7 also provides management direction regarding timber harvest, recreation management, road construction and maintenance, and scenery management within these areas. Any activity in the developed recreation areas is done to provide a specific recreation experience.

Developed recreation sites outside of MA7 will continue to be managed for recreation use and improved where necessary and budgets allow. The desired condition across the Forest (FW-DC-AR-01) is to provide quality, well-maintained recreation facilities at key locations to accommodate concentrations of use, enhance the visitor's experience, and protect the natural resources of the area. Recreation rental cabins and lookouts provide safe, comfortable, overnight facilities that allow visitors to experience and learn about the rich history of the area.

Recreation Special Uses

In all alternatives, existing special uses would continue. Options for additional recreation special uses may be affected by alternative selected. Some recreation special uses, such as outfitter/guide operations, could be affected by the amount of area managed for semi-primitive nonmotorized and primitive settings. Additional recommended wilderness acres may increase the need for traditional outfitted activities due to limitations on access. Because Alternative C has the most semi primitive nonmotorized and primitive ROS acres, it may have the greatest potential for additional types of traditional outfitter/guide operations.

No new special use authorizations are analyzed so there are no changes to the Recreation Special Use program in any of the four alternatives.

Consequences to Access and Recreation from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Vegetation Management

Commercial timber harvest activities will generally result in road reconstruction and continued application of best management practices on existing NFS roads. New road construction is likely to be limited and temporary road construction used as a more common method for short term access needs.

Administrative use of gated roads that normally prohibit motor vehicle use yearlong is likely when management activities such as pre-commercial thinning, invasive weed treatments, or other non-commercial silvicultural treatments are planned.

Because general forest (MA6) allocations are lowest in Alternative C it would generally be expected to result in the least amount of vegetation management activities and result in a lower amount of road use compared (respectively) to Alternatives B, A, and D. Consequently, reduced traffic (i.e., number of vehicles on roads), both commercial and administrative, can be expected. Associated with reduced commercial use is the reduction of road reconstruction and best management practices work. Road maintenance activities done in conjunction with commercial use would also occur less often since this work is only required commensurate with use.

Timber harvest has the potential to affect recreation experiences and opportunities in several ways. Short-term effects may include increased noise and dust levels; the sight of landscapes altered by differing types of harvesting; the presence of slash piles, burned areas, and roads constructed for timber sales; conflicts with logging trucks on roads used by other drivers or by bicyclists; and the removal of snow for winter log hauling from roads frequented by snowmobilers, cross-country skiers, and snowshoers. Users may be temporarily displaced to

other locations because of log truck traffic, helicopter operations, and the noise from chainsaws. Visitors may experience prolonged displacement the longer a project or series of projects continue in the same vicinity.

Alternative D has the highest number of acres in MA6 where most of the timber harvest and other vegetation management activities will take place, followed by Alternatives A, B, and C. Timber harvest and road building can create changes to the landscape, resulting in changes to ROS classifications. Alternative D has the greatest potential to convert semi-primitive settings to roaded natural settings. Alternatives A, B, and C follow in descending order. Partial cutting could lessen the impacts to recreationists. Road development for timber management purposes in undeveloped areas has the potential to attract more visitors to the interior of the Forest where access previously has been limited. As use increases, visitors would experience less solitude and remoteness. Primitive and semi-primitive nonmotorized settings could change to semi-primitive motorized and roaded natural settings. This change would occur only if the MVUM was changed in conjunction with vegetation management activities. Recreational benefits from vegetation management can include new roads and trails and the opportunity to gather firewood. In many cases, roads built for logging operations are then used by recreationists, although these roads typically are closed and/or decommissioned after completion of the timber harvest activity. Depending on resource objectives, some logging roads can be left open to create additional dispersed recreation opportunities.

Effects from Wildlife Management

Since wildlife management does not vary between the four alternatives, the possible consequences to access do not vary. All four alternatives include direction contained in the Northern Rockies Lynx Management Direction (ROD 2007) (USDA Forest Service 2007) and the Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (FSEIS and ROD 2011). These previous decisions will be carried forward in all four alternatives and affect locations where wheeled motorized vehicle use will be allowed and limit additional opportunities for over-snow vehicle use.

Forestwide wildlife management direction (i.e., FW-GDL-WL-01, 08, 09) can directly affect motorized recreation opportunities. Restrictions that limit types of access and seasonal closures during sensitive periods, such as mating, calving, and when animals emerge from dens, can temporarily displace recreationists to other areas. The KNFs MVUM limits wheeled, motorized uses to designated routes yearlong or seasonally, often in response to wildlife needs. The MVUM does not change by alternative.

Recreational benefits from wildlife management could include increased hunter and wildlife viewer satisfaction, as well as maintaining angler satisfaction. The effect on recreation from wildlife management is the same for all alternatives.

Effects from Aquatic Management

Watershed improvement activities are likely to continue. The consequences to access for wheeled motor vehicle use can be expected to be light. One common activity is treating roads to reduce sediment production and transport to surface waters or to provide for aquatic organism passage. Actions taken might be culvert removal, out-sloping of road prisms, or the removal of unstable fills. These types of treatments are generally done on roads that are not designated for motor vehicle use. Any roads receiving these types of treatments are generally no longer drivable. On occasion, these treatments may be completed on roads that are currently designated for motor vehicle use (maintenance Level 2, 3, 4, and 5), but this is expected to occur

infrequently. In some cases, roads receiving these types of treatments may be converted to trails which allow other vehicle classes of wheeled, motorized vehicles (e.g., OHVs, UTVs, motorcycles).

Recreational benefits from aquatic management could include increased satisfaction by water recreation users as well as those utilizing lakes and streams for fishing. The effect on recreation from aquatic management is the same for all alternatives.

Effects from Recreation Management

Development of new roads for recreation purposes can be expected to be very low to none, and would not vary by alternative.

Effects from Fire and Fuels Management

Fuels management activities (e.g., prescribed burning) are likely to continue. Administrative use of gated roads that normally prohibit motor vehicle use yearlong is likely when these management activities occur.

Fire suppression actions are also likely to continue and could result in the use of gated roads as described above. In some cases, roads that are impassible to motor vehicle use (due to re-vegetation or other restrictive condition) may be opened in order to facilitate suppression actions. These roads would probably be used for the duration of the suppression efforts and post-fire work and then returned to their previous status.

Fuels management effects on recreation are similar to the effects described under vegetation management. An increase in fire extent, creating a more visible and long-lasting change to the setting, could cause a shift in recreation use. The degree of these effects is difficult to determine and based on the size and intensity of a wildfire event. Prescribed fire has some level of predictability for time, location, and intensity, which may decrease the short-term impacts on visitors. These effects are common to all alternatives.

Effects from Minerals and Energy Exploration, Development, and Reclamation

The US Forest Service does not initiate exploration or development of mineral or energy resources. Proposals for exploration and development are driven by external parties and market forces and regulated by existing mining law. Access and road development (long-term or temporary) is often associated with mineral exploration and development, but a site-specific analysis is required prior to any approval for exploration or development activities.

If any mine reclamation activities occur they would likely use existing roads. These may be roads that are not currently designated for motor vehicle use. These roads would probably be used for the duration of the reclamation work and then returned to their previous status.

Recreation could be affected by mineral exploration and extraction in all alternatives. Nonmotorized settings could potentially change to motorized settings. Short-term effects may include noise and visual impacts from open-pit or underground mining operations. In the long term, effects may include: development from a more naturally appearing landscape; new permanent underground or open pit mines and physical structures; and new roads and road corridors constructed for mining or drilling operations that may change the recreation setting.

The potential for oil and gas development on the KNF is low, with only a small portion of the Forest having a moderate potential for development. Well sites and other facilities would affect national forest visitors depending on the location of development and the setting affected.

Cumulative Effects

Access

Access across the Forest is likely to be influenced by a variety of factors. Given the mixed land ownership (State lands, corporate timberlands) in and around the KNF and the continuing management actions taken on these lands, there may be options for new access opportunities through cooperative and cost-share agreements.

A gradual rise in population is a general trend in the region and this often leads to increased use of forest roads and trails. The degree of change in traffic by the public will likely vary due to economic conditions (e.g., energy costs) and other demographics.

Commercial traffic (timber hauling) can be expected to fluctuate to some degree, relative to vegetation management activities. Market conditions and other external factors can often influence activity levels. These traffic conditions are usually limited to relatively small geographic areas and short periods of time. Hauling occurs more often during the summer months, but is not uncommon during the winter months as well.

If either the Rock Creek or Montanore mining proposals begin operations, it can be anticipated that commercial and operational traffic will increase (on both NFS roads and other county and state roads) due to facility construction and production operations. These traffic conditions would be localized in that the area influenced would be limited to the location of the mine facilities and the eventual terminal facilities for hauling operations.

Change in ownership of private lands can result in continued requests for road access across NFS lands. Depending on the circumstances, these may be requests for Forest or Private Road Special Use Authorization. Depending on the terms and conditions written into any new authorizations, opportunities for access to NFS lands may be created.

State and local government agencies with road management authority can be expected to continue to maintain their existing road network across the Forest. Some changes such as widening, resurfacing, and bridge replacements are probable but are dependent on budgets and funding allocations. The likelihood of jurisdiction of NFS roads being passed to other public road agencies is low.

Recreation

The KNF has experienced many changes in recreation since the Forest was established, and even over the life of the 1987 Plan. Initially, recreation was light and concentrated in just several popular areas, with few campgrounds or other sites developed until the Civilian Conservation Corps era, when many developed sites and trails were constructed. Another major boom in recreation occurred after World War II through the early to mid 1960s, as post-war populations started heading to the national forests, demanding more and better recreation facilities.

Since the 1970s, interest in and appreciation of the environment has increased national forest recreation visitation and has shifted activities and expectations. As temperatures increase during the summer and a majority of the Forest is free from snow cover, many people venture out onto

the national forests for relief from the heat and to pursue traditional outdoor recreational opportunities.

Technical advancements in snowmobiles now allow visitors to travel many places where they were unable to travel as recently as five years ago. The development of the ATV has added a new motorized use in the summer and allows many people to travel on routes into areas that they may never have been able to travel into previously. Lastly, the invention of the mountain bike has added a summer nonmotorized use that was not considered when the 1987 Forest Plan was written.

All of these issues, along with several others, have led to more crowded recreation experiences during peak use times, increasing levels and range of demands on natural resources and resource managers, and more conflicts among the users themselves.

Continuing changes in equipment technology used for recreational purposes on the Forest will have impacts as new uses, or existing uses, and the manner of how and where people recreate. These changes in uses may alter the recreational experience in some areas. Those who pursue recreation opportunities such as hiking or back-country skiing in remote settings are likely to be more affected than other users.

All alternatives accommodate a mix of recreation opportunities providing today's recreationists with reasonable assurances of future motorized and nonmotorized recreational opportunities. Alternative D may provide slightly more recreation opportunities toward the developed end of the ROS classes by accelerating development of the Forest with a variety of management actions. Some values such as remoteness, solitude, and wildlife-related recreation opportunities may be reduced in Alternative D. Alternative C would propose the least amount of forest management thereby emphasizing the primitive and semi-primitive classes of recreational opportunities.

Lands/Special Uses

Introduction

This section addresses landownership administration and adjustments and, special uses of NFS lands on the KNF.

Management of landownership includes survey and marking of landlines and other boundaries, purchase and exchange of lands with private parties and non-federal government entities, handling of title claims and other assertions of title, and acquisition of rights-of-way.

Adjustments of land ownership can occur through congressionally mandated conveyances, exchanges, and acquisitions, or through Forest Service administrative activities.

The objectives of the Forest Service landownership adjustment program (FSM 5402) are to:

- Achieve the optimum landownership pattern to provide for the protection and management of resource uses to meet the needs of the nation now and in the future;
- Settle land title claims equitably and promptly, and avoid land use conflicts with non-Federal landowners; and
- Provide resource administrators readily accessible and understandable title information affecting the status and use of lands and resources they administer.

Land occupancy and use by private parties and other government entities is managed through the issuance of special use authorizations. Authorized special uses on the KNF include industrial or commercial uses, private uses, and a variety of recreational uses.

All occupancy, use, or improvements on NFS lands that are not directly related to timber harvest, grazing, mining activities, and recreation are referred to as 'non-recreation special uses.' Typically, non-recreation special uses includes: roads, utilities, easements, storage facilities, and agricultural improvements. Recreation special uses include: resorts, ski areas, outfitter & guides, and a variety of uses that provide access to NFS lands by commercial ventures.

Use and occupancy of NFS lands may be authorized when such use is determined to be in the public interest.

Legal and Administrative Framework

The following statutory authorities govern landownership adjustments and the issuance and administration of special use authorizations on NFS lands:

Law and Executive Orders

- **Organic Administration Act of June 4, 1897 (16 U.S.C. 477-482, 551):** This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the national forests. This is the basic authority for authorizing use of NFS lands for other than rights-of-way.
- **Transfer Act of February 1905 (33 Stat. 628):** This act transferred the Forest Reserves to the USDA.
- **Preservation of American Antiquities Act of June 8, 1906 (16 U.S.C. § 431 et seq.):** This act authorizes permits for archeological and paleontological exploration involving excavation, removal, and storage of objects of antiquity or permits necessary for

investigative work requiring site disturbance or sampling which results in the collection of such objects.

- **Occupancy Permits Act of March 4, 1915 (16 U.S.C. § 497 et seq.) as amended:** This act authorizes use and occupancy on national forest land for recreational purposes including resorts and recreation residences.
- **The Mineral Leasing Act of 1920, as amended on November 16, 1973 (30 U.S.C. 185(1)):** This act authorizes the issuance of permits and easements for oil and gas pipelines. It requires annual payments in advance which represent fair market rental value and provides for reimbursement to the government for administrative and other costs incurred in monitoring, construction (including costs for preparing required environmental analysis and documentation), operation, maintenance, and termination of oil and gas pipelines.
- **General Exchange Act of March 20, 1922 (16 U.S.C. 485, 486):** This act authorized the US Forest Service to consolidate its holdings in national forests where a large percentage of private lands were intermingled with forest lands. It made possible the exchange of inholdings within national forests for private lands of equal value and within the same state.
- **Bankhead-Jones Farm Tenant Act of July 22, 1937 as amended (7 U.S.C. 1010-1012):** Title III of this act directs and authorizes the Secretary of Agriculture to develop programs of land conservation and use to protect, improve, develop, and administer the land acquired and to construct structures thereon needed to adapt the land to beneficial use. Under the act, the USDA may issue leases, licenses, permits, term permits, or easements for most uses, except rights-of-way.
- **Section 7 of the Granger-Thye Act of April 24, 1950 (16 U.S.C. 490, 504, 504a, 555, 557, 571c, 572, 579a, 580c-5801, 581i-1):** This act authorizes special-use permits not to exceed 30 years duration for the use of structures or improvements under the administrative control of the Forest Service and for the use of land in connection therewith, without acreage limitation.
- **Independent Offices Appropriation Act of 1952, as amended (31 U.S.C. 9701):** This act provides authority for agency heads to charge fees for services or benefits provided by the agency that are fair and based on fair market value and cost to the Government. Office of Management and Budget (OMB) Circular No. A-25 further defines this authority and requires agencies to establish user fees based on sound business management principles.
- **Permits for Public Buildings and Other Public Works Act of September 3, 1954 (68 Stat. 1146; 43 U.S.C. 931c, 931d)**: This act authorizes permits, term permits, leases, or easements at the fair market value, not to exceed 30-years duration, to States, counties, cities, municipalities, or other public agencies without acreage limitation for the construction and operation of public buildings or other public works, exclusive of rights-of-way.
- **Highway Act of August 27, 1958 (23 U.S.C. 317), supplemented by the Act of October 15, 1966 (49 U.S.C. 1651):** This act authorizes the Federal Highway Administration to grant easements to States for highways that are part of the Federal-aid system or that are constructed under the provision of chapter 2 of the Highway Act. The Forest Service consents to the grant of these easements in a form agreed upon by the two agencies and upon the State highway agency's execution of stipulations. This is the only authority for granting rights-of-way for projects on the Federal-aid system or projects constructed under the provisions of chapter 2 of the Highway Act (FSM 2731).
- **Wilderness Act of September 3, 1964 (16 U.S.C. 1131-1136):** This act establishes requirements for special use authorizations in designated wilderness areas for temporary structures, commercial public services and access to valid mining claims and non-Federal

lands. Under this act, Presidential approval is necessary for the establishment of new water facilities, power projects, and transmission lines. Except for the Alaska National Interest Lands Conservation Act of December 2, 1980, this act is the exclusive authority for rights-of-way occurring within designated wilderness areas.

- **Land and Water Conservation Fund Act of September 3, 1964, as amended (16 U.S.C. 4601-6a(c)):** Section 4(c) of this act authorizes permits for recreation, such as group activities, organized events, motorized recreational vehicle use, and other specialized recreation activities of limited duration.
- **National Forest Roads and Trails Act of October 13, 1964 (16 U.S.C. 532-38):** This act authorizes the Secretary of Agriculture to grant temporary or permanent easements to landowners who join the Forest Service in providing a permanent road system that serves lands administered by the Forest Service and lands or resources of the landowner. It also authorizes the grant of easements to public road agencies for public roads that are not a part of the Federal-aid system (FSM 2732).
- **Sisk Act of December 4, 1967, as amended (16 U.S.C. 484a):** This act authorizes the exchange of lands with states and local governments.
- **The Act of November 16, 1973 (30 U.S.C. 185):** This act, amending Section 28 of the 1920 Mineral Leasing Act, authorizes the Forest Service to issue authorizations for oil and gas pipelines and related facilities located wholly on NFS land. When the lands are under the jurisdiction of two or more Federal agencies, authority for issuance is reserved to the USDI, BLM, subject to approval by the agencies involved.
- **Federal Land Policy and Management Act of October 21, 1976 (43 U.S.C. 1761-1771):** Title V of the Federal Land Policy and Management Act (FLPMA) authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse NFS lands. FLPMA directs the United States to receive fair market value unless otherwise provided for by statute and provides for reimbursement of administrative costs in addition to the collection of land use fees (43 U.S.C. 1764(g)).
    - a. Except in designated Wilderness Areas, Alaska, and specifically excepted situations, FLPMA is the only authority for all forms of use involving:
        - (1) Transportation, distribution, or storage of water
        - (2) Transportation, distribution, or storage of liquids or gases other than water and other than oil, natural gas, synthetic liquid, or gas fuels, or their refined products
        - (3) Transportation of solid materials and associated facilities for storing such materials
        - (4) Generation, transmission, and distribution of electrical energy
        - (5) Transmission or reception of electronic signals and other means of communication
        - (6) Transportation facilities outside of wilderness, except those rights issued in connection with commercial recreation facilities, authorized by the Federal Highway Act (FSM 2731), or the National Forest Road and Trail Act (FRTA) of October 13, 1964 (FSM 2732). The FLPMA is also used for granting rights-of-way to those otherwise qualified for FRTA easements, but who elect to pay a road-use fee at the time of commercial hauling instead of paying their share of road costs at the time the easement is issued. For further direction of FLPMA road rights-of-ways see FSM 2733

    - (7) Other transportation systems or facilities that are in the public interest, including those that would arise from future technological advances
  - b. Section 504g of Title V (Public Law 98-300) exempts facilities financed through the Rural Electrification Administration from Federal land use fees. This section also provides for recovery of administrative costs from those uses.
  - c. Section 501(b)(3) of Title V (Act of October 27, 1986; 100 Stat. 3047; commonly referred to as "Colorado Ditch Bill") expanded the authority of the Secretary of Agriculture to:
    - (1) Issue free conditional easements for certain water conveyance systems crossing NFS lands;
    - (2) Authorize lump-sum payments for uses on NFS lands; and
    - (3) Administer uses on NFS lands authorized under previous acts that were granted or issued by the Secretary of the Interior.
- **American Indian Religious Freedom Act of August 11, 1978 (42 U.S.C. 1996):** This act states the policy of the United States to preserve and protect the rights of Native Americans to reasonable access and use NFS lands for exercising their traditional cultural religious beliefs and practices. This act does not grant authority to issue authorizations.
- **Archeological Resources Protection Act of October 31, 1979 (16 U.S.C. 470aa):** This act authorizes the Secretary of Agriculture to issue permits for archeological research, investigations, studies, and excavations.
- **Alaska National Interest Lands Conservation Act of 1980 (16 U.S.C 3210):**
  - a. The Alaska National Interest Lands Conservation Act (ANILCA) provides numerous authorities related to access that are specific to national forests in Alaska (except for sec. 1323(a), which applies to all NFS lands; see the following paragraph b). The Regional Forester, Region 10, shall prepare Manual supplements providing necessary direction for Alaska.
  - b. The provisions of section 1323(a) (16 U.S.C. 3210) apply to all NFS lands. This section provides that, subject to terms and conditions established by the Secretary of Agriculture, the owners of non-Federal land within the NFS shall be provided adequate access to their land. Regulations implementing section 1323(a) are set forth at Title 36, Code of Federal Regulations, Part 251, and Subpart D - Access to Non-Federal Lands. See FSM 2701.3, paragraph 3, for the summary of the provisions of 36 CFR 251, Subpart D.
- **Small Tracts Act of January 12, 1983 (16U.S.C. 521c-521i):** This act authorizes the sale, exchange, or interchange of certain parcels of minimal size.
- **Federal Timber Contract Payment Modification Act of 1984 (16 U.S.C. 618):** Section 3 of this act authorizes a waiver of all or part of a land use fee for an organizational camp operated by the Boy Scouts of America or other nonprofit organizations when they provide services the authorized officer determines are a valuable benefit to the public or programs of the Secretary of Agriculture.
- **Ditch Bill Act of October 27, 1986 (P.L. 99-545):** This act amended FLPMA to authorize permanent easements for agricultural water systems.
- **Omnibus Parks and Public Lands Management Act of 1996 (16 U.S.C. 497c):** Section 701 of this act:
  - a. Establishes a system to calculate fees for ski area permits issued under the National Forest Ski Area Permit Act of 1986, (16 U.S.C. 497b);

  - b. Provides for holders of ski area permits issued under other authorities to elect this permit fee system (FSH 2709.11, sec. 38.03a);
  - c. Includes provisions concerning compliance with NEPA when issuing permits for existing ski areas (FSM 2721.61f and FSH 2709.11, sec. 41.61b); and
  - d. Withdraws leasable and locatable minerals, subject to valid existing rights (FSH 2709.11, sec. 41.61c).
- **Act of May 26, 2000 (16 U.S.C. 406l-6d):** This act supplements the authority of the Secretary of Agriculture to regulate commercial filming and still photography on NFS lands. It also authorizes the Secretary to retain and spend land use fees collected for commercial filming and still photography without further appropriation, and provides for recovery of administrative and personnel costs in addition to the collection of the land use fee.
- **Cabin User Fee Fairness Act of 2000 (16 U.S.C. 6201-6213) as set out in title VI of the appropriations act for the USDI and Related Agencies for Fiscal Year 2001 (Pub. L. 106-291):** This act establishes procedures for appraising recreation residence lots and determining fees for recreation residence lots located on NFS lands.
- **National Forest Organizational Camp Fee Improvement Act of 2003 (16 U.S.C. § 6231 et seq.):** This act establishes a land use fee system for organizational camps located on NFS lands and authorizes the Secretary to retain and spend these fees without further appropriation. The act also exempts certain ministerial actions from the provisions of the NEPA.

Code of Federal Regulations (CFR)

The following regulations provide direction for special uses management on NFS lands:

- **36 CFR 251 –** Land Uses
  - Subpart A: Miscellaneous Land Uses
  - Subpart B: Special Uses
  - Subpart C: Appeal of Decisions Relating to Occupancy and Use of NFS Lands
  - Subpart D: Access to Non-Federal lands
  - Subpart E: Revenue-producing Visitor Services in Alaska
- **36 CFR 254 –** Landownership Adjustments
  - Subpart A: Land Exchanges
  - Subpart B: National Forest Townsites
  - Subpart C: Conveyance of Small Tracts

Key Indicators

- Acres of NFS land administered; and
- Number of special use authorizations.

Methodology and Analysis Process

The number of acres of NFS lands currently administered by the KNF and number of special use authorizations currently in effect would be compared to changes that would result from implementation of any of the alternatives considered.

The total acres of NFS lands are derived using a GIS measuring process. The total is comprised of lands under Forest Service jurisdiction both within and external of the proclaimed NFS boundary. The total acres of non-NFS lands are provided by the Washington Office Lands group and are only those lands within the proclaimed NFS boundary. The data source for the number of special use authorizations is the national special uses data system.

Affected Environment (Existing Condition)

Lands

There are approximately 2,219,000 acres of NFS lands that are the administrative responsibility of the KNF. This is the result of the original congressionally designated lands and the conveyances (acquisitions, disposals, and exchanges) that have occurred to date.

The KNF landownership pattern varies with location (see figure 37).

The pattern can be characterized as:

- Large blocks of uninterrupted, contiguous NFS lands;
- Checkerboard situations with alternate sections of private and NFS lands;
- Isolated tracts of private lands surrounded by NFS lands;
- Isolated tracts of NFS lands surrounded by private lands; and
- Large blocks owned by corporate landowners.

Within the proclaimed boundary of the KNF there are approximately 390,000 acres of non-NFS lands. These non-NFS lands are comprised of State and local government, other agency, corporate and private ownership; and large waterbodies.

The KNF has administrative responsibility for surveying and marking of approximately 2,500 miles of landline.

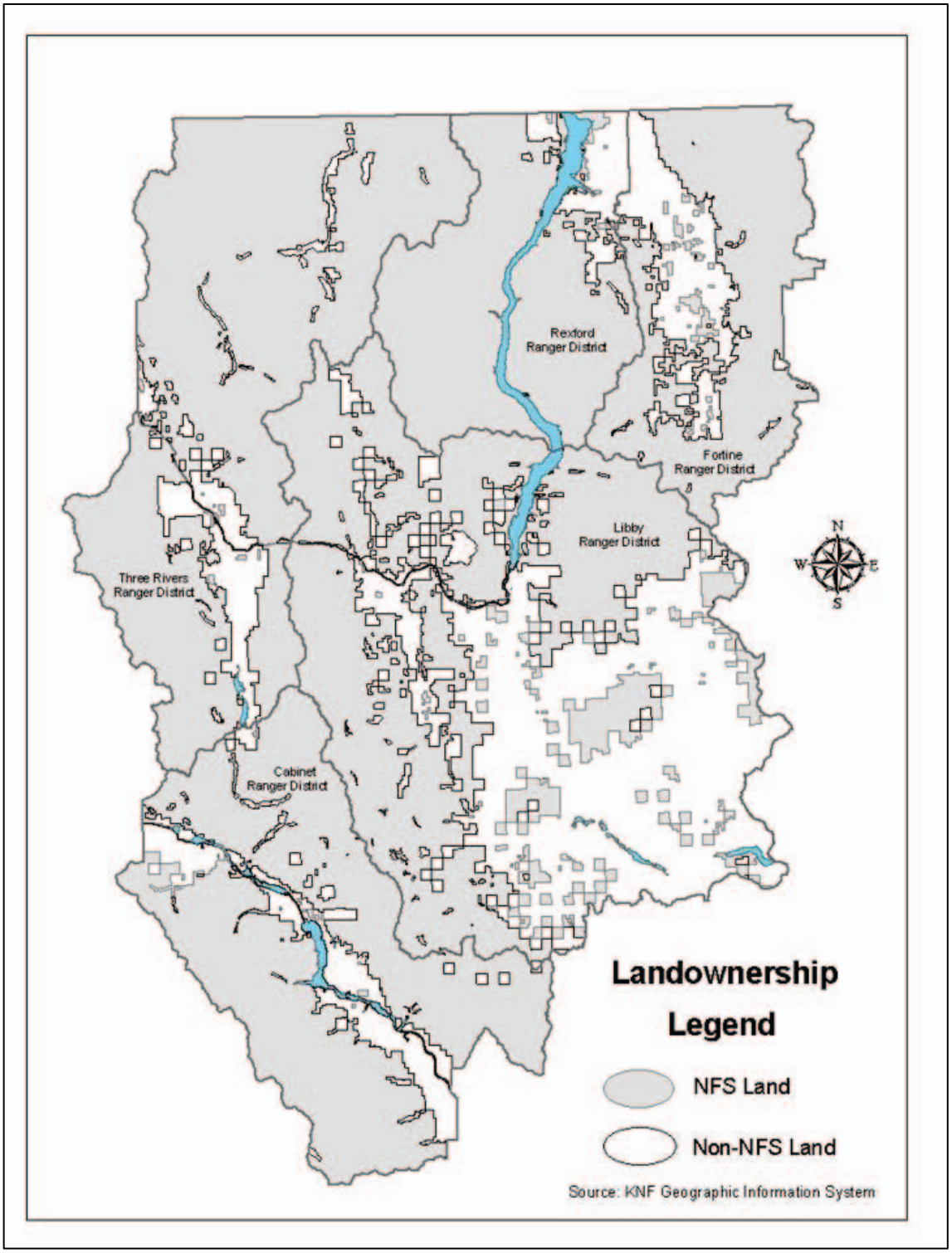


Figure 37. Kootenai National Forest Landownership Pattern

Special Uses

Special use authorizations permit occupancy and use on NFS lands by federal, state and local agencies, private industry, and individuals. Non-recreation special uses vary from low-intensity, often short-term actions such as filming or locations for scientific instruments, to larger

developed facilities such as roads, communication sites, dams, and utility/energy transmission infrastructure.

Currently there are about 680 non-recreation special use authorizations in effect. Table 60 summarizes the current status with the categories and number of permits in each category.

Close to 70 percent of all authorizations are related to roads (DOT easements, FRTA easements, FLPMA easements and permits). The next closest category is for waterlines which account for about 10 percent of current authorizations. Outfitter and Guide authorizations account for about 5 percent and the remaining 15 percent is spread through all the other categories.

Table 60. Summary of Non-recreation Special Use Authorizations

Special Use Category	# of Permits
AIRPORT OR AIRWAY BEACON	1
AIRPORT, HELIPORT	2
BROADCAST TRANSLATOR/LOW POWER TV & FM	5
BUILDING	3
CABLE TELEVISION	1
CELLULAR	4
CULTIVATION	3
DOT EASEMENT	28
EXPERIMENTAL AND DEMONSTRATION	1
FACILITY MANAGER	3
FEDERAL LAND POLICY & MGMT ACT EASEMENT	30
FEDERAL LAND POLICY & MGMT ACT PERMIT	107
FIBER OPTICAL CABLE	1
FOREST ROAD AND TRAIL ACT EASEMENT	331
HYDROELECTRIC PROJECT, FERC EXEMPTED	1
HYDROELECTRIC PROJECT, FERC LICENSED	1
IRRIGATION WATER DITCH	5
IRRIGATION WATER TRANS PIPELINE < 12" D	17
LIQUID WASTE DISPOSAL AREA	1
LIVESTOCK AREA	2
MICROWAVE-COMMON CARRIER	5
MICROWAVE-INDUSTRIAL	1
MOTION PICTURE AND TV LOCATION	1
NONDISTURBING USE	2
PASSIVE REFLECTOR	4
POWERLINE	6
POWERLINE, REA FINANCED	4
PRIVATE MOBILE RADIO SERVICE	9
RAILROADS RIGHT-OF-WAY	2
RESIDENCE, PRIVATELY-OWNED BUILDING	1
RESOURCE MONITORING SITE	4

Special Use Category	# of Permits
SERVICE BUILDING	2
SIGN	1
SLURRY PIPELINE	1
STOCKPILE SITE	1
STREAM GAUGING STATION	2
TELEPHONE AND TELEGRAPH LINE	2
TELEPHONE LINE, REA FINANCED	2
TRANSFER STATION	3
WAREHOUSE AND STORAGE YARD	1
WATER CONVEYANCE EASEMENT, PL 99-545	3
WATER QUALITY MONITORING STATION	1
WATER TRANS PIPELINE < 12" D	70
WATER TRANS PIPELINE >=12" D	1
WEATHER STATION	1
Grand Total	**677**

Source: INFRA: Special Uses Data System (SUDS) 1/2010

Environmental Consequences

General Effects

Alternative A – No-action Alternative

This alternative reflects the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations that have been promulgated since the original Forest Plan and the amendments were adopted. The 1987 Forest Plan recognized the desirability of adjusting landownership in order to improve manageability of NFS lands. This alternative does not propose to acquire or dispose of any lands but did identify (in appendix 9 of the 1987 Forest Plan) lands that were desirable to be acquired and lands that were available for disposal.

Alternatives B, C, and D

None of the alternatives propose to make any site specific changes to the existing landownership on the KNF. No conveyances (acquisitions, disposals, or exchanges) are proposed. Any of these actions would only be considered at the project level. Until an external entity presents a proposal there would be no changes to the existing landownership pattern.

Since no changes in landownership are proposed, the number of acres of NFS lands remains the same for all four alternatives.

None of the alternatives propose to make any site specific changes to existing special use authorizations or rights-of-way on the KNF.

Since no changes in special use authorizations or in rights-of-way are proposed there is no difference between Alternatives A, B, C, or D.

Consequences to Lands and Special Uses from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Some MA allocations, such as NFS lands which have not been statutorily designated for a specific use (e.g., MA1b – Recommended Wilderness, MA2 – Eligible Wild & Scenic Rivers) or lands that have been administratively designated for a specific use (e.g., MA3 – Special Areas, MA4 – Research Natural Areas) are less likely to be considered for disposal or exchange. Based on MA allocations, Alternative C would have the greatest number of acres that would be less likely to be considered for disposal or exchange, followed by Alternative B, D, and A.

Similar to lands, some special uses authorizations are less likely to be considered in MA1b, MA2, MA3, or MA4. Based on MA allocations, Alternative C would have the greatest number of acres that would be less likely to be considered for special use authorizations, followed by Alternative B, D, and A.

Effects from Vegetation Management

Vegetation treatments tend to impact the appraised value of NFS lands. Depending on the type of treatment the value may decrease or increase. Since Alternative D has the most likelihood of vegetation treatments it is most likely to result in fluctuations in land values, followed by Alternative A, B, and C.

Effects from Wildlife Management

National Forest System lands that provide secure habitat or contribute as linkage areas are less likely to be considered for disposal or exchange. The impact is the same for the four alternatives since the lands where these conditions exist does not vary between the alternatives.

Effects from Recreation Management

National Forest System lands with developed recreation sites (e.g., campgrounds) are less likely to be considered for disposal or exchange.

Cumulative Effects

Cumulative effects evaluate the potential impacts to NFS lands and special uses from the proposed action when combined with past, present, and reasonably foreseeable actions. The lands within the KNF boundary form the geographic scope for cumulative effects since this is the scope for the proposed action (Alternative B). The temporal bound would be the life of the Forest Plan which is estimated to be a 15 year time span.

In order to integrate the contribution of past actions to the cumulative effects of the proposed action and alternatives, existing conditions are used as a proxy for the impacts of past actions. This is because existing conditions reflect the collective impact of all prior actions that have affected landownership and special uses and might contribute to cumulative effects.

If either the Rock Creek or Monantore mining proposals begin operations it can be anticipated that authorizations would be granted for electric transmission lines. These would be localized in that the area influenced would be limited to the location of the mine facilities and existing power line source points. As part of probable mitigation measures for wetlands it can also be expected that additional lands would be conveyed as NFS lands resulting in a slight increase of the number of acres administered by the KNF.

Landownership and special uses can be expected to be influenced by a variety of factors.

As described in the "Affected Environment" section, the KNF has administrative responsibilities for 2,219,000 acres of NFS lands. At this time the KNF is not actively pursuing any adjustments in landownership. But, in recent years, external entities have made land acquisitions and have transferred ownership to the national forests, and there is some likelihood that these types of actions may continue. Any change (increase or decrease in total NFS lands) is dependent on what actions might be initiated. Outright purchase and transfer would most likely result in an increase in the acres of NFS lands. Land exchanges, on the other hand, may result in a decrease in the acres of NFS lands.

The Forest can expect requests for special use authorizations to continue. As more private land is subdivided there is usually an associated increase in requests for road special use permits and utility easements. Requests for modification of existing authorized communication sites and designation of new communication sites can reasonably be expected as technological advances (e.g., cell phones) are made. On the KNF these sites typically occupy small acreages (1 to 2 acres).

Boundary survey and marking will continue and occasional encroachments are likely to be discovered.

Roadless Areas

Introduction

Inventoried roadless areas are undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. Roadless area inventories were initially completed during the Roadless Area Resource Evaluations of 1972 (RARE I) and 1979 (RARE II). The 1987 KNF Plan EIS, appendix C, included 32 IRAs identified by name, number, and description of the area.

Inventoried roadless areas are distributed across the Forest comprising approximately 638,000 acres of undeveloped area. These areas provide a range of primitive and semi-primitive recreation opportunities. Roadless area recreation levels vary from low to moderate, depending upon their location. Use levels tend to be lower than the developed portions of the Forest where roads allow easier access to developed and dispersed recreational opportunities. The roadless areas provide a myriad of other resource benefits including undeveloped fisheries and wildlife habitat, biological diversity, and sources for high-quality water.

Public opinions regarding the use of these areas vary greatly, and future management of roadless areas is a controversial and polarized issue. Management direction for IRAs has been proposed in the draft Forest Plan and for each alternative. IRAs within the state of Idaho (approximately 35,100 acres) are managed under the Idaho Roadless Rule of 2008 (36 CFR 294 subpart C). While a management allocation may allow development activities such as vegetation management in a roadless area, it does not require it. Such activities may be proposed, but must be further evaluated in site-specific NEPA prior to approval and implementation.

Each roadless area is evaluated through the forest planning process to determine if it provides wilderness characteristics and whether or not it should be recommended for wilderness. Areas not recommended for wilderness could still be considered for wilderness by Congress. Impacts on the areas' inherent wilderness character, its undeveloped nature, its naturalness, the opportunity to provide primitive and unconfined recreation, and its natural ecosystem forces could detract from future consideration of the area as wilderness. This analysis evaluates the effects of the proposed Plan and alternatives on roadless characteristics. This evaluation considered the criteria and process for evaluating potential wilderness found in FSH 1909.12, chapter 70, Wilderness Evaluation.

Legal and Administrative Framework

Law and Executive Orders

- **The Wilderness Act of September 9, 1964 (P.L. 88-577):** Defines wilderness and sets forth policy and implications for wilderness designation.
- **Montana Wilderness Study Act of 1977:** "provides for the study of certain lands to determine their suitability for designation as wilderness in accordance with the Wilderness Act of 1964", and for other purposes.
- **Memorandum 1042-154:** Secretary of Agriculture Vilsack reserved decision authority for projects in inventoried roadless areas involving road construction/ reconstruction or the cutting, sale or removal of timber, as re-authorized.

Code of Federal Regulations (CFR)

- **36 CFR 219.27(b):** States, 'Unless federal statute directs otherwise, all undeveloped areas that are of sufficient size as to make practicable their preservation and use in an unimpaired condition must be evaluated for recommended wilderness designation during the Plan revision process. These areas may be evaluated at other times as determined by the responsible official.'
- **Idaho Roadless Rule (36 CFR 294 Subpart C):** Provides State-specific direction for the conservation of inventoried roadless areas in the national forest within the State of Idaho.

Key Indicator

- Number of acres recommended for wilderness, by alternative.

Methodology and Analysis Process

Inventory of Roadless Areas for the Forest Plan Revision

When revising forest plans, national forests are required to evaluate roadless areas, consider their wilderness characteristics, and to make recommendations to Congress regarding areas suitable for inclusion into the National Wilderness Preservation System. The Forest Service can only recommend wilderness allocations to Congress via Forest Plans, and only Congress can designate wilderness through the legislative process. The first step in the evaluation of potential wilderness is to identify and inventory all roadless areas within NFS lands that satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act.

Criteria for determining whether an area of NFS land qualifies as an IRA are provided in Forest Service Handbook 1909.12 (71.1), which states: "Areas qualify for placement on the potential wilderness inventory if they meet the statutory definition of wilderness. Include areas that meet either criteria 1 and 3, or criteria 2 and 3 below." In addition, they may have improvements if they meet the criteria in section 71.11, and for areas east of the 100 meridian, they must also meet the criteria in 71.12.

> 1. Areas contain 5,000 acres or more.
>
> 2. Areas contain less than 5,000 acres, but can meet one or more of the following criteria:
>
> > a) Areas can be preserved due to physical terrain and natural conditions
> > b) Areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.
> > c) Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.
>
> 3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian."

Inventoried roadless areas may contain improvements such as motorized trails, unauthorized and user-created roads, fences, outfitter camps, and evidence of historic logging activities. The identification of potential wilderness inventory does not constitute a land designation, nor does it imply any particular level of management direction or protection. It is completed with the

express purpose of identifying all lands that meet the criteria for being evaluated for wilderness suitability and possible recommendation for inclusion in the National Wilderness Preservation System.

Evaluation for Wilderness Potential

The next step in potential wilderness evaluation is to determine the mix of land and resources uses that best meet public needs. An area recommended as suitable for wilderness must meet the test of capability, availability, and need. In addition to the inherent wilderness quality it possesses, an area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment, and the ability of the area to be managed as wilderness.

The IRAs were evaluated for suitability for potential wilderness with the test of capability, availability, and need as follows:

- **Capability –** The capability of a potential wilderness is the degree to which that area contains the basic characteristics that make it suitable for wilderness recommendation without regard to its availability for or need as wilderness. This includes environmental as well as manageability considerations.
- **Availability –** All NFS lands determined to meet wilderness capability requirements are considered potentially available for wilderness designation. However, the determination of availability is conditioned by the value of and need for the wilderness resource compared to the value of and need for other resources.
- **Need –** The need for an area to be designated as wilderness is determined through an analysis of the degree to which it contributes to the overall National Wilderness Preservation System. This evaluation is conducted at the regional level considering factors such as geographic distribution of areas and representations of landforms and ecosystems.

Each of the forty three areas of potential wilderness inventory was evaluated to determine suitability as recommended wilderness. The IRAs were first assessed for capability and availability. The Regional need analysis was then applied.

The Wilderness Needs Assessment was completed in 2003 for the USDA Forest Service Northern Region. Need is described as the degree to which an area contributes to the local and national distribution of wilderness (FSH 1909.12, 72.3a). The Northern Region assessment included social and ecological factors.

The Regional Needs Assessment found that designation of additional wilderness acreage in the Region could provide a greater level of habitat security for additional plant species that are rare at the global or state level according to the state Natural Heritage Programs. The KNF is included in the Flathead Valley Ecological section of the Northern Region. This section would gain acreage of under-represented cover types of with the addition of IRAs into the wilderness system (USDA 2003).

The four under represented types on the KNF are vegetation response units 2 (ponderosa pine), 5 (western red cedar and western hemlock), 8 (western red cedar and western hemlock –wet), and Aquatic Response Unit types representing forest-dominated riparian areas.

Affected Environment (Existing Condition)

Inventory of Roadless Areas

The1987 Plan identified 32 IRAs with a total of 403,300 acres. This inventory was updated as part of the initial Forest Plan revision efforts in 1999 (KNF 1999). The updated inventory identified 11 additional areas and 235,870 additional acres for a total of 43 IRAs on 639,100 acres (see figure 38). Acreage on Forest Service land only totals 638,030.

For the purposes of this evaluation, the IRAs shown in figure 38 have been determined to qualify as the potential wilderness inventory. They are all areas within NFS lands and satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act.

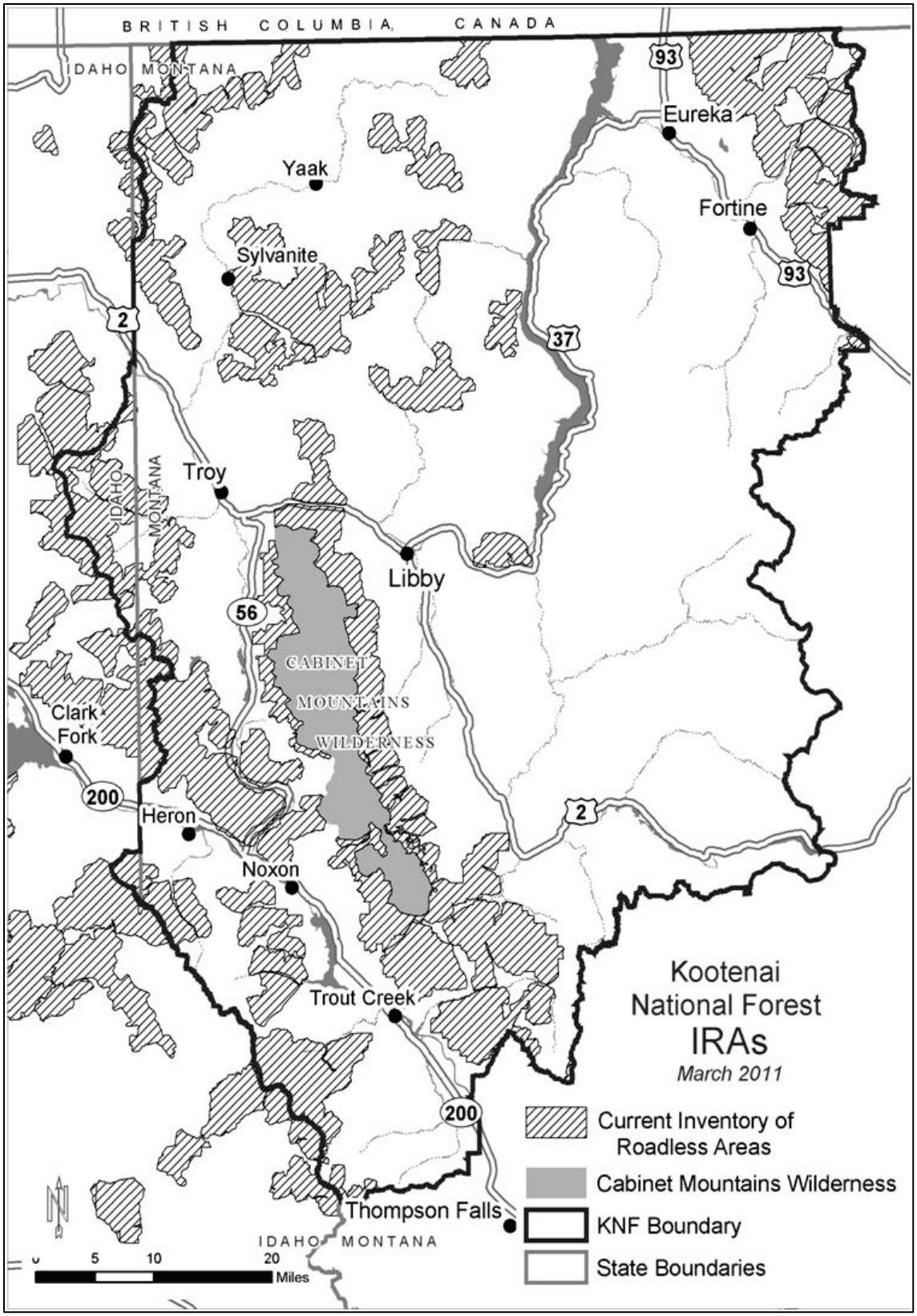


Figure 38. Potential Wilderness Inventory Map

Table 61 summarizes the change in potential wilderness inventory that has occurred since the 1987 Forest Plan was adopted. Currently, a total of 43 areas of potential wilderness inventory (IRAs), are distributed across the Forest comprising approximately 638,034 acres of undeveloped area. These areas provide a range of primitive and semi-primitive recreation opportunities. Overall, recreation levels are relatively low compared to the use that is occurring in roaded and developed areas that offer easier access and a greater variety of amenities and services.

Table 61. Potential Wilderness Inventory Summary (IRAs)

	1987 Forest Plan	1999 Inventory (NFS land only)	Net Change 1987 to 2011
Number of Areas	32	43	+11
Total Acres	**403,300**	**638,034**	**234,870**

Evaluation for Wilderness Potential

Each of the 43 roadless areas was evaluated to determine its potential for wilderness designation. All IRAs were assessed for capability and availability. A need analysis was then completed. Appendix C contains details of the IRA evaluations. Opportunities and experiences one would expect to find and manageability of an area was incorporated to determine which IRA's were suitable for potential inclusion in the National Wilderness Preservation System. Table 62 is a summary of the potential wilderness inventory suitability evaluation ratings by IRA. IRAs are listed alphabetically in this report and appendix C.

Table 62 Potential Wilderness Inventory by IRA, and Suitability Ratings

IRA		Total Area Acres	Rating		
Name	#		Capability	Availability	Need
Alexander	696	6,714	Low/Mod	Moderate	Low
Allen Peak	185	29,617	Moderate	High	High
Barren Creek	183	14,526	Moderate	Moderate	Moderate
Berray Mountain	672	9,105	Moderate	Moderate	High
Big Creek	701	7,526	Moderate	Moderate	High
Buckhorn Ridge	661	28,789	High	High	High
Cabinet Face East	671	50,192	High	Low to High	High
Cabinet Face West	670	13,683	High	High	High
Cataract Creek	665	25,441	Moderate	Low	High
Chippewa	682	1,261	High	High	Moderate
Cube Iron	784	623	Low	High	Low
Devils Gap	698	5,349	Mod/High	High	High
East Fork Elk	678	6,766	Moderate	Moderate	High
Flagstaff	690	11,102	Moderate	Moderate	Moderate
Galena	677	19,293	Moderate	Moderate	High
Gold Hill	668	6,452	Low/Mod	Moderate	Low
Gold Hill West	176	15,072	Moderate	High	Moderate

IRA		Total Area Acres	Rating		
Name	#		Capability	Availability	Need
Government Mountain	673	10,084	Low/Mod	Moderate	Moderate
Grizzly Peak	667	7,436	Moderate	High	Moderate
Huckleberry Mountain	699	8,959	Moderate	Moderate	Moderate
LeBeau	507	1,258	Low	High	Moderate
Lone Cliff Smeads	674	5,115	Low	Low	Moderate
Lone Cliff West	674a	5,311	Low/Mod	Low	Moderate
Maple Peak	141	3,588	Low	High	Low
Marston Face	172	9,092	Moderate	High	Moderate
McKay Creek	676	15,285	Mod/high	Moderate	Moderate
McNeeley	675	6,653	Low	High	High
Mt Henry	666	13,596	Moderate	High	Low
Northwest Peaks	663	15,341	High	High	High
Roberts	691	10,815	Moderate	Moderate	Moderate
Robinson Mountain	164	7,030	Moderate	High	Low
Rock Cr	693	805	High	Low	High
Roderick	684	29,657	High	High	High
Saddle Mountain	168	14,666	Mod/High	High	Moderate
Scotchman Peaks	662	54,439	High	High	Moderate
Ten Lakes	683	48,510	Mod/High	Moderate	High
Thompson Seton	483	29,379	Moderate	High	Moderate
Trout Creek	664	30,866	Moderate	Low	Moderate
Tuchuck	482	2,235	Moderate	High	Moderate
West Fork Elk	692	5,117	Low	Low	High
West Fork Yaak	694	8,232	Mod/Low	High	Moderate
Willard Estelle	173	33,046	High	Moderate	Moderate
Zulu	166	10,004	Moderate	High	Moderate

In addition to inherent wilderness quality (ratings for capability, availability and need), an area must provide opportunities and experiences that are dependent or enhanced by a wilderness environment, and the manageability of the area as a wilderness should be considered (FSH 1909.12, 72). Other considerations in determining suitability include; size and shape of the IRA, location in relation to other IRAs or designated wilderness, adjacent property, adjacent forest's evaluation, public comments, social and economic considerations, or administrative recommendations.

The areas of potential wilderness inventory were rated as high, medium or low for each of the three categories of suitability. Wilderness suitability is a composite of the three ratings in addition to other considerations. Those rated as low in any category were dropped from further consideration unless recommended for wilderness in the1987 Plan, or specifically suggested in public comments received.

Fifteen potential wilderness inventory areas were determined not to be suitable based on a low rating, and were not recommended as wilderness in any alternative.

An additional twelve potential wilderness inventory areas, while rated moderate or high in all suitability categories, were determined to not be suitable based on other considerations, and not recommended as wilderness in any alternative. Reasons for this varied from identified public concerns, need of treatment for fuel reduction, adjacent private lands, unmanageable boundaries, existing recreation uses (over snow, motorized and/or mechanical), and white bark pine restoration needs or road/fish restoration needs.

For example Northwest Peaks IRA rated high in all suitability categories, but was determined not to be suitable based on concerns from the public and elected officials. This area is a popular over snow vehicle use area. The majority of Northwest Peaks IRA is allocated to MA3 (special areas) in all alternatives to maintain its unique character, and allow for existing uses (see appendix C for suitability ratings, and rational for determination of recommended wilderness).

Parts of sixteen IRAs, grouped in nine areas, were identified as capable, available and determined suitable as recommended wilderness (see table 63). These areas total 217,348 acres or approximately nine percent of the KNF.

Table 63. Potential Wilderness Inventory Suitable as Recommended Wilderness

IRA		Total IRA Acres	Suitable Recommended Wilderness	
Name	#		Acres[1]	Name
Allen Peak	185	29,617	20,542	Allen Peak
Barren Creek	183	14,526	2,126	Cabinet Mountains[2]
Big Creek	701	7,526	6,615	Big Creek
Cabinet Face East	671	50,192	33,745	Cabinet Mountains[2]
Cabinet Face West	670	13,683	8,145	Cabinet Mountains[2]
Chippewa	682	1,261	365	Cabinet Mountains[2]
Gold Hill West	176	15,072	12,176	Gold Hill West
Marston Face	172	9,092	7,873	Whitefish Divide
McKay Creek	676	15,285	8,781	Cabinet Mountains[2]
Rock Cr	693	805	582	Cabinet Mountains[2]
Roderick	684	29,657	23,471	Roderick
Saddle Mountain	168	14,666	14,291	Saddle Mountain
Scotchman Peaks	662	54,439	37,300	Scotchman Peaks
Ten Lakes	683	48,510	9,073	Ten Lakes Contiguous Area
Thompson Seton	483	29,379	30,110	Whitefish Divide
Tuchuck	482	2,235	2,153	Whitefish Divide
TOTAL			**217,348**	

1 Potential wilderness acres do not match total acres for individual roadless areas because boundaries of recommended wilderness areas sometimes include acres outside of the roadless boundary and sometimes exclude some of the roadless area.

2 Existing Cabinet Mountains Wilderness additions

This evaluation of potential wilderness inventory is not a land designation, nor does it imply any particular level of management direction or protection in association with the evaluation of these potential wilderness areas. The evaluation was completed with the express purpose during forest planning to identify all lands that meet the criteria for being evaluated for wilderness suitability and possible recommendation to Congress for wilderness designation (FSH 1909.12.71).

Recommended Wilderness

As a result of decisions made in the 1987 Forest Plan, 76,500 acres were recommended for wilderness (see table 64). These areas have not been designated by Congress as wilderness. This is the existing condition (Alternative A) for recommended wilderness. These areas recommended for wilderness were identified because of special or unique features and public support

Table 64. 1987 KNF Forest Plan Recommended Wilderness

Name	Acres[1]
Cabinet Additions	33,600
Scotchman Peaks	36,100
Ten Lakes Contiguous Area	6,800
Total	**76,500**

1. Acres have been updated from the 1987 Forest Plan to reflect current GIS layers and data.

Under the 1987 Forest Plan, the use of motorized and mechanized equipment in recommended wilderness is allowed to varying degrees. The Ten Lakes contiguous area (MA8) and wilderness study area (MA9) remain open to snowmobiles in winter while the other recommended wilderness areas are closed to vehicles year-round. There has been use of the Scotchman Peaks recommended wilderness by over-snow vehicles, which is not permissible. Law enforcement patrols and monitoring of the area will continue.

Levels of motorized travel were much lower in the mid-1980s when the existing Forest Plan was completed. The increased popularity and expansion of these uses, the potential of these activities to affect wilderness character, and potential for designation, were not fully anticipated. No recommended wilderness is currently closed to bicycles or other nonmotorized mechanized transport such as game carts, back country in-line skates or skate boards, or hang gliders.

Idaho Roadless Rule

Approximately 35,100 acres of IRAs managed by the KNF are located in the State of Idaho, and are managed under the Idaho Roadless Rule of 2008. The Idaho Roadless Rule (36 CFR 294 Subpart C) establishes management direction for designated roadless areas in the State of Idaho.

There are four areas on the KNF located in the State of Idaho which are managed under the Idaho Roadless Rule of 2008 (see table 65). All four areas straddle both state lines and forest boundaries. Only the portions of IRA's located in the State of Idaho are managed under the Idaho Roadless Rule.

Table 65. Idaho Roadless Rule Areas on the Kootenai National Forest

Area	Inventoried Roadless Area #.	KNF Idaho Acres[1]	IPNF Idaho Acres[1]	KNF Montana acres[2]	IPNF Montana Acres[2]	Total IRA Acres
Mt. Willard-Lake Estelle	#173	**23,400**	35,000	9,600		68,000
Roberts	#691	**7,400**		3,400		10,800
Scotchman Peak	#662	**600**	19,800	53,800	12,300	85,300
West Fork Elk	#692	**3,700**		1,500		5,200
Total		**35,100**				

1 Managed under the Idaho Roadless Rule 2008
2 Managed under current Forest Plans

Environmental Consequences

The purpose of the analysis on the roadless resource is to disclose potential effects to roadless and wilderness attributes and determine if, or to what extent, it might affect future consideration for wilderness recommendations. This analysis focuses on the potential effects of land management designations and allowable uses on wilderness characteristics as defined in the Forest Service Handbook (FSH) 1909.12 (72.1). Wilderness characteristics, as defined in FSH 1909.12 (72.1) and evaluated here include the following:

- Natural − The extent to which long-term ecological processes are intact and operating.
- Undeveloped − The degree to which the impacts documented in natural integrity are apparent to most visitors.
- Outstanding opportunities for solitude or primitive unconfined recreation − Solitude is a personal, subjective value defined as the isolation from sights, sounds, and presence of others and from developments and evidence of humans. Primitive recreation is characterized by meeting nature on its own terms, without comfort and convenience of facilities.
- Special features and values − Unique ecological, geographical, scenic, and historical features of an area.
- Manageability − The ability to manage an area for wilderness consideration and maintain wilderness attributes.

General Effects

The following discussion includes general effects on roadless areas, indentified as potential wilderness inventory areas (IRAs) for Forest Planning. Management allocations will not directly affect the character of potential wilderness inventory areas (IRAs) until a planned management activity is scheduled. Activities may be proposed in IRAs, but must be further evaluated in site-specific NEPA prior to approval and implementation. Management activities that substantially alter the undeveloped character of an inventoried roadless area of 5,000 acres or more, generally require preparation of an EIS (FSH 1909.15 21.2).

The MA allocation MA1b (recommended wilderness) is designed to provide areas where wilderness characteristics are protected. This management area is designed to meet Forest

Service Manual and Handbook requirements and contains direction to manage the recreation settings to the standards established for recommended wilderness areas.

The effects for all alternatives are based on assigned MAs and their potential for development. Table 66 displays the acres by recommended wilderness area for each alternative.

Table 66. Acres of Recommended Wilderness by Alternative

Area	Acres by Alternative[1]			
	A	B	C	D
Scotchman Peaks[2]	36,100	35,900	37,300	
Cabinet Additions	33,600	29,900	53,700	37,300
Ten Lakes Contiguous Area	6,800		9,100	
Whitefish Divide		23,500	40,100	
Roderick		23,500	23,500	
Saddle Mountain			14,300	
Allen Peak			20,500	
Big Creek			6,600	
Gold Hill West			12,200	
Total Acres	**76,500**	**112,800**	**217,300**	**32,300**

1 Acres don't match forestwide summary acres by MA because of overlapping acres within MA.
2 There is an additional 22,000 acres proposed on the Idaho Panhandle National Forest.

Each alternative displays a mix of land and resource uses that best meet public needs for additional recommended wilderness areas in the National Wilderness Preservation System based on the alternative theme. As compared to Alterative A, Alternative B drops consideration of the Ten Lakes Contiguous Area as recommended wilderness and adds two additional areas: Whitefish Divide and Roderick. Alternative C recommends the most wilderness, retaining the same areas as under the current Plan and adding six additional areas: Whitefish Divide, Roderick, Saddle Mountain, Allen Peak, Big Creek, and Gold Hill West. Alternative D recommends the least wilderness, recommending only the Cabinet Additions.

Effects of Forestwide Direction

Alternative A – No-action Alternative

This alternative reflects the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations that have been promulgated since the original Forest Plan and the amendments were adopted. The 1987 ROD identified three recommended wilderness areas: Scotchman Peaks, Cabinet Additions, and Ten Lakes Contiguous Area for a total of 76,500 acres.

Alternatives B, C, and D

All action alternatives recommend some wilderness, to varying degrees. Alternative B recommends four potential wilderness areas: Scotchman Peaks, Cabinet Additions, Whitefish Divide, and Roderick for a total of 112,800 acres. Alternative C recommends nine potential wilderness areas for a total of 217,300 acres while Alternative D recommends the least number of acres, 32,300 acres (Cabinet Wilderness additions). Desired conditions, standards, and guidelines for MA1b would apply regardless of which alternative is selected for implementation.

Consequences to Roadless Areas from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Allocations

Research shows Americans that engage in outdoor activities are seeking opportunities for day hikes. Typically, visitors prefer day hiking to a destination such as a waterfall, lake, scenic vista, or unique feature. Forests near population centers in Montana and Idaho should continue to consider this need for nonmotorized hiking trails as they complete their wilderness assessments (Regional Wilderness needs assessment 2003).

Table 67 shows the distribution of the 638,034 acres of inventoried roadless area, across the range of MAs in each alternative. All the acres shown were included in the roadless area review completed for Forest Plan revision.

Table 67. Acres of Inventory Roadless Area Management Area Allocation by Alternative

MA	Alt A[1]	Alt B[2]	Alt C[2]	Alt D[2]
MA1a Wilderness	0	0	0	0
MA1b Wilderness Recommended	76,085	107,061	205,334	35,912
MA1c Wilderness Study Area	34,521	33,778	33,778	33,778
MA2 Eligible Wild and Scenic River	0	10,662	8,140	12,770
MA3 Special Areas	7,907	13,548	12,379	13,650
MA4 Research Natural Areas	Included in MA3	5,856	5,855	5,856
MA5a Backcountry Nonmotorized	234,690	223,060	322,861	110,799
MA5a/5b Combined	27,326	0	0	0
MA5b Backcountry Motorized	1,349	149,870	33,607	47,759
MA5c Backcountry Nonmotorized with Snowmobile	0	80,980	9,967	114,582
MA6 General Forest Area	243,788	13,213	6,105	262,926
MA7 Recreation Area	76	0	0	0
Unknown	12,226	0	0	0

1 The 1987 Forest Plan did not categorize MA by these descriptions, acres are rounded and may not equal total potential wilderness inventory due to GIS mapping.

2 Acres do not match forestwide summary acres by MA because of overlapping acres within MA, and acres outside of IRAs included in recommended wilderness are not shown.

Management area allocation can be grouped into broad categories; areas that allow a full range of development opportunities (MA6, MA7); areas that have potential for low levels of development and maintain their undeveloped roadless character (MA2, MA3, MA4, MA5a, MA5b, MA5c); and areas that are recommended as wilderness (MA1b). Management area allocations will not directly affect the character of IRAs until management activities are planned and implemented. Table 68 summarizes the MAs allocated to each IRA for each alternative.

In general, Alternative D allocates the most acres of IRAs to allow a full range of development opportunities. Alternatives A, B, and C allocate the least acres of IRAs to development, and provide the best opportunity to maintain their underdeveloped roadless character.

Table 68. Inventoried Roadless Area Management Area Allocation by Alternative

Inventoried Roadless Area		Area	Action Alternative/MA(s)		
Name	#		B	C	D
Alexander	696		2,5a	2,5a	2,5a
Allen Peak	185	Allen Peak	2,3,5b	1b, 2,3,5a,5b,6	2,3,6
Barren Creek	183	Cabinet Addn's	5b	1b,5a,5b	6
Berray Mountain	672		2,5a	2,5a	2,6
Big Creek	701	Big Creek	2,5c	1b, 2,6	2,5c
Buckhorn Ridge	661		5a,5c	5a,5b,6	5c
Cabinet Face East	671	Cabinet Addn's	1b,2,4,5a,5b	1b,2,,5a,6	1b, 2,4,5a,6
Cabinet Face West	670	Cabinet Addn's	1b, 2,4,5a	1b, 2,5a,6	1b, 2,4,5a,6
Cataract Creek	665		2,4,5a,5b	2,4,5a,	2,4,6
Chippewa	682	Cabinet Addn's	1b,2,5a,6	1b,2,5a,5b,6	1b,2,6
Cube Iron	784		5a	5a	5b
Devils Gap	698		5b	5b	6
East Fork Elk	678		5a,5c	5a	6
Flagstaff	690		2,3,4,5a,5c	2,3,4,5a	2,3,4,6
Galena	677		3,5b	3,5a	3,6
Gold Hill	668		6	5c	6
Gold Hill West	176	Gold Hill West	3,5c	1b,3,5a,5c,6	3,5c,6
Government Mtn	673		2,5a	2,5a	2,5b,6
Grizzly Peak	667		5a	5a,5b,6	5a,6
Huckleberry Mtn	699		5b	5b	6
LeBeau	507		4,5b	4,5a	4,6
Lone Cliff Smeads	674		5b	5b	6
Lone Cliff West	674a		5b	5a	6
Maple Peak	141		5b	5b	6
Marston Face	172	Whitefish Div	5a,5b,6	1b,5a,5b,6	5c
McKay Creek	676	Cabinet Addn's	1b, 3,5a,5b,6	1b, 3,5a,5b	1b,3,6
McNeeley	675		5b	5b	6
Mt Henry	666		2,5a	2,5a,5c	2,5c
Northwest Peaks	663		3,5a,5c,6	3,5a,5b	3,5b,5c,6
Roberts	691		5a	5a,5b,6	5b
Robinson Mtn	164		5a	5a	5a,5c
Rock Cr	693	Cabinet Addn's	1b, 3,5b,6	1b, 3,5b	3,6
Roderick	684	Roderick	1b,2,5a,5b,6	1b,2,5a,5b,6	2,5a
Saddle Mtn	168	Saddle Mtn	2,5a,5c,6	1b, 2,5a,6	2,5a,6
Scotchman Peaks	662	Scotchman Pks	1b,2,3,4,5a,5c	1b,2,3,4,5a	2,3,4,5a,6

Inventoried Roadless Area		Area	Action Alternative/MA(s)		
Name	#		B	C	D
Ten Lakes	683	Ten Lakes Cont	1c,2,35a,5b,6	1b, 1c,2,3,5a,5b,5c	1c,2,3,5c,6
Thompson Seton	483	Whitefish Div	1b,2,5a,5b,5c,6	1b,2,5a,5b	2,5a,5c
Trout Creek	664		5a,5b	5a	6
Tuchuck	482	Whitefish Div	2,5a	1b, 2,5b	2,5c
West Fork Elk	692		5a	5a	5b
West Fork Yaak	694		2,4,5a	2,4,5a	2,4,5a,6
Willard Estelle	173		3,5a	3,5a	3,5c
Zulu	166		3,5c	3,5a	3,5c

Appendix C contains information on the allocation of each roadless area by alternative. The effects for all alternatives are based on assigned management area direction and their potential for development. The forestwide and MA direction is the same for all action alternatives.

Effects from Fire and Fuels Management

Forest health, as it affects natural integrity, is an issue of concern with IRAs and recommended wilderness. Effective fire suppression, insect and disease infestations, and vegetation and fuel types on the KNF have led to excessive fuel buildup. Lightening caused wildfires may be managed for resource benefits to trend vegetation towards desired conditions. Likewise, prescribed fire may be used to trend vegetation towards the desired conditions while serving other important ecosystem functions.

Roadless areas allocated to the MA5s would use prescribed fire and wildland fire for resource benefits as the primary mechanism for managing vegetation (MA5a, b, c-GDL-Fire-01). Wildland fire use would be more likely in Alternative C, which emphasizes the use of natural disturbances, and has the highest acres of recommended wilderness.

Prescribed fire and wildland fire would continue the long term ecological processes in these areas. There could be a temporary loss of vegetation, reduction in water quality due to sedimentation, air pollution, and a perceived reduction in scenic quality; however, these effects are part of the natural ecological processes. These activities generally would not affect the undeveloped character, except during the actual burning period when crews are burning or monitoring the burns. Users could expect temporary access restrictions during periods of fire use activities. Impacts to opportunities for solitude could be expected where visitors encounter crews working on firing operations.

Prescribed fire and wildland fire should not affect primitive recreation, although recreational use of burned-over areas may drop for a period of years until vegetative recovery achieves a more advanced stage. Lethal fire in heavy timber stands would also increase long-term trail maintenance needs from continued downfall of snags across trails.

Effects from Timber Harvest

Roadless areas that are allocated to MA1b (recommended wilderness), MA1c (wilderness study areas) are not available for timber harvest. Limited timber harvest could occur in MA2 (scenic or recreation rivers), MA3 (special areas) and MA4 (research natural areas); only if done to

maintain or restore the values or meet the objectives of the area. Timber harvest is also limited in the MA5s (backcountry).

For those lands in MA6, timber harvest could occur for the purposes of timber production. Other forestwide management direction would apply to these areas and could constrain the extent, timing, and duration of timber harvest in MA6.

Treatment of vegetation by mechanical means can affect natural appearance with creation of linear patterns and presence of stumps. The existing roadless character may be modified where timber harvest occurs.

In the MA5s, timber harvest is expected to be limited and generally would be done for purposes that would result in retaining the natural integrity of the ecosystem. Timber harvest that is done to reduce hazardous fuels may be more intensive and change the undeveloped character, to some degree, until the vegetation re-grows. This is most likely to happen on the edges of a roadless area nearer communities. Primitive recreation opportunities would be unchanged.

Timber harvest in MA6 could be more extensive. Alternatives B and C only have small acreages allocated to MA6 (6,000 – 13,000 acres). In these alternatives, the IRAs in MA6 are on the edges of the roadless areas, and generally adjacent to roads. Activities in these areas would not be in the heart of the roadless areas and would not affect a roadless areas ability to provide primitive recreation or solitude. The only exception is the 6,500 acre Gold Hill roadless area, allocated to MA6 in Alternatives B and D. This roadless area is small in size and currently provides limited primitive recreation opportunities, or opportunities for solitude. Alternative D allocates a larger portion of roadless areas (more than 250,000 acres), where timber harvests would have a larger impact on roadless characteristics. The undeveloped character of roadless areas could be affected where timber harvest occurs, at least until the vegetation re-grows. If roads are constructed to access any of these areas, they could also affect the primitive nature and undeveloped character.

Vegetation and fuel treatments designed to increase hardwoods, reduce conifer encroachment, reduce fuels, maintain some level of old growth, are desirable in IRAs because these actions help restore natural conditions.

Effects from Terrestrial Wildlife Management

Wildlife management actions may result in a broad array of physical alterations; including road obliteration, vegetation treatments, prescribed burning, and habitat improvement structures. Some of these actions could be visually evident and detract somewhat from IRA values and wilderness characteristics. However, actions which maintain, restore, protect, or enhance wildlife habitat also improve natural integrity and ecosystem function and benefit IRA and wilderness values in the long term.

Allocations of MAs that are nonmotorized and benefit wildlife should also have beneficial effects on IRA's. Alternative C would result in the most lands allocated in nonmotorized MAs, improving roadless character of the individual IRAs.

Watershed and fisheries improvement actions can include construction of structures for stream bank stabilization, slope stabilization, and fish habitat improvements. Some structural improvements may be visually evident, and may detract from apparent naturalness. However, any such improvement structures are generally small and localized, and would have a negligible effect upon undeveloped character and wilderness characteristics.

Effects from Minerals Management

Inventoried roadless areas in prescription which are administratively unavailable for mineral development will be largely unaffected by development. All other IRAs are potentially affected by development of minerals under the mining law. Mineral exploration and development activities can vary from small, easily reclaimed operations to larger developments. Large mines may lead to extensive site alterations and long term impacts to the undeveloped character of IRAs and to wilderness characteristics. These impacts may reduce roadless inventories by removing portions of IRAs where mining occurs. However, evidence of past mining, and even ongoing mining operation, do not necessarily preclude wilderness consideration, although they may make it less likely.

The exploration and development of locatable minerals is allowed within IRAs and recommended wilderness as secured by the Mining Act of 1872 and does not vary by alternative. Therefore, effects are common to all alternatives.

Effects from Access and Recreation Management

Areas that are recommended for wilderness will be managed to protect the wilderness character of that area. As the population grows, use is likely to increase. An increase in use may lead to improvement of trailhead facilities or visitor use management techniques.

Opportunities for primitive and nonmotorized recreation will be found in IRAs and areas recommended for wilderness designation. Inventoried roadless areas that are assigned to other MAs will be managed for the recreation opportunities appropriate to the assigned MAs. The existing settings are generally semi-primitive nonmotorized in character.

Trails and new trail construction is usually compatible with maintaining wilderness characteristics and undeveloped character.

Roadless areas recommended for wilderness (MA1b) will permit foot and horse travel and will prohibit motorized and mechanized travel. Roadless areas not recommended for wilderness may have a variety of travel opportunities depending on the MA assigned. Table 69 displays the acres and percents of IRAs by type of access allowed for each alternative. Alternative C, then A, B, and D provide for the most nonmotorized, non-mechanized travel opportunities in IRAs.

Table 69. Summary of Access within Inventoried Roadless Areas by Alternative (Acres and Percent of Total IRA Acres)

	Not Available for Wheeled Motor Vehicle Use	Not Available for Over-snow Vehicle Use	Not Available for Mechanized Use
Alt A[2]	406,079 (64%)[3]	399,294 (63%)[3]	0 (0%)[1]
Alt B	393,937 (62%)	137,100 (21%)	146,667 (23%)
Alt C	588,321 (92%)	231,682 (36%)	244,941 (38%)
Alt D	212,734 (33%)	41,452 (6%)	88,286 (14)

1 1987 Plan had no restriction on mechanized use.

2 Access restriction acres shown do not indicate current condition, but what was allowed under the 1987 Plan.

3 Most areas shown as not available to motorized use in 1987 Plan, allowed existing use on roads and trails to continue.

Cumulative Effects

Cumulative effects are past, present, and reasonably foreseeable future actives that were considered with regard to cumulative effects to the wilderness resource. Cumulative effects have been considered for the life of the Plan. The area of consideration is the KNF.

Reasonable and foreseeable actions on NFS lands include: future vegetation management, mining/reclamation, population growth, expansion of ski areas, and reduction of fuels in WUI. Community plans, such as the County Comprehensive Plans and Fire Plans, may influence the management of IRAs.

Population growth and development increases the need for public open space. Growth in Lincoln and Sanders County, as well as surrounding areas of Flathead County, and Idaho and Washington, is likely to increase recreation use of the Forest including an increase in use within recommended wilderness. The effects of urbanization and population growth on wilderness use and resource conditions are likely to be gradual and extend well beyond the planning period.

Inventoried roadless area characteristics are changed by development such as roads, timber management, recreation facilities, reservoirs, etc. The development of the KNF for human benefit is a long-term continuing trend. The development of roads and management of vegetation has affected roadless areas in the past. Since the mapping of roadless areas in 1999 and the evaluation for wilderness potential there have been fewer developments which have changed the roadless characteristics of those IRAs.

The alternatives rank D, A, B, C from the least to most area retaining a roadless undeveloped character over the next 15 years. In terms of wilderness recommendation, the alternatives rank C, B, D, A from the most to the least area recommended.

Subsequent to the most recent potential wilderness evaluation, no management activities have been implemented which would affect the character of the roadless areas to the extent they would be precluded from future wilderness inclusion. Management activities, which have occurred, include trail management, surveys for noxious weeds, and ongoing studies for grizzly bear and other species.

Designated Wilderness, Wilderness Study Area, Recommended Wilderness

Introduction

The Wilderness Act of 1964 requires the preservation of wilderness character and recognizes multiple values and public benefits found in these areas. Wilderness provides outstanding opportunities for solitude and for primitive and unconfined recreational experiences. Wilderness is also important for maintenance of species diversity, protection of threatened and endangered species, protection of watershed, scientific research, and various social values. Wilderness is part of the national forest multiple use management mission.

The KNF manages the Cabinet Mountains Wilderness Area. The United States Congress designated this area in 1964, consisting of approximately 93,700 acres. All of this wilderness is located in Montana and is managed by the KNF.

The KNF manages one wilderness study area (WSA) − the Ten Lakes WSA. This wilderness study area was designated in 1977, as part of the Montana Wilderness Study Act (Public Law 95-150). It is administered to maintain the wilderness character that existed in 1977, and the potential for inclusion in the National Wilderness Preservation System. Some uses that existed prior to the 1977 Act continue to occur in the WSA.

This section addresses areas that have already been designated as wilderness or WSAs and recommended wilderness. Potential additions to the National Wilderness Preservation system are presented here but the analysis of which areas were recommended for wilderness is explained within the “Roadless Area” section in this chapter.

Legal and Administrative Framework

Law and Executive Orders

- **Wilderness Act of September 3, 1964 (16 U.S.C. 1131-1136):** This act provides the statutory definition of wilderness and management requirements for these congressionally designated areas. This act established a National Wilderness Preservation System to be administered in such a manner as to leave these areas unimpaired for future use and enjoyment as wilderness.
- **Montana Wilderness Study Act of 1977 (P.L.95-105):** Provides for the study of certain lands to determine their suitability for designation as wilderness in accordance with the Wilderness Act of 1964, and for other purposes. These areas are referred to as Wilderness Study Areas (WSAs).
- **National Forest Management Act (NFMA) of 1976, as amended (16 U.S.C. 1600):** Provides that management direction for wilderness be incorporated into Forest Plans and sets minimum standards for the content of the Plans.

Code of Federal Regulations (CFR)

- **36 CFR 293:** Wilderness–Primitive Areas
- **36 CFR 212.57**: Monitoring of effects of motor vehicle use on designated roads and trails and in designated areas.

Key Indicator

- Acres of recommended wilderness.

Affected Environment (Existing Condition)

Cabinet Mountains Wilderness Area

The Cabinet Mountains derived their name from early French explorers who observed that the mountains resembled a series of closets or cabinets. The Cabinet Mountains Wilderness Area is located in the southwest-central portion of the KNF, in both Lincoln and Sanders counties. The Cabinet Mountains Wilderness Area is approximately 34 miles long and varies from ½ mile to 7 miles wide. Elevations range from 2,500 feet to 8,700 feet above sea level, and the vegetation is predominantly subalpine. Glaciations have produced spectacular features such as high craggy peaks, vertical cliffs, knife edge ridges, and many amphitheater-like basins.

Encompassing approximately 94,000 acres, the area includes more than 20 hiking trails, 85 small lakes (many of which are stocked), ridge-top panoramas, and alpine meadows. The numerous drainages from this area flow into the Kootenai and Clark Fork Rivers; and elevations range from 2,500 feet at the base of Grambauer Mountain to 8,738 feet at Snowshoe Peak. As the result of a wetter climate, the vegetation differs from what characterizes much of western Montana. Elk are the primary game species but the area is also home to grizzly bear, deer, moose, mountain goat, black bear, mountain lion, and numerous smaller animals.

The Cabinet Mountains Wilderness Area is currently managed under MA7 of the 1987 Forest Plan, and the 2009 Cabinet Mountains Wilderness Plan.

Travel by visitors is apparent on many of the trails leading through the alpine meadows and along streams to many of the lakes; however, trails give access to only about 15 percent of the area. Recreation use in 2007 was estimated at just over 12,000 national forest visits. Types of recreation use vary, with day hiking a major portion of total wilderness use. Other activities include but are not limited to backpacking, horseback riding, fishing, and hunting.

There are significant mineral reserves such as copper and silver; efforts to develop those minerals are ongoing, see “Minerals” section. There have been no oil and gas leases issued; hence, there are no valid oil or gas lease rights.

Wilderness campsite inventory and conditions surveys have been completed since 1983 by wilderness rangers. In 2008 a campsite and weed inventory was completed under partnership with the University of Montana. A total of 460 weed patches were mapped, with 15 different species of weeds identified. In terms of area covered, orange hawkweed and spotted knapweed are the most abundant.

The Cabinet Mountains Wilderness is designated as Class I Wilderness area under the Clean Air Act amendments of 1977. Air quality related values have been actively monitored since 1993 (United States Forest Service R1 Wilderness Air Quality Monitoring Plan 2008).

Ten Lakes Wilderness Study Area

The Ten Lakes Wilderness Study Area lies entirely in Lincoln County and is comprised of approximately 34,000 acres. Elevations range from approximately 4,000 feet to nearly 8,000 feet. There are several small lakes in the area. The size and configuration of the area is such that many people hike in and out the same day. The vegetation is sub-alpine with a few spruce basins

scattered over the area. The west side is pine and fir and is high quality winter range for elk and deer.

The Ten Lakes WSA lies within the Ten Lakes Inventoried Roadless Area (IRA), and was recommended for wilderness under the 1987 Forest Plan, and managed as MA9.

Language in the 1977 Act required that the areas be managed to maintain their presently existing wilderness character and potential for inclusion in the National Wilderness Preservation system. In 1996 the Montana Wilderness Association filed a complaint that this part of the act had been violated. A Settlement Agreement and Stipulation for Dismissal to the Montana Wilderness Association lawsuit in March 2007 affirms that, pending completion of site-specific travel management plans, the KNF will manage the Ten Lakes WSA in accordance with applicable law and policy, including but not limited to the Montana Wilderness Study Act and Forest Service Manual 2329. The Fortine Ranger District is currently working on a travel management plan for this area in the Galton Project.

In 2010 a survey of the wilderness character of the Ten Lakes WSA was initiated in partnership with the University of Montana. Community volunteers worked with the University of Montana Wilderness Institute field leaders to monitor recreation use, sites, impacts, structures, installations, and developments; and invasive weeds and other indicators of ecological change. They were to also hand pull invasive weeds and reseed with native plant species. Project outcomes are to have detailed inventories, select restoration of native plants, and increased agency and community capacity for citizen stewardship. The final report is pending.

Region 1 Supplement to Forest Service Manual 2329.3(d) provides for management of existing uses and facilities in WSAs. At the time of designation of the areas, uses that existed in 1977 can be allowed to continue subject to 36 CFR 212.57.

Under the 1987 Forest Plan, over-snow vehicle use is permitted in the Ten Lakes WSA with no restriction on dates of use. All of the area open to over-snow vehicle use is not necessarily used because of terrain, vegetation, dangerous avalanche potential and personal preferences. There are very few places currently accessed by over-snow vehicles that were not accessed in 1977. The difference in use from 1977 to present is with the new snowmobile technology; snowmobiles are now capable of travel in powder snow conditions, whereas earlier snowmobiles required harder and more crusted snow.

Wheeled Cross Country motorized use is not allowed under the 1987 Plan, and there are no trails in the Ten Lakes WSA which allow motorized use.

There are currently no restrictions in the 1987 Plan, or in Forest Special Orders, to mechanized use in the Ten Lakes WSA. According to direction (R1 FMS 2329), mountain bikes may be allowed on trails that had established motor-bike use in 1977; or on nonmotorized trails as long as the aggregate amount of mountain bike and motorcycle use maintains the wilderness character of the WSA as it existed in 1977. Use levels must be such to maintain the area's potential for inclusion in the National Wilderness Preservation System.

Environmental Consequences

Resource Protection Methods

Designated wilderness is governed largely by the terms of the Wilderness Act and limit human uses and activities. These limitations are designed to retain the wilderness in a natural and wild

state. The Cabinet Mountains Wilderness is managed and regulated in an effort to limit human impacts and influences to desired limits. Project proposals within these areas are evaluated for compliance with wilderness values. Commercial use of wilderness is controlled by special use permits and the operation plans that are required under the special use permits.

General Effects

Because direction for wilderness management is detailed in law, regulation, and agency policy and in specific management plans, management in the revision alternatives does not differ. In all alternatives, the existing Cabinet Mountains Wilderness Area and Ten Lakes WSA acres remain the same. There will be no affect to undeveloped or special features and values in any alternative.

Significant effects to wilderness areas are not expected under any alternative nor are effects expected to differ by alternative. In all action alternatives the Cabinet Mountains Wilderness Area is managed under its Wilderness Management Plan (2009).

In all action alternatives the Ten Lakes WSA would be managed to protect wilderness character, as it existed in 1977, and allow activities which do not degrade wilderness character.

All action alternatives and the no-action alternative (Alternative A) propose to manage some of the area directly adjacent to the Cabinet Mountains Wilderness Area as recommended wilderness (MA1b). Alternative C contains the most recommended wilderness adjacent to the Cabinet Mountains Wilderness Area with about the same amount of recommended wilderness in all three other alternatives.

The following discussion of general effects on wilderness addresses recommendations for additional wilderness primarily in roadless areas. See the “Roadless Area” section in this chapter for a discussion of the affected environment. New areas recommended for wilderness designation have the potential effect of protecting wilderness resources. In general, alternatives that have areas recommended for wilderness exclude motorized and mechanized uses.

Recommended wilderness can affect existing wilderness and WSAs. All alternatives recommend new areas for wilderness designation. Designation of new wilderness may change patterns of recreation use and reduce pressure in the existing wilderness. Motorized and mechanized travel on trails, and winter motorized use would be prohibited in areas recommended for wilderness designation. Motorcycle, snowmobile, bicycle, and ATV use may be displaced in recommended wilderness areas. Recommended wilderness provides larger areas with wilderness character.

The MA allocation for recommended wilderness (MA1b) does not create a wilderness. Congress must pass legislation designating wilderness. MA1b, recommended wilderness, protects the values that make the area suitable for wilderness designation. Management strategies for recommended wilderness may affect recreation opportunities and experiences within these areas.

Both wilderness and the WSA may be affected by MA allocation of adjacent lands by alternative. Alternative C, and then B, would add the most to the size of the protected areas and, therefore, discourage motorized trespass. Alternative D has the least amount of recommended wilderness and would potentially have the most affect by management of adjacent lands in MA6 due to motorized use.

Effects of Forestwide Direction

Alternative A – No-action Alternative

Alternative A includes three areas identified as recommended wilderness in the 1987 Forest Plan: Cabinet Additions, Scotchman Peaks, and Ten Lakes Contiguous Area. Total acres were 76,500.

The Scotchman Peaks area is recommended wilderness in Alternatives A, B, and C. Alternative C includes an area on the north end of Scotchman Peaks IRA which is not included in Alternative B.

Additions to the existing Cabinet Mountains Wilderness are recommended in all alternatives. Alternatives A and D are similar in additions to the Cabinet Mountains. Alternative A has additional area by Treasure Mountain and Alternative D has additional area by Goat Creek being included. Ten Lakes Contiguous Area is included in Alternatives A and C.

Alternative B – Proposed Action

Alternative B is based on the Proposed Land Management Plan from May 2006 and the response to comments on the proposed Plan, prior to the 2008 Planning Rule being enjoined and vacated. This alternative allocates 112,800 acres to recommended wilderness on four areas: Cabinet Additions, Roderick, Scotchman Peaks, and Whitefish Divide.

Alternative C

Alternative C includes nine areas as recommended wilderness totaling 217,300 acres. The nine areas are Allen Peak, Big Creek, Cabinet Additions, Gold Hill West, Roderick, Saddle Mountain, Scotchman Peaks, Ten Lakes Contiguous Area and Whitefish Divide. Alternative C provides for the largest area as recommended wilderness, emphasizing the alternative theme of natural disturbance processes, use of wildland fire for multiple objectives, and prescribed burns in addition to low frequency management activities in order to meet watershed and vegetation restoration objectives.

Alternative D

Alternative D has the least recommended wilderness, identifying only the Cabinet Additions for a total of 37,300 acres. This alternative provides more options for vegetation management and motorized or mechanized access across more areas.

Consequences to Wilderness from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Allocations

When considering the number of acres where wheeled motor vehicle use would be allowed, it must be remembered that this refers only to those acres in MAs where roads or trails may exist and be designated for such use. All four alternatives recommend wilderness and this MA designation would preclude the designation of trails for wheeled motor vehicle use. Table 70 (below) displays the recommended wilderness acres by alternative. Wheeled motorized vehicle use would not be allowed in these areas. Wheeled motorized vehicle use is prohibited in the Cabinet Mountain Wilderness Area in all four alternatives. Single track motor vehicle use is allowed within the Ten Lakes WSA in all four alternatives as outlined in the Montana Wilderness Study Act. Allowed uses within the wilderness area and the WSA do not vary by alternative.

There is an effect to the number of acres available for over-snow vehicle use based on the amount of recommended wilderness (MA1b) in the various alternatives. Table 70 (below) indicates the acreage of recommended wilderness in each alternative. Alternative C would prohibit over-snow vehicle use on the most acreage while Alternative D would limit this use on the least number of acres. Any area that currently has no prohibition to over-snow vehicle use, and is allocated to MA1b (recommended wilderness), will have a legal order prohibiting this use (as per 36 CFR 212.81, and 36 CFR 261.14) issued in conjunction with the ROD for the final Forest Plan. Over-snow vehicle use is prohibited in the Cabinet Mountain Wilderness Area in all four alternatives. Over-snow vehicle use is allowed within the Ten Lakes WSA in all four alternatives as outlined in the Montana Wilderness Study Act. Allowed uses within the wilderness area and the WSA do not vary by alternative.

There is an effect to the number of acres available for mechanized use (e.g., mountain bikes) based on the amount of recommended wilderness (MA1b) in the various alternatives. Table 70 (below) indicates the acreage of recommended wilderness in each alternative. Alternative C would prohibit mechanized use on the most acreage while Alternative D would limit this use on the least number of acres. Any area that currently has no prohibition to mechanized use, and is allocated to MA1b (recommended wilderness), will have a legal order prohibiting mechanized use (as per 36 CFR 261.55[b]) issued in conjunction with the ROD for the final Forest Plan. Mechanized use is prohibited in the Cabinet Mountain Wilderness Area in all four alternatives. Mechanized use is allowed within the Ten Lakes WSA in all four alternatives as outlined in the Montana Wilderness Study Act. Allowed uses within the wilderness area and the WSA do not vary by alternative.

Alternative C provides the most recommended wilderness adjacent to the Cabinet Mountains Wilderness. Larger areas increase diversity of wilderness, and provide greater benefit to the National Wilderness Preservation System.

Effects from Fire and Fuels Management

Naturally-ignited fires significantly affects the composition, structure, and functioning of many different types of ecosystems. Fire occurs relatively quickly, but the effects may last over long time spans and influence spatial patters of vegetation and the distribution of wildlife over an entire region. Because naturally-ignited fire is such a key process, fire suppression and climate change have made the vegetation on the KNF more susceptible to large scale disturbance (fire, insects, and disease). The importance of fire and impacts of fire suppression have long been understood; and naturally-ignited fire is recognized as a crucial factor in maintaining naturalness within wilderness (D. Cole and P. Landers 1995).

Restoring natural processes that occur over large areas, and hundreds of years, will be a formidable management challenge. Restoring natural fire regimes will be difficult because of the risk to property and visitors, both within wilderness as well as on adjacent lands. Fire in its natural role has a positive effect on the natural character of wilderness character. Wildland fire would continue as reintroduced process in the Cabinet Mountains Wilderness under all alternatives, and would have similar effects.

Alternative C, which emphasizes the use of natural disturbances, provides the most benefit to the natural character as use of wildland fire for resource benefit would be more likely. Impacts to opportunities for solitude could be expected where visitors encounter crews working on firing operations.

Effects from Vegetation Management

Vegetation management in wilderness and WSAs is restricted to unplanned ignitions and prescribed fire in all alternatives. Fire control measures would be used if and where fuels and weather increase risk of unwanted fire in or coming out of wilderness. All alternatives provide for use of wildland fire for multiple objectives in wilderness.

Fire managed for resource benefits will be utilized in wilderness, recommended wilderness, and WSAs. Alternative C and B respectively, would benefit most from wildland fire with larger areas of backcountry, where Alternative D would benefit least.

Effects from Access and Recreation Management

Wilderness itself is equally treated under the alternatives. The Cabinet Mountains Wilderness and Ten Lakes WSA may be affected by management of adjacent lands. All alternatives recommend additions to the size of protected area and further discourage motorized trespass in to wilderness (see table 70). Alternative C has the most nonmotorized areas next to the Cabinet Mountains Wilderness, and is the best for maintaining wilderness character. Although Alternative B has fewer acres of recommended wilderness adjacent to the Cabinet Mountains Wilderness, it has the most acres adjacent in MA5a (nonmotorized backcountry) and, thus, is the second best at protecting the wilderness area. Alternatives A and D are less beneficial than the other alternatives.

Alternatives A and C include Ten Lakes Contiguous Area, recommended wilderness adjacent to the Ten Lakes WSA, and would provide for additional solitude.

Table 70. Acres of Recommended Wilderness Areas by Alternative

Area	Alternative			
	A	B	C	D
Allen Peak			20,500	
Big Creek			6,600	
Cabinet Additions	33,600	29,900	53,700	37,300
Gold Hill West			12,200	
Roderick		23,500	23,500	
Saddle Mountain			14,300	
Scotchman Peaks[2]	36,100	35,900	37,300	
Ten Lakes Contiguous Area	6,800		9,100	
Whitefish Divide		23,500	40,100	
Total Acres	**76,500**	**112,800**	**217,300**	**32,300**

1 Acres don't match forestwide summary acres by MA because of overlapping acres with RNAs that are on top of proposed wilderness

2 There is approximately an additional 25,000 acres proposed on the Idaho Panhandle National Forest.

Recreation and travel in the WSAs does not change by alternative. Motorized or mechanized use in place prior to 1977 may continue as allowed by law. Recommended wilderness in Alternative C would provide for the most nonmotorized use area.

Areas that are recommended for wilderness will be managed to protect the wilderness character of that area. An increase in use may lead to improvement of trailhead facilities or the visitor use management techniques.

Effects from Minerals Management

The Cabinet Mountains Wilderness Area and Ten Lakes WSA have been withdrawn from mineral entry and are not available for new leases or claims. Surface and mineral estates within the wilderness are entirely federal. Mining activities can result in both short-term and long-term effects from associated structures, roads, vegetation clearing, and general ground-disturbing activities. Two mines are currently under analysis for development under the Cabinet Mountains Wilderness.

Cumulative Effects

Cumulative effects are past, present, and reasonably foreseeable future activities that were considered with regard to the wilderness resource. Cumulative effects have been considered for the life of the Plan. The area of consideration is the KNF.

Reasonable and foreseeable actions on NFS lands include: future vegetation management, mining/reclamation, population growth, County Comprehensive Plans, expansion of ski areas, Fire Plan – priority WUI areas. There have been mineral developments surrounding the Cabinet Mountains Wilderness.

Population growth and development increases the need for public open space. Growth in Lincoln and Sanders County, as well as surrounding areas of Flathead County, Idaho, and Washington is likely to increase recreation use of the Forest, including an increase in wilderness use. The effects of urbanization and population growth on wilderness use and resource conditions are likely to be gradual and extend well beyond the planning period.

No Forest Plan alternative would change the amount of existing wilderness that occurs within the State of Montana, or the National Wilderness Preservation System. Currently the KNF contributes approximately two percent of designated wilderness within Montana, and less than 1/1000 percent of national wilderness.

Wild and Scenic Rivers

Introduction

Congress enacted the Wild and Scenic Rivers Act in 1968 to preserve select river's free-flowing condition, water quality, and outstandingly remarkable values. The most important provision of the Wild and Scenic Rivers Act is protecting rivers from the harmful effects of water resources projects. To protect free-flowing character the Federal Energy Regulatory Commission (which licenses nonfederal hydropower projects) is not allowed to license construction of dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works on or directly affecting wild and scenic rivers. Other federal agencies may not assist by loan, grant, and license or otherwise any water resources project that would have a direct and adverse effect on the values for which a river was designated.

The Wild and Scenic Rivers Act also directs that each river in the National Wild and Scenic Rivers System (National System) be administered in a manner to protect and enhance a river's outstanding natural and cultural values. It allows existing uses of a river to continue and future uses to be considered, so long as existing or proposed use does not conflict with protecting river values. The Wild and Scenic Rivers Act also directs building partnerships among landowners, river users, tribal nations, and all levels of government.

Rivers may be identified for suitability studies by an act of Congress under Section 5(a), or through federal agency-initiated study under Section 5(d) (1). By the end of 2002, Congress had authorized 138 rivers for study. Section 5(d) (1) directs federal agencies to consider the potential of wild and scenic rivers in their planning processes; and its application has resulted in numerous individual river designations, and state and area-specific legislation.

Both Sections 5(a) and 5(d) (1) require determinations to be made regarding a river's eligibility, classification, and suitability. Eligibility and classification represent an inventory of existing conditions. Eligibility is an evaluation of whether a river is free-flowing and possesses one or more outstandingly remarkable value. If found eligible, a river is analyzed as to its current level of development and a preliminary classification determination is made as to whether it should be placed into one of three classes; wild, scenic, or recreational.

The final procedural step, a suitability study, provides the basis for determining whether to recommend a river as part of the National System. A suitability study is designed to answer the following questions:

- Should the river's free-flowing character, water quality, and outstandingly remarkable values be protected; or are one or more other uses important enough to warrant doing otherwise?
- Will the river's free-flowing character, water quality, and outstandingly remarkable values be protected through designation? Is it the best method for protecting the river corridor? In answering these questions, the benefits and impacts of Wild and Scenic River designation must be evaluated and alternative protection methods considered.
- Is there a demonstrated commitment to protect the river by any nonfederal entities that may be partially responsible for implementing protective management?

Rivers authorized for suitability studies by Congress are protected under the Wild and Scenic Rivers Act; specifically, Sections 7(b) − prevents the harmful effects of water resources projects; 8(b) − withdraws public lands from disposition under public land laws; 9(b) − withdraws

locatable minerals from appropriation under mining laws; and 12(a) – directs actions of other federal agencies to protect river values. These protections last through the suitability study process, including a three-year period following transmittal of the final suitability study report by the President to Congress. The integrity of the identified classification must also be maintained during the protection period.

The identification of a river as eligible through the forest planning process does not trigger any protections under the Wild and Scenic Rivers Act. To manage the river for its potential inclusion into the National System, other authorities are cited to protect its free-flowing character, water quality, outstandingly remarkable values, and preliminary or recommended classification.

No suitability studies are being conducted with this Forest Plan revision.

In this evaluation, only eligibility of rivers on the KNF is completed. Suitability is deferred, pending:

- Public interest or support in wild and scenic river study;
- Congress expresses interest in a specific river for wild and scenic river designation; or
- A proposed project would alter the free-flowing character of a stream, such as by impoundment, or adversely affect outstandingly remarkable values, or the river's inventoried classification.

Legal and Administrative Framework

Law and Executive Orders

- **Organic Administration Act of June 4, 1897 (30 Stat. 11, as amended; 16 U.S.C. § 473 et seq.):** This act provides the Secretary of Agriculture the authority to regulate the occupancy and use of NFS lands.
- **Multiple-Use Sustained-Yield Act of June 12, 1960 (P.L. 86-517, 74 Stat.215):** This act provides direction to the NFS lands to provide access and recreation opportunities. The act states, "The policy of Congress is that national forests are established and administered for outdoor recreation…"
- **Wild and Scenic Rivers Act of October 2, 1968 (P.L. 90-542, Stat. 906, as amended; 16 U.S.C. § 1271(note), 1271-1287):** This act established a policy for preserving selected rivers or sections thereof in a free-flowing condition. The intent was to protect water quality of such rivers and to fulfill other vital national conservation measures that would balance the development of water, power, and other resources for the benefit and enjoyment of present and future generations.
- **Federal Land Policy and Management Act of October 21, 1976 (P.L. 94-579, 90 Stat. 2742, as amended):** This act declares (per Sec. 102) that "…the public lands be managed in a manner that…will provide for outdoor recreation and human occupancy and use."
- **National Forest Management Act (NFMA) of October 22, 1976 (P.L. 94-588, 90 Stat. 2949; 16 U.S.C. § 1600 et seq.):** The act requires the Forest Service to establish a comprehensive system of land and resource planning, including the development and maintenance of a comprehensive and detailed inventory of lands and resources. The act also specifies the use of a systematic interdisciplinary approach to achieve integrated consideration of the physical sciences into planning for the management and use of NFS lands and resources.

Code of Federal Regulations (CFR)

- **36 CFR 297 –** Wild and Scenic Rivers

Key Indicator

- Miles of eligible, wild, and scenic or recreational rivers.

Analysis Area

The analysis area for wild, scenic, and recreational rivers is the named rivers and streams on the KNF.

Methodology and Analysis Process

The wild and scenic river study process requires determination to be made regarding a river's eligibility, classification, and suitability. Eligibility and classification represent an inventory of existing conditions. Eligibility is an evaluation of whether a river is free-flowing (without major dams, diversions, or channel modifications) and possesses one or more outstandingly remarkable values. These values should be a unique or exceptional representation for the area studied and must be related to the river or its immediate environment.

As per the Wild and Scenic River Act at 5(d) (1) and Forest Service Manual policy (FSM 1924.03) a systematic inventory of named streams and rivers was completed for the KNF. The inventory of the named rivers and streams on the KNF was accomplished by using the current GIS databases for rivers and streams on the Forest.

The Forest then determined which of the named rivers and streams were free-flowing. This determination was made by answering the question; "Is the river segment flowing in a natural condition without impoundment, diversion, straightening, rip rapping, or other modification of the waterway"? If the river segment was not free-flowing, then the river was not eligible.

The next step was to identify potential eligibility by determining which of the named rivers and streams that are free-flowing might have a potential 'outstandingly remarkable value'.

Eligibility

To be eligible for designation, a river must be free-flowing and possess one or more outstandingly remarkable value. Thus, the eligibility analysis consisted of an examination of the river's hydrology, including any man made alterations, and an assessment of its natural, cultural, and recreational resources.

In order to be assessed as outstandingly remarkable, a river-related value must be a unique, rare, or exemplary feature that is significant at a comparative regional or national scale. Dictionary definitions of the words "unique" and "rare" indicate that such a value would be one that is a conspicuous example from among a number of similar values that are themselves uncommon or extraordinary. Only one such value is needed for eligibility.

The area, region, or scale of comparison is not fixed, and is defined as that which serves as a basis for meaningful comparative analysis; it may vary depending on the value being considered. Typically, a "region" is defined on the scale of an administrative unit, a portion of a state, or an appropriately scaled physiographic or hydrologic unit. The comparative scale used for this assessment is the individual forest. That is, the rivers and streams on the KNF were compared one to another.

While the spectrum of resources that may be considered is broad, all values should be directly river-related. That is, they should:

- Be located in the river or on its immediate shore-lands (generally within 1/4 mile on either side of the river);
- Contribute substantially to the functioning of the river ecosystem; and/or
- Owe their location or existence to the presence of the river.

Using the Forest as the comparative scale, the KNF then reviewed the identified potential 'outstandingly remarkable values' and determined whether they meet the criteria of being rare, unique, or exemplary. After reviewing the initial assessments a preliminary determination was made as to whether the potential outstandingly remarkable values is a unique, rare, or exemplary feature that is significant at the selected comparative scale and meets the other criteria for being directly river-related (as described above).

The potential classification of a river found to be eligible is based on the condition of the river and the adjacent lands as they currently exist. Section 2(b) of the Wild and Scenic Rivers Act (1968) specifies and defines these terms as follows:

- **Wild Rivers:** Rivers or sections of rivers free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- **Scenic Rivers:** Rivers or sections of rivers free of impoundments, with shorelines or watersheds still largely undeveloped, but accessible in places by roads.
- **Recreational Rivers:** Rivers or sections of rivers readily accessible by roads or railroad, which may have some development along their shoreline and which may have undergone some impoundments or diversions in the past.

Affected Environment (Existing Condition)

The 1987 Forest Plan initially identified four rivers that appeared to be eligible for consideration per the Wild and Scenic Rivers Act: the Yaak, Kootenai, Bull, and Vermilion Rivers. While there was no specific MA assigned to wild and scenic rivers under the 1987 Forest Plan, these areas were "protected to maintain the characteristics which led to their existing status" (1987 Plan, p. II-27).

The 1987 Forest Plan was amended in February 1989 and October 1989 to include additional section and tributaries of the Bull River and Big Creek and additional management standards.

As per the Wild and Scenic River Act at 5(d) (1) and Forest Service Manual policy (FSM 1924.03), a systematic inventory has been completed on the KNF. The inventory of named rivers and streams on the KNF resulted in the identification of 752 candidates to consider for eligibility: Libby District (206), Cabinet District (180), Three Rivers District (189), Rexford District (84), and Fortine District (3). An assessment of these 752 candidates was conducted to identify any potential outstandingly remarkable values and their free-flowing characteristics. As a result of this assessment, it was determined that there are additional rivers and streams eligible for inclusion in the National Wild and Scenic Rivers System. These additional rivers are summarized in table 72.

The 1987 KNF Forest Plan did not contain any monitoring items in relation to eligible, suitable, or designated Wild and Scenic Rivers. During the life of the Plan, no suitability studies were conducted on any of the eligible rivers.

To this end, projects were designed and implemented so the identified outstandingly remarkable values would not be compromised, until such time as a suitability study could be conducted. As a result, the free-flowing characteristic of all eligible rivers has been maintained. In addition, management actions taken to comply with State water quality goals and INFISH (USDA Forest Service 1995) direction have resulted in the protection of those rivers and streams where fisheries were the identified outstandingly remarkable value.

Table 71 summarizes the eligible rivers that were included in the 1987 KNF Forest Plan subsequent to 1989 Forest Plan amendments.

Table 71. Summary of Eligible Rivers on the KNF (1987 Forest Plan)

River/Segment(s)	Status	Outstandingly Remarkable Value(s)	Length on all Lands (miles)	Preliminary Classification	Acres(on NFS lands)
Kootenai River					
S - 1	Eligible	Scenery, Fisheries, and History	8.9	Recreational	737
S - 2	Eligible		10.1	Recreational	362
S - 3	Eligible		8.8	Recreational	2,299
S - 4	Eligible		10.2	Recreational	235
S - 5	Eligible		8.7	Recreational	2,309
Yaak River					
S - 1	Eligible	Scenery and History	19.1	Recreational	1,842
S - 2	Eligible		9.8	Recreational	2,734
S - 3	Eligible		11.4	Recreational	2,069
S - 4	Eligible		9.3	Wild	2,586
Bull River System					
S - 1 (Bull River)	Eligible	Scenery	11.3	Recreational	1,911
S - 2 (Bull River)	Eligible		9.1	Recreational	1,622
S - 3 (N. Fork & Middle Forks of Bull River)	Eligible		17.4	Wild	4,135
S - 4 (E Fork Bull Rv)	Eligible		4.5	Recreational	1,118
S - 5 (E Fork Bull Rv)	Eligible		3.0	Wild	997
Big Creek System					
S - 1 (Big Creek)	Eligible	Scenery and Recreation	7.6	Recreational	2,261
S - 2 (S Fork Big Ck)	Eligible		6.7	Recreational	2,103
S - 3 (Little N F Big Ck)	Eligible		1.6	Wild	452
S - 4 (Good Creek)	Eligible		2.4	Wild	717
S - 5 (NF Big Creek)	Eligible		5.6	Wild	1,797
S - 6 (Copeland	Eligible		1.8	Wild	564

River/Segment(s)	Status	Outstandingly Remarkable Value(s)	Length on all Lands (miles)	Preliminary Classification	Acres(on NFS lands)
Creek)					
S - 7 (Lookout Creek)	Eligible		2.4	Wild	725
S - 7 (EF Lookout Ck)	Eligible		1.5	Wild	443
S - 7 (Unnamed trib to Lookout Ck)	Eligible		1.7	Wild	515
Vermilion River	Eligible	Scenery and History	13.2	Recreational	3,599
TOTAL*			**186.1**		**38,132**

Maps of the eligible rivers can be found in appendix F.

Environmental Consequences

General Effects

Alternative A – No-action Alternative

Under Alternative A there would be no new river miles identified as eligible on the KNF. The 1987 ROD and amended Plan identified approximately 186 miles of rivers (and the associated corridors containing about 38,100 acres) on the KNF as eligible for study as additions to the National Wild and Scenic River system (see table 71)

Alternatives B, C, and D

In addition to the existing eligible rivers identified in the 1987 ROD and subsequent amendments, Alternatives B, C, and D identify approximately 63 additional miles of river (and the associated corridors containing about 18,300 acres) as eligible for study as additions to the National Wild and Scenic River System (see table 72 below).

Table 72 KNF Rivers Identified During Plan Revision as Eligible to Add to the Wild, Scenic, and Recreational River System

River/Segments(s)	Status	Outstandingly Remarkable Value(s)	Length on all Lands (miles)	Preliminary Classification	Acres (on NFS Lands)
Bull River System					
S - 6 (N.F. of the E. Fork Bull Rv)	Eligible	Scenery	2.2	Recreational	616
S - 7 (N.F. of the E. Fork Bull Rv)	Eligible		1.4	Wild	497
Grave Creek System					
S - 1 (Grave Creek)	Eligible	Scenery and History	13.0	Recreational	3,699
S - 2 (Stahl Creek)	Eligible		4.3	Recreational	1,244
S - 3 (Clarence Creek)	Eligible		5.2	Recreational	1,654
S - 4 (Blue Sky Creek)	Eligible		6.3	Recreational	2,002

River/Segments(s)	Status	Outstandingly Remarkable Value(s)	Length on all Lands (miles)	Preliminary Classification	Acres (on NFS Lands)
Quartz Creek System					
S - 1 (Quartz Creek)	Eligible	Scenery	9.5	Recreational	2,572
S - 2 (West Fork Quartz Creek)	Eligible		2.8	Wild	892
S - 3 (West Fork Quartz Ck)	Eligible		3.1	Recreational	904
Vinal Creek System					
S - 1 (Vinal Creek)	Eligible	Scenery and Recreation	4.1	Scenic	1,074
S - 2 (Turner Creek)	Eligible		1.0	Scenic	386
West Fork Yaak River					
S - 1	Eligible	Scenery and Recreation	4.3	Wild	1,329
S - 2	Eligible		5.6	Recreational	1,428
Total*			**62.8**		**18,297**

* Lengths and acres are a result of using current GIS methodologies.
Maps and descriptions of the eligible rivers can be found in appendix F.

Under Alternatives B, C, and D eligible rivers would be allocated to MA2 and would provide management direction for approximately 249 miles of stream (and the associated corridors containing about 56,429 acres); and would be managed to protect the outstandingly remarkable values for which these rivers are eligible to the National Wild and Scenic River System. This direction would apply to those streams identified as eligible in the existing Plan, as well as the additional river miles identified as eligible.

Consequences to Wild and Scenic Rivers from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Under Alternatives B, C, and D the number of miles of river identified as eligible is the same and would result in an increase of about 63 miles of river (and the associated corridors containing about 18,300 acres) that would be managed and protected for their identified unique characteristics. Alternative A does not recommend any additional eligible rivers; therefore, would not result in any increase.

Effects from Vegetation Management

Although all river corridors are removed from the ASQ, trees could be harvested in eligible scenic or recreational river corridors if it is to maintain or restore the values for which the scenic or recreational river was identified. Within wild river segments, vegetation restoration projects may occur if the need is linked to human-induced changes and is necessary for the recovery of threatened and endangered species or native ecological communities. Trees would be cut only if they do not alter the recreation characteristics of the land and physical resources; or if they do not affect the eligibility, classification, or potential suitability of the area.

Effects from Recreation Management

Impacts from recreational use and management within eligible river segments are anticipated to be low. Although river corridors may be used for camping, canoeing, hiking, and other activities,

the impacts can be expected to be minimal since they are generally low intensity. In order to provide an essentially primitive character, eligible wild segments would not likely have any recreation development occur. In scenic and recreational segments recreation development would be allowed but only when it would preserve the identified river values. Trail maintenance work can be expected to have little if any impact in the river corridors.

Effects from Fire and Fuels Management

Both natural and prescribed fires are allowed to be used as a tool to maintain ecological conditions within river corridors. These burns could affect scenery in the short term, but should contribute to meeting long-term scenic objectives and desired future conditions of the MA.

Effects from Minerals Management

Anticipated effects from minerals management would be low in all alternatives. Potential for leasable minerals is low across most of the Forest and currently there are no permits or operating plans for exploration within the corridors. Although potential for locatable minerals does exist, there are no current permits or operating plans for mineral exploration within the corridors. Mineral materials are present and could potentially be used for construction purposes but generally proposals for development of mineral materials do not occur. Eligible wild segments would not be available for mineral material development.

Cumulative Effects

Cumulative effects evaluate the potential impacts to Wild and Scenic Rivers from the alternatives when combined with past, present, and reasonably foreseeable actions. The lands within the KNF boundary, and the named rivers and streams contained therein, form the geographic scope for cumulative effects since this is the scope for the proposed action (Alternative B). The temporal bound would be the life of the Forest Plan which is estimated to be a 15 year time span.

In order to integrate the contribution of past actions to the cumulative effects of the proposed action and alternatives, existing conditions are used as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior actions that have affected Wild and Scenic Rivers and might contribute to cumulative effects. On those rivers (e.g., Kootenai River, Yaak River, and Bull River) which predominantly flow through lands other than NFS lands, there has been continual development on private property. Water-related activities such as fishing, rafting, kayaking, and similar uses are expanding as the population in the nearby urban areas increases and access points are developed.

On rivers that predominantly flow through NFS lands, there has been a steady increase in water-related activities such as fishing, rafting, canoeing, and kayaking; mostly at dispersed sites. An exception to this; however, would be those river sections that do not contain road access.

Management activities generally take place outside of eligible Wild and Scenic Rivers unless an action is needed to help protect or preserve the identified unique feature or characteristic. For example, if invasive weeds were discovered in an eligible river corridor there may be a need to take some action (hand pull, herbicide application) to eradicate or prevent further spread.

Figure 39 and accompanying table 73 display the eligible wild, scenic, and recreational rivers on the Forest.

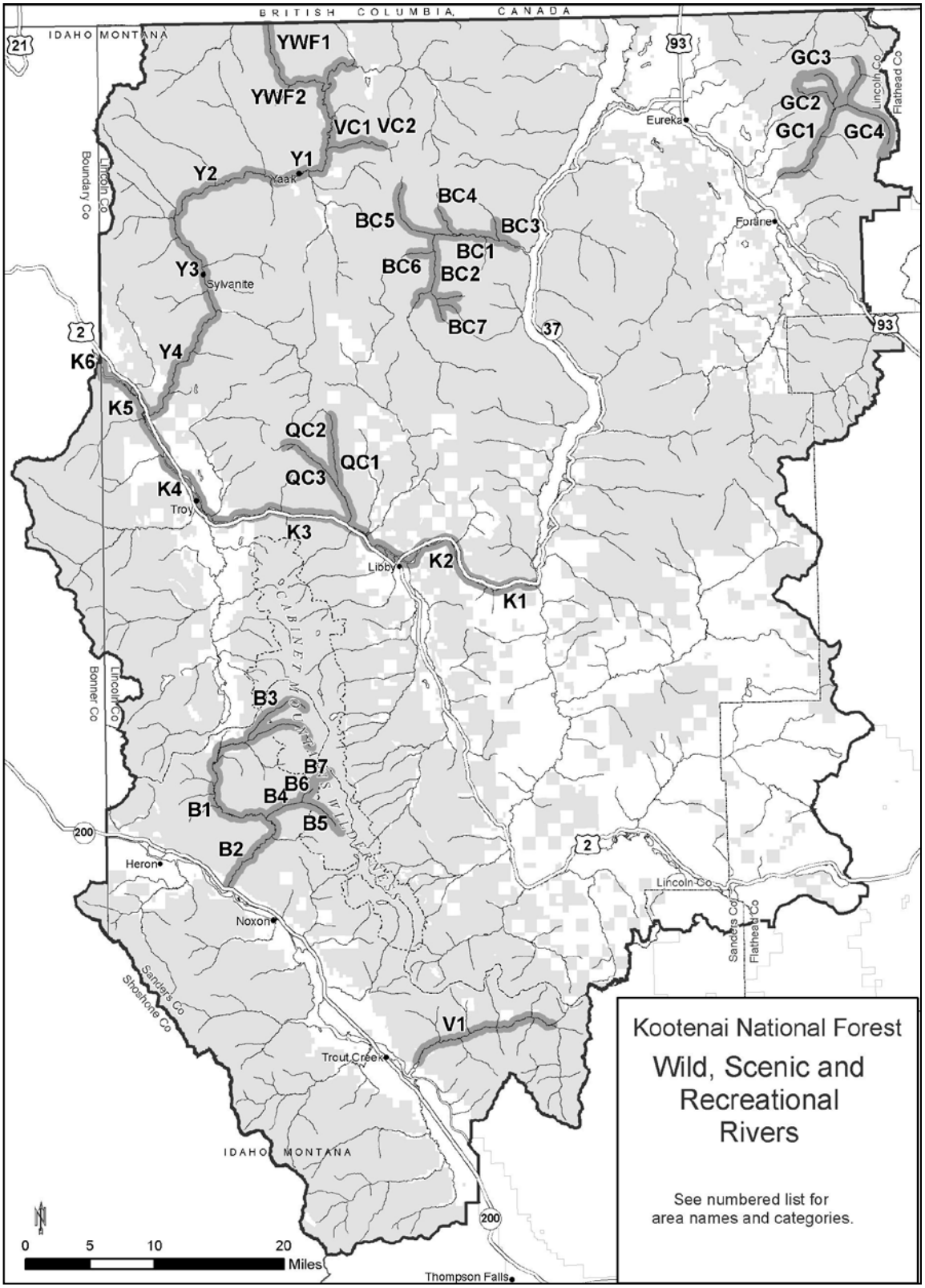


Figure 39. Map of KNF Wild, Scenic and Recreation Rivers

Table 73. KNF Wild, Scenic and Recreation Rivers Map Reference List

Map Code (segment #)	Name	Type
YWF1	West Fork Yaak River	wild
YWF2	West Fork Yaak River	recreation
VC1	Vinal Creek	scenic
VC2	Vinal Creek / Turner Falls	scenic
Y1	Yaak River	recreation
Y2	Yaak River	recreation
Y3	Yaak River	recreation
Y4	Yaak River	wild
K1	Kootenai River	recreation
K2	Kootenai River	recreation
K3	Kootenai River	recreation
K4	Kootenai River	recreation
K5	Kootenai River	recreation
QC1	Quartz Creek	recreation
QC2	West Fork Quartz Creek	wild
QC3	West Fork Quartz Creek	recreation
GC1	Grave Creek	recreation
GC2	Grave Creek	recreation
GC3	Grave Creek	recreation
GC4	Grave Creek	recreation
BC1	Big Creek	recreation
BC2	South Fork Big Creek	recreation
BC3	Little North Fork Big Creek	wild
BC4	Good Creek	wild
BC5	North Fork Big Creek	wild
BC6	Copeland Creek	wild
BC7	Lookout Creek	wild
B1	Bull River	recreation
B2	Bull River	recreation
B3	Bull River	wild
B4	Lower East Fork Bull River	recreation
B5	Upper East Fork Bull River	wild
B6	North Fork of East Fork Bull River	recreation
B7	North Fork of East Fork Bull River	wild
V1	Vermilion River	recreation

Research Natural Areas

Introduction

Research natural areas (RNAs) are permanently established to maintain areas of natural ecosystems and areas of special ecological significance. These protective designations attempt to maintain natural ecosystem components and processes and are cooperatively identified and managed with the USDA Forest Service Rocky Mountain Research Station. These areas form a long-term network of ecological reserves established as baseline areas for non-manipulative research, education, and the maintenance of biodiversity. Most of these areas on the KNF would protect examples of late-seral or climax conditions. They are administratively designated by the regional forester with station director concurrence.

RNAs Serve Three Important Functions:

- **Reference Areas –** RNAs serve as benchmarks for monitoring and evaluating the sustainability and impacts of land management practices on lands with similar ecosystems. To determine the impact of management on an area it is useful to have, as a control, a similar area maintained in natural condition for comparison. RNAs contribute to ecosystem management by providing these controls.
- **Biological Diversity –** RNAs provide protection for biological diversity. A representative RNA system provides some degree of assurance that a wide array of plant and animal species will be afforded a high degree of protection in the future. This protection may be most important for soil microorganisms, fungi, insects, and other forms of biological diversity on which ecosystems often depend the most, but about which we know the least. RNAs also can be selected to help protect specific populations of threatened, endangered, and/or sensitive species.
- **Research –** RNAs provide sites for research into how ecosystems function, particularly in areas in which ecological and evolutionary processes are functioning in a relatively natural state. They serve as sites for monitoring long-term change in ecosystems such as global climate change and shifting patterns in the landscape that result from such disturbances as fire, floods, and insect epidemics. Research projects in an identified RNA can greatly increase our understanding of particular ecosystems and improve the quality of ecosystem management. RNAs also serve an important educational function by providing excellent examples of ecosystems in a relatively natural condition, with functioning ecological processes.

Legal and Administrative Framework

Law and Executive Orders

- **Organic Administration Act of June 4, 1897 (16 U.S.C. 477-482, 551):** This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the national forests.

Code of Federal Regulations (CFR)

The following regulations provide direction for RNA establishment and management on NFS lands:

- **36 CFR 219 –** Planning
  - **219.25 Special Designations:** States that forest planning shall provide for the establishment of RNAs. To be identified are examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special or unique characteristics of scientific interest and importance and that are needed to complete the national RNA network.

Methodology and Analysis Process

Kootenai National Forest resource specialists and research scientists, along with the Rocky Mountain Research Station, have identified NFS lands on the KNF that possess ecological characteristics that make them desirable for RNA establishment. The draft Forest Plan would include recommendations for three additional RNAs in addition to the eight established RNAs already on the KNF.

Affected Environment (Existing Condition)

There are currently eight established RNAs on the KNF (table 74 below). The 1987 KNF ROD recommended eight RNAs as candidates for possible establishment. These eight RNAs totaled approximately 3,140 acres when the ROD was issued in 1987 and have been officially established since the ROD was signed. Most of the eight RNAs have had boundaries modified and refined when they were officially established and now total approximately 5,210 acres.

Table 74. Established Research Natural Areas on the KNF

RNA Name	District	Established (Acres)
Big Creek	Rexford	178
Hoskins Lake	Three Rivers	376
LeBeau	Fortine	411
Lower Ross Creek	Three Rivers	1,874
Norman Parmenter	Libby	1,289
Pete Creek Meadows	Three Rivers	153
Ulm Peak	Cabinet	689
Wolf Weigel	Libby	240
Total Acres		**5,210**

Environmental Consequences

General Effects

Alternative A – No-action Alternative

This alternative reflects the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations that have been promulgated since the original Forest Plan and the amendments were adopted. Under Alternative A, eight areas, encompassing 5,210 acres would continue to be

managed as RNAs. These areas represent examples of late successional plan communities, or pristine examples of plant communities that are relatively rare; or unusual complexes of plan communities in very good condition. RNAs are managed under MA21. MA21 provides specific direction for the management of these areas for non-manipulative research, observation, and study. MA21 precludes management activities such as timber harvest and road construction.

Alternatives B, C, and D

Under Alternatives B, C, and D RNAs would be managed under MA4. MA4 includes the eight existing established RNAs. In addition, Alternatives B, C, and D would add three new RNAs (table 75 below) resulting in an increase of about 3,226 acres of NFS lands that would be managed and protected for their ecological characteristics.

Table 75. Recommended Research Natural Areas on the KNF

RNA Name	District	Recommended Acres
Doonan Peak	Three Rivers	504
Huson Peak	Libby	731
Seven Point Genetical	Cabinet	1,991
Total Acres		**3,226**[1]

1 Additional acres to those established through previous decisions.

Recommended Research Natural Area Descriptions

Doonan Peak: The area contains hybrids of a cross between western larch and alpine larch. It is known as hybrid larch. This site has an extensive, well-developed distributional overlap of western larch and alpine larch and their natural hybrids. Trees of all three taxa are present in both old growth and young age classes. It is the largest known concentration of hybrid larch in northwestern Montana. After the St. Mary's area in the Bitterroot Valley, it is the most extensive natural hybridization zone of western larch and alpine larch. The site also contains a tree that is nominated for the Montana Champion Tree Program for alpine larch. The proposed RNA is located adjacent to the Cabinet Mountain Wilderness. The area is in a rugged glacial cirque having a steep headwall with talus slopes and an adjacent subalpine ridge. The site contains approximately 504 acres.

Huson Peak: The area contains a viable stand of whitebark pine. This stand is an historic representation of the species for western Montana and northern Idaho. The site is used for collecting seed for a breeding program to determine genetic resistance of the species to white pine blister rust. It is not known if these trees contain any rust resistance, but they are alive and well, while many of the stands in the area have been killed by the rust. The stands are generally located above 5,800 feet elevation. This site is approximately 731 acres.

Seven Point Genetical: The area contains a viable stand of whitebark pine. This stand is an historic representation of the species for western Montana and northern Idaho. The site is used for collecting seed for a breeding program to determine genetic resistance of the species to white pine blister rust. It is not known if these trees contain any rust resistance, but they are alive and well, while many of the stands in the area have been killed by the rust. The stands are generally located above 5,800 feet elevation. This site is approximately 1,991 acres.

Consequences to Research Natural Areas from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Management prescriptions in any of the four alternatives would not result in any change in the lands recommended as RNAs. Areas allocated to RNAs are substantially free from human activities, although research and educational activities occur. Under special circumstances, deliberate manipulation may be used to maintain or re-establish ecological processes within an RNA (i.e., if approved in the RNA management plan or establishment record); otherwise most activities are precluded in RNAs.

Effects from Access Management

Currently there are no roads in the existing designated RNAs, nor is road construction permitted in MA21. Alternatives B, C, and D would restrict new road construction on an additional 3,226 acres (MA4-STD-AR-03). In addition, MA4 includes STD-AR-02 which precludes mechanized use (e.g., mountain bikes and other wheeled vehicles) except on designated routes. These prohibitions would protect the natural processes within the RNAs.

Effects from Vegetation Management

MA21 (Alternative A) and MA4 (Alternatives B, C, and D) prohibit timber harvest (MA4–STD-TBR-01); therefore, this activity would not result in any change in the lands recommended as RNAs. These MAs are not part of the suited timber base. Under special circumstances, deliberate manipulation may be used to maintain or re-establish ecological processes within an RNA (i.e., if approved in the RNA management plan or establishment record) (MA21 Research Standard [Alternative A]; MA4-DC-VEG-01[Alternatives B, C, and D]). Any activity would be designed to meet RNA management objectives.

Effects from Wildlife Management

All alternatives preclude activities that do not comport to the RNA management plan; therefore, wildlife management in these areas would not occur and would not affect RNAs.

Effects from Aquatic Management

All alternatives preclude activities that do not comport to the RNA management plan; therefore, aquatic management in these areas would not occur and would not affect RNAs.

Effects from Recreation Management

All alternatives preclude activities that do not comport to the RNA management plan; therefore, recreation management in these areas would be limited to nonmotorized recreation and mechanized use is limited to established trails. These limited recreation activities would not result in any change in the lands recommended as RNAs.

Effects from Fire and Fuels Management

Prescribed fire, or the use of natural, unplanned ignitions is not allowed unless the RNA Establishment Record and/or approved RNA management plan indicates otherwise; therefore, fires would continue to be suppressed in these areas (MA21 Protection standards [Alternative A]; MA4-GDL-FIRE-01 [Alternatives B, C and D]).

Effects from Lands and Special Uses Management

All alternatives preclude activities that do not comport to the RNA management plan; therefore, lands and special use management would not occur and would not affect RNAs.

Cumulative Effects

Management activities generally take place outside of established or recommended RNAs unless an action is needed to help protect or preserve the identified ecological characteristics. For example, if invasive weeds were discovered in an RNA there may be a need to take some action (hand pull, herbicide application) to eradicate or prevent further spread. However, this activity, or any management activity, would have to be identified in the RNA Establishment Record or approved RNA management plan or analyzed at the site specific level.

Vegetation treatments are likely to continue. It is not expected that vegetation management activities resulting from any of the four alternatives would likely result in any change to established or recommended RNAs since vegetation treatments take place outside of RNAs. Any vegetative treatment within RNAs would be analyzed at the site specific level and be identified in the RNA Establishment Record or approved RNA management plan.

Wildlife management activities can be expected to continue but are not likely to result in any change to established or recommended RNAs since wildlife management activities occur outside of RNAs.

Watershed improvement activities are likely to continue. It is unlikely that any aquatic management activities resulting from any of the four alternatives would likely result in any change to established or recommended RNAs since watershed improvement activities generally take place outside of RNAs.

Recreation management activities such as trail maintenance can be expected to continue but are not likely to have any effect on any established or recommended RNAs.

Fuels management activities (e.g., prescribed burning) are likely to continue. It is unlikely that fire and fuels management activities would likely result in any change to established or recommended RNAs since fuels management activities generally take place outside of RNAs.

Special Areas

Introduction

The areas discussed in this section are comprised of the Special Area classifications listed below. Special Areas are protected and managed for public use and enjoyment. These areas are identified due to their unique or special characteristics. Special Areas are 'Suitable areas on national forest land, other than wilderness or wild areas, which should be managed principally for recreation use" (36 CFR 294.1). These areas are not congressionally designated, but are administratively designated by the Chief of the Forest Service, regional forester, or forest supervisor.

The following are Special Area classifications, depending on their special characteristics or unique value(s):

- Botanical – A unit of land that contains plant specimens, plant groups, or plant communities that are significant because of their occurrence, habitat, location, life history, ecology, rarity, or other features.
- Geological – A unit of land with outstanding formations or unique geological features of the earth's development.
- Historical – A unit of land possessing a significant site or a concentration of sites, buildings, structures, or objects united historically or prehistorically by plan or physical development.
- Paleontological – A unit of land that contains fossils of plants and animals, shellfish, early vertebrates, coal swamp forests, early reptiles, dinosaurs, and other prehistoric plants or animals.
- Pioneer – A unit of land that is recognized for its unroaded, scenic, recreational, wildlife, and watershed values intended to provide a primitive recreation experience and maintain an undeveloped setting.
- Recreational – A unit of land that has been administratively designated for particular recreation opportunities or activities such as hiking, rock hounding, recreational mining, viewing, or other special activity.
- Scenic – A unit of land with outstanding natural beauty that requires special management to preserve this beauty.
- Zoological – A unit of land that contains animal specimens, animal groups, or animal communities that are significant because of their occurrence, habitat, location, life history, rarity, or other features.

Legal and Administrative Framework

Law and Executive Orders

- **Organic Administration Act of June 4, 1897 (16 U.S.C. 477-482, 551):** This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the national forests.

Code of Federal Regulations (CFR)

The following regulations provide direction for Special Area designation and management on NFS lands:

- **36 CFR 219** – Planning
  - Subpart A: National Forest Land and Resource Management Planning
- **36 CFR 294** – Special Areas
  - Subpart A: Miscellaneous Provisions
  - Subpart B: State Petitions for Inventoried Roadless Area Management
  - Subpart C: Idaho Roadless Area Management

Key Indicator

- Acres of NFS lands recommended for designation as Special Areas.

Methodology and Analysis Process

Resource specialists across the Forest, through field data collection and inventory work, have identified NFS lands that possess 'Special Area' characteristics and have submitted them to be recommended for designation.

For the purposes of this analysis the total acres of all recommended areas is calculated for each alternative and compared.

Affected Environment (Existing Condition)

There are currently 13 designated Special Areas are on the KNF (see table 76).

Table 76. Designated Special Areas on the KNF

Name	District	Existing (Acres)	Classification
Berray Cedars[1]	Cabinet	86	Botanical
Hidden Lake[1]	Fortine	607	Botanical
Kootenai Falls[1]	3 Rivers/ Libby	420	Historical
Lower West Fork Yaak Falls[1]	3 Rivers	274	Historical/Geological
Northwest Peak Scenic Area[1]	3 Rivers	4,714	Scenic
Rexford Hoodoos[1]	Rexford	83	Geological
Ross Creek Scenic Area[1]	3 Rivers	101	Scenic/Historical
Star Canyon[1]	3 Rivers	81	Geological
Ten Lakes Scenic Area[1]	Fortine	6,542	Scenic
Tenmile Talus[1]	Rexford	390	Geological
Upper Big Creek Riparian Ecosystem[1]	Rexford/ Libby	2,966	Botanical
Wood Creek Larch Scenic Area[1]	3 Rivers	115	Scenic
Yahk Mining District[1]	3 Rivers	456	Historical
Total Acres		**16,835**	

1 Areas designated under the 1987 Forest Plan, (as amended)

Environmental Consequences

General Effects

Alternative A – No-action Alternative

Under Alternative A there would be no new Special Areas designated. The 1987 ROD designated approximately 10,420 acres as Special Areas (exclusive of RNAs). Some of these Special Areas have had the boundaries modified since they were first designated and now total approximately 16,800 acres. The 1987 Plan does not recommend any additional areas beyond those designated in the ROD.

Alternatives B, C, and D

In addition to the existing designated Special Areas Alternatives B, C, and D recommends approximately 32,100 additional acres to be designated as Special Areas (see table 77).

Under Alternatives B, C, and D recommended Special Areas would be allocated to MA3. MA3 would provide management direction for approximately 48,900 acres of NFS lands which would be managed for public use and enjoyment and to protect their unique or special characteristics.

Table 77. Recommended Special Areas on the KNF

Name	District	Recommended (Acres)	Classification
Bad Medicine	3 Rivers	1,938	Zoological/Historical
Baree Creek	Libby	57	Historical
Barnum Wetland	Libby	227	Botanical
Barron Creek	Rexford	326	Historical
Big Creek Face	Rexford	327	Historical
Bitterroot Point	Libby	126	Botanical/Historical
Callahan Historic Mining & Logging District	3 Rivers	3,263	Historical
Chicago Peak	Cabinet	278	Historical
Cody Lakes	Libby	194	Botanical/Zoological
East Fork Pipe Creek	Libby	1,118	Geological
Falls Creek	3 Rivers	42	Scenic/Geological
Fivemile	Libby	80	Historical
Flower Lake	Libby	16	Botanical
French Creek Cedars	3 Rivers	131	Botanical
Gateway Prairie	Rexford	2,147	Botanical
Geiger Lakes	Libby	578	Historical
Halverson Face	3 Rivers	47	Botanical
Kelsey Creek	3 Rivers	53	Botanical
Kenelty Caves	Libby	87	Geological
Kootenai Mountain	3 Rivers	217	Historical
Little North Fork Falls	Rexford	6	Recreational/Historical
Lost Horse Fen	3 Rivers	308	Botanical

Name	District	Recommended (Acres)	Classification
Lower Bristow	Libby	371	Historical
Lower Stone Hill	Rexford	81	Historical
Lower Sunday Creek Ecosystem	Fortine	150	Botanical/Historical
Northwest Peak Scenic Area	3 Rivers	8,533[1]	Scenic
Pete Creek	3 Rivers	320	Botanical
Pinkham Falls	Rexford	21	Historical/Geological
Rock Creek Meadows	Cabinet	186	Botanical
Rocky Fivemile Forest	Fortine	214	Botanical
Ross Falls	3 Rivers	44	Historical/Geological
Silver Butte Mountain	Libby	170	Historical
Spar Springs	3 Rivers	196	Geological
Spread Otis Creeks	3 Rivers	382	Botanical
Stone Hill	Rexford	760	Recreational/Geological
Sutton Falls	Rexford	113	Historical/Geological
Ten Lakes Scenic Area	Fortine	8,403[1]	Scenic
Tenmile Falls	Rexford	187	Historical / Geological
Tepee Lake	Libby	46	Botanical
Terriault Pass	Fortine	493	Geological
Vermilion Falls	Cabinet	99	Recreational/Historical
Vinal Lake	3 Rivers	83	Historical/Botanical
Yaak Falls	3 Rivers	44	Historical/Recreational
Total Acres		**32,109**	

1 Additional acres to those designated in the 1987 ROD.

Consequences to Special Areas from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Under Alternatives B, C, and D, the number of acres recommended for designation as Special Areas is the same. This would result in an increase of about 32,100 acres of NFS lands and would be managed and protected for their identified unique characteristics. Alternative A does not recommend any additional Special Areas and would not result in any increase.

Effects from Vegetation Management

Although Special Areas are removed from the ASQ, trees could be harvested as long as it maintains or restores the values for which the Special Areas was identified.

Effects from Recreation Management

Impacts from recreational use and management within Special Areas are anticipated to be low. Hiking and other activities do occur, but the impacts can be expected to be minimal since they are generally low intensity. Developed recreation sites are unlikely, although trailhead and

sanitation facilities can be expected in scenic and recreational areas. Trail maintenance work can be expected to have little, if any, impact on Special Area characteristics.

Effects from Fire and Fuels Management

Impacts from fire and fuels management are expected to be low. Prescribed fire, although allowed, is rarely used unless the values for which the area was designated can be maintained or enhanced. Natural, unplanned wildfire would generally be suppressed in biological, zoological, and historical special areas as the potential risk to the resource from wildfire would be undesirable.

Effects from Minerals Management

Anticipated effects from minerals management would be low in all alternatives. Potential for leasable minerals is low across most of the Forest and currently there are no permits or operating plans for exploration within any Special Area. Although potential for locatable minerals does exist, there are no current permits or operating plans for mineral exploration within the corridors. No impacts would occur from the disposal of mineral materials since it is not an allowed use within Special Areas.

Cumulative Effects

Cumulative effects evaluate the potential impacts to Special Areas from the proposed action and alternatives when combined with past, present, and reasonably foreseeable actions. The lands within the KNF boundary form the geographic scope for cumulative effects since this is the scope for the proposed action (Alternative B). The temporal bound would be the life of the Forest Plan which is estimated to be a 15 year time span.

In order to integrate the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis uses existing conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior actions that have affected Special Areas and might contribute to cumulative effects.

Management activities generally take place outside of designated Special Areas unless an action is needed to help protect or preserve the identified unique feature or characteristic. For example, if invasive weeds were discovered in a botanical area there may be a need to take some action (hand pull, herbicide application) to eradicate or prevent further spread.

Vegetation treatments are likely to continue. It is not expected that vegetation management activities resulting from any of the four alternatives would result in any change to designated Special Areas since vegetation treatments generally take place outside of designated Special Areas.

Wildlife management activities can be expected to continue but are not likely to result in any change to designated Special Areas since wildlife management activities generally occur outside of designated Special Areas.

Watershed improvement activities are likely to continue. It is unlikely that any aquatic management activities resulting from any of the four alternatives would result in any change to designated Special Areas since watershed improvement activities generally take place outside of designated Special Areas.

Recreation management activities, such as trail maintenance, can be expected to continue but are not likely to have any effect on any designated Special Areas.

Fuels management activities (e.g., prescribed burning) are likely to continue. It is unlikely that fire and fuels management activities would result in any change to designated Special Areas since fuels management activities generally take place outside of designated Special Areas.

Neither the Rock Creek nor Monantore mining proposals, if they were to begin operations, is likely to have an effect on any designated Special Area since these projects occur outside of designated Special Areas.

Cultural Resources

Introduction

Historic properties include cultural sites that reflect past use of the area, having value as defined by the National Register of Historic Places (Register) Criteria for Eligibility for their: a) association with important events b) association with important people in our history, c) distinctive historical or architectural style, and d) potential to provide information about the past. A property can be eligible under one or more of these criteria and, generally, are at least 50 years old. Identification of historic properties is completed through field inventory, sites are evaluated for inclusion on the National Register of Historic Places, and a selection of those properties is formally nominated for listing on the Register. Through this process, current and potential impacts to eligible properties are identified and protection measures designed and implemented.

Legal and Administrative Framework

Law and Executive Orders

- **National Historic Preservation Act (NHPA) of 1966 (P.L. 89-665, as amended, P.L. 91-423, P.L. 94-422, P.L.94-458 and P.L. 96-515)**
  - **Section 106:** Requires each agency to take into account the effects of its actions on historic properties, prior to approving expenditure of Federal funds on an undertaking or prior to issuing any license. Furthermore, an agency must afford the Advisory Council on Historic Preservation (an independent Federal agency created by NHPA) an opportunity to comment on any of the agency's undertaking that could affect historic properties.
- **36 CFR 800:** Provides explicit direction for the identification of sites, the determination of project effects on sites, requirements for consultation with state historic preservation offices and the Advisory Council on Historic Preservation; and how to develop agreements.

  The Department of Interior has posted guidelines for identifying and nominating traditional cultural properties under the NHPA in Bulletin 38. A traditional cultural property is defined generally as one that is eligible to the National Register because of its association with cultural practices or beliefs of living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. The Forest Service has issued policy on the interpretation of Bulletin 38. If a property or area being considered for treatment under the provisions of the NHPA does not meet all specified criteria, the Section 106 provisions do not apply. The concerns expressed for designation may be very real and very important; but consideration of any traditional cultural values associated with the area might properly occur under some other mechanism or process, such as NEPA or American Indian Religious Freedom Act.

- **Section 101(a) (8):** Gives the Secretary of Interior (National Park Service) the responsibility and authority to assess "significant threats to properties included in, or eligible for inclusion on, the National Register, in order to:
  - (A) Determine the kinds of properties that may be threatened;
  - (B) Ascertain the causes of the threats; and
  - (C) Develop and submit to the President and Congress recommendations for appropriate action."

The Park Service will turn to individual agencies to report such information. This would require a forestwide assessment of known sites, factoring in their present condition, potential for threat, and recommendations for protection.

- **Section 110 (a) (2) (A)**: Directs Federal agencies to establish "a preservation program for the identification, evaluation, and nomination to the National Register of Historic Places, and protection of historic properties" to "ensure that such properties under the jurisdiction or control of the agency, are identified, evaluated, and nominated to the National Register". This would require development of a schedule for the identification, evaluation and nomination of unrecorded sites.
- **36 CFR 79:** Establishes standards, procedures, and guidelines to be followed by Federal agencies to preserve collections of prehistoric and historic material remains; and associated records that are recovered in conjunction with Federal projects and programs under certain Federal statutes. This action should ensure that federally-owned and administered collections of prehistoric and historic materials remains; and associated records are deposited in repositories that have the capability to provide adequate long-term curatorial services.
- **36 CFR 60:** Sets forth basic procedures of evaluation and nomination of sites to the National Register of Historic Places, procedures for the operations of state historic preservation officers, and minimum qualification standards for cultural resource professionals.
- **36 CFR 219.24:** Provides guidance for addressing cultural and historic sites in forest plans. Forest planning shall provide for the identification, protection, interpretation, and management of significant cultural resources on NFS lands. Forest planning shall provide an overview of known data relevant to history, ethnography, and prehistory of the area under consideration; including known cultural resource sites; identify areas requiring more intensive inventory; provide for evaluation and identification of appropriate sites for the National Register of Historic Places; provide for establishing measures for the protection of significant cultural resources from vandalism and other human depredation, and natural destruction; identify the need for maintenance of historic sites on, or eligible for inclusion in the National Register of Historic Places; and identify opportunities for interpretation of cultural resources for the education and enjoyment of the American Public.
- **Executive Order 11593 of 1971, Protection and Enhancement of the Cultural Environment:** States that the Federal Government will provide leadership on preserving, restoring, and maintaining the historic and cultural environment of the Nation. Directs Federal agencies through Federal plans and programs to preserve cultural resources, contribute to the preservation and enhancement of non-federally owned sites, structures, and objects of historic, architectural, or archaeological significance. It orders Federal agencies to locate, inventory, and nominate to the National register all properties under their control or jurisdiction that meets the criteria for nomination. It also directs Federal agencies to exercise caution during the interim period to ensure cultural resources under their control are not inadvertently damaged, destroyed, or transferred.
- **Archaeological Resources Protection Act of 1979 (ARPA) P.L. 96-95) and 36 CFR Part 7 Sec 2a:** The Congress finds:
  - (1) Archaeological resources on public lands and Indian lands are an accessible and irreplaceable part of the Nation's heritage;
  - (2) These resources are increasingly endangered because of their commercial attractiveness;

- (3) Existing Federal laws do not provide adequate protection to prevent the loss and destruction of these archaeological resources and sites resulting from uncontrolled excavations and pillage; and
- (4) There is a wealth of archaeological information which has been legally obtained by private individuals for noncommercial purposes and which could voluntarily be made available to professional archaeologists and institutions...

The purpose of this section is to provide protection for archaeological resources found on public lands and Indian lands of the United States. The legislation provides civil and criminal penalties for those who remove or damage archaeological resources in violation of the prohibitions contained in the bill. The bill prohibits the removal of archaeological resources on public lands or Indian lands without first obtaining a permit from the affected Federal land manager or Indian Tribe.

- **Section 470ii (c):** States that "Each Federal land manager shall establish a program to increase public awareness of the significance of the archaeological resources located on public lands and Indian lands and the need to protect such resources." It further directs that an annual report of such progress will be submitted to Congress.
- **Section 470mm:** Directs Federal agencies to:
  - (a) Develop plans for surveying lands under their control to determine the nature and extent of archaeological resources on those lands;
  - (b) Prepare a schedule for surveying lands that are likely to contain the most scientifically valuable archaeological resources; and
  - (c) Develop documents for the report of suspected violations of this act and establish when and how those documents are to be completed by officers, employees, and agents of their respective agencies.
- **Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (P.L. 101-601, 25 U.S.C. 3001-3013) and Regulations 43 CFR Part 10:** Addresses the rights of lineal descendants and members of Indian tribes, Alaska Native and native Hawaiian organizations to certain human remains and precisely defined cultural items. It covers items currently in Federal repositories as well as future discoveries. The law requires federal agencies and museums to provide an inventory and summary of human remains and associative funerary objects. The law also provides for criminal penalties in the illegal trafficking in Native American human remains and cultural items.
- **Executive Order 13287 of 2000, Preserve America:** Reinforces the Federal Government policy for "protection and enhancement of America's historic treasures, and to recognize and treat cultural resources as assets. Federal agencies shall advance this policy through the protection of, continued use of, and reinvestment in, the Federal government's historic buildings and sites and by conforming to the highest standards of care for, and consideration of, the unique cultural heritage of communities, and of the Nation." Each agency is directed to: (a) review its regulations, management policies, and general operating procedures for compliance with Section 110 of the NHPA, and (b) develop annual goals and measures as part of their compliance with the Government Performance and Results Act (P.L. 103-62) and report annually on the protection of historic and archeological properties within its care. The order also encourages the formation of partnerships with Indian tribes, State and local governments, and the private sector to promote public understanding of the preservation and use of historic properties.
- **Executive Order 13007, 1996 (Indian Sacred Sites):** Directs federal agencies, to the extent practicable, accommodate access to and ceremonial use of sacred sites by Indian religious

practitioners while avoiding adversely affecting the sites and maintaining the confidentiality of the sites.

Key Indicator

- Effects to eligible historic properties (which can be either no adverse[1] or adverse[2].

Methodology and Analysis Process

Analysis methods used for historic properties include a review and synthesis of all pertinent literature, records, and documentation available on the history and prehistory of the Forest. This information includes not only that which is available from a variety of generalized sources, but also information resulting from several years' worth of Forest Service cultural resource inventories. Information of previously documented sites can be an indicator of the type, frequency, and location of sites likely to be found within the analysis area. This cumulative knowledge provides the basis for a prehistoric site probability model.

Alternative A reflects the 1987 Forest Plan, as amended to date, and accounts for current laws and regulations that have evolved since the original Forest Plan and the amendments were adopted. New information on the number of cultural sites will be analyzed through GIS. Output levels will be recalculated for this alternative to comply with these new sources of information. The no-action alternative retains the 1987 Forest Plan goals and objectives, standards and guidelines, and MA prescriptions, as amended. This alternative serves as the baseline for comparison for the other three "action" alternatives.

Affected Environment (Existing Condition)

Historic properties reflect the prehistoric and historic past. The prehistoric period, is that time predating any written history of a people. Through the use of geological, biological, sociological, and archaeological evidence the prehistory of the KNF goes back at least 8,000 years, when people moved across the landscape hunting and gathering. These early people were mobile hunters and gatherers, taking advantage of the wide range of mineral resources here, as well as the varied plant, animal, and aquatic life. Although the lifestyle of these early residents is becoming clearer, there is still much to be learned about the interaction of these people with their environment.

Prehistoric sites can take the form of camps, trails, rock art, cambium-peeled trees, quarries, burial grounds, and others. The Kootenai Indians were the last prehistoric group to inhabit the area. The time of their arrival as well as their origin remains one of the great puzzles of North American prehistory. Their language is unique and distinctive from that of their neighbors.

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[1] No adverse could include stabilizing a historic property such as controlling erosion of an archaeological site, restoring and maintaining a historic building, or reducing fuels concentrations around a historic property. This kind of treatment is designed and agreed upon through consultation conducted under Section 106 of the NHPA with the State Historic Preservation Officer

[2] Adverse effects are impacts to the integrity of the property that destroy a portion of or the entire property. A direct adverse impact occurs during the activity itself; such as when a road is built through a historic property and the construction process destroys the site. Indirect adverse impacts are a side effect of the activity or occur after the activity is complete; an example is runoff from a road that eventually erodes a historic property adjacent to it. Adverse impacts can be avoided altogether through project design or mitigated. These avoidance or mitigation measures are agreed to in consultation conducted under Section 106 of NHPA with the State Historic Preservation Officer and the Advisory Council on Historic Preservation

Ethnographic research of the Kootenai tribe was only recently undertaken, beginning in the 1940s with the work of Turney-High and continuing to the present (Manning 1983). These studies suggest a lifestyle highly influenced by the European culture: the introduction of the horse, fur trapping and trade, missionaries, mining, and homesteading. Sites relating specifically to this era have yet to be clearly distinguished from sites of earlier activities.

The KNF contains land that is subject to treaty rights for the Flathead/Kootenai-Salish Indian Tribes. These treaty rights provide for hunting and fishing. Certain sites are still in use by Native Americans exercising their rights under the American Indian Religious Freedom Act.

The written history began with the trappers' and explorers' journals' written in the early 1800s. The early traders were sent by Hudson's Bay and the Northwest Fur Trade companies. The remainder of the historic period is marked by the coming of the railroads, which opened land to miners scouring the Forest for gold and silver. Quickly, mining camps turned into towns. The demand for lumber ushered in the early loggers. The Homestead Act of 1862 provided opportunities for anyone willing to apply, file for deed of title, and improve their 160 acres to become landowners. Archaeologists have been piecing together a description of how the native peoples used the land now known as the Kootenai National Forest.

Several major activities dominate the history of the 19th and 20th centuries within this region, all represented by recorded sites on the Forest. These include: fur trade missionaries, mining, homesteading and agriculture, transportation, logging, and public management of the resources. All of these themes are represented by recorded sites on the Forest.

This prehistoric and historic past left its mark on the landscape that is visible today as cultural sites. The KNF has conducted cultural resources inventories in areas of planned projects and to date has completed 3,242 investigations, covering 1,709,332 acres of surveyed land. Through cultural resource survey 1,759 cultural sites have been identified within the KNF, including 1,138 historic sites and 624 prehistoric sites. Of the historic sites, 353 have been determined as not eligible and 151 have been determined as not eligible to the National Register of Historic Places. Another 634 historic sites have not yet been evaluated. Of the prehistoric sites, 54 have been determined as not eligible and 306 have been determined as eligible to the National Register of Historic Places, with 261 prehistoric sites not yet evaluated. If the artifacts present at a location do not warrant formal recording as a formal site, then they are recorded as "isolated finds." There are 48 historic and 44 prehistoric isolated finds on the Forest. In addition to the known historic and prehistoric sites, it is likely that many more will be uncovered, as projects are planned for areas previously unexamined.

Information on cultural sites is kept on file as hard copy site and inventory forms, as well as on GIS and within the National Heritage Infra data base. Information concerning the nature and location of any cultural resource is confidential and not subject to public disclosure as per Public Law 94-456, [16 U.S.C. 470 hh Section 9 (a & b)].

Environmental Consequences

The Heritage Program requirements for compliance with law and regulation are the same for all alternatives. The difference between the alternatives is the amount of survey, site evaluation, and possible mitigation required.

General Effects

Effects to cultural resources are caused by direct project actions, public use and vandalism, and natural causes. “Direct project actions” include all of those activities, both beneficial and harmful, that are conducted by the Forest Service or authorized by Forest Service permits, including timber and silvicultural management, prescribed fire, wildlife and fisheries management, road and trail construction, facilities construction and maintenance, recreation use and management, and special uses authorization to third parties. “Public use and vandalism” of historic facilities and archaeological sites, causes disturbance and destruction of cultural resources. Natural causes include damage by wind and water erosion, fire, weathering, and other natural processes. The type of cultural resources and their management allocation must be taken into account to assess project effects.

Compliance with Section 106 of the NHPA and 36 CFR 800 regulations is fulfilled by a process to establish the presence of historic properties within the area of potential effect for each alternative; through background research, State Historic Preservation Office consultation, and an appropriate level of field investigation. This takes into account the number of alternatives under consideration, the magnitude of the undertaking and its likely effects, and the views of the State Historic Preservation Office/Tribal Historic Preservation Office; and any other interested parties.

Alternative A – No-action Alternative

Under the 1987 Forest Plan there were two identified historic special interest areas for cultural resources that were afforded special protection and enhancement treatment. The management direction was, and is designed, to protect and enhance the cultural resource within these special areas. The one additional special area identified in the draft Forest Plan would be excluded from special treatment under Alternative A.

Those MAs under the 1987 Forest Plan that allow for more active management (suitable timberland) would be more likely to have the potential to adversely affect cultural resources found through inadvertent discoveries after compliance with Section 106 (MAs 11, 12, 14, 15, and 16). MA2, 3, 7 through 10 would have less potential to adversely affect cultural resource areas.

Alternative B, C, and D

For Alternatives B, C, and D the MAs have the same direction and only the size and location of the areas change. Since there are fewer MAs and they tend to be grouped with like activity sets it is easier to determine potential effect than for Alternative A. For these alternatives MA6 and 7 are the most intensively managed and have the highest potential for adversely affecting cultural sites. However, as with Alternative A, MA3, 5, 6 and 7 with moderate to high use by the public may suffer from direct public use and vandalism, especially along trails, ridges and streams, rivers, lakes where hunters, campers, hikers, fishermen, and ATV riders dispersed camp; and where long established developed recreation sites may not have been inventoried. Along trails, streams, rivers, and lakes in more remote areas where public activities are concentrated, dispersed camping may have significant effects to cultural resources when not managed appropriately.

Compliance with Section 106 of the NHPA is required of all agency “undertakings” and would be consistently applied to Alternatives B, C, and D. There would most likely be a decreased cultural resource workload for Alternative C which emphasizes wilderness and an increased

cultural resource workload for Alternative D, as it emphasizes more active management related to timber production.

Consequences to Cultural Resources from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects that are Consistent in All Alternatives

Effects from Recreation Management

The direct effects are related to management activities such as construction or reconstruction of developed and undeveloped recreation sites, such as adding new campground spurs and waterlines. The management of dead and dying vegetation can also have a direct effect on cultural resources. For the planned recreation projects direct effects can be eliminated or mitigated.

The indirect effects occur from recreation site use and would include such activities as trampling, which could expose sites and adversely affect their physical integrity. Another indirect effect is from looting of sites to remove artifacts, which is an adverse effect as well as a felony.

Unauthorized, user-created routes and areas have already affected historic properties within route/area prisms. A direct effect can be caused by motorized vehicle uses or the consequences of such use, including physical damage resulting in or from erosion, down-cutting, rutting, or displacement or damage to cultural features.

Indirect effects are associated with motorized vehicle uses but occur outside designated routes and areas, such as adjacent dispersed camping areas or areas where travel off of designated routes or areas may occur. The proximity of sensitive cultural resources, such as rock art, rock shelters, historic structures, and Traditional Cultural Properties, to designated routes or areas is important when determining where resources could be susceptible to greater threats or risks. Indirect effects could include those listed for direct effects, but also include destructive actions like vandalism and looting.

Any adverse effects can be mitigated through compliance with Section 106 of the NHPA.

Effects from Eligible Wild and Scenic Rivers

The direct effects from the management of eligible wild and scenic rivers have the potential to directly affect cultural resources. The indirect effect of recreational use also has the potential to affect cultural resources. Any adverse effects can be mitigated through compliance with Section 106 of the NHPA.

Effects from Botanical, Geological, Historical, Recreational, Scenic, or Zoological Areas

The direct effects of management of Special Areas depend on the management direction specified for the resource managed within Special Areas. Any vegetation management, including fire use, has the potential for adverse effects. These effects can be mitigated through compliance with Section 106 of the NHPA.

Effects that Vary Between Alternatives

Effects from Wilderness Management

The management of wilderness may include camp site maintenance, which can cause damage to any cultural resources. The only other potential adverse effect would involve access. Roads provide access for the management of cultural sites and motorized restrictions limit access for that purpose. However, limitations on access into wilderness can contribute to protection of cultural resources by limiting use. Alternative C provides the most recommended wilderness and, therefore, the greatest protection to cultural resources through limited use. Conversely, Alternative D provides the least amount of recommended wilderness; and thus, the least protection to cultural resources by limiting use.

Effects from Motorized Use Management

Adverse effects on cultural resources have been shown in past actions, where motorized users have gone off road. When increased motorized use is planned, adverse effects can be mitigated through compliance with Section 106 of the NHPA. Alternative D provides the most motorized access; and thus, the least protection to cultural resources and the most mitigation needed. Alternative C provides the least amount of motorized access and, therefore, the most protection to cultural resources and the least mitigation needed.

Effects from General Forest Management

General forest management, including vegetation management and fire use, has the potential for adverse effects to cultural resources. The adverse effects can be caused by machinery and vehicles, including tree felling, skidding, and burning of slash piles, and construction or reconstruction of roads. Any adverse effects can be mitigated through compliance with Section 106 of the NHPA. Alternative D provides the most timber harvest; and thus, the least protection to cultural resources and the most mitigation needed. Alternative C provides the least amount of timber harvest and, therefore, the most protection to cultural resources and the least mitigation needed.

Cumulative Effects

Cumulative effects, over time, can include loss and damage to cultural resources ranging from damage to the complete loss of a site. Adverse effects can occur to sites due to surface or subsurface disturbance with subsequent loss of physical and scientific integrity. Adverse effects to cultural resources representing the prehistoric period is also considered as a loss for the traditional cultural integrity by Tribes. Forest management causing surface disturbance may expose sites to illegal collection of artifacts (looting). Any adverse effects can be mitigated through compliance with Section 106 of the NHPA.

Tribal Interest and Treaty Rights

Introduction

Federal agencies have trust responsibilities to American Indian Tribes under treaty (Treaty Tribes) and in compliance with various laws and executive orders. Within the boundaries of the KNF, the Confederated Salish and Kootenai Tribes have reserved, through a U.S. Treaty, Tribe off-reservation Treaty Rights. Federal guidance for tribal consultation directs the Forest Service to increase and improve the involvement of tribes in the decision-making process in the areas where decisions affect tribes and their treaty rights and interests. There is a trust responsibility with regard to managing the resources on which the Treaties are based. The Forest is also required to consult with all federally-recognized tribes that had/have traditional uses within the Forest boundary. This consultation extends to the Kootenai Tribe of Idaho, Kalispel, Spokane, and Coeur d' Alene Tribes.

Legal and Administrative Framework

Law and Executive Orders

- **The Hellgate Treaty of 1855:** The Flathead, Kootenai, and Upper Pend d'Orielles Indian Tribes reserved rights under the Hellgate Treaty of 1855 (July 16, 1855). These rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land." The federal government has trust responsibilities to Tribes under a government-to-government relationship to ensure that the Tribes reserved rights are protected. Consultation with the Tribes in early phases of project planning helps the Forest Service meet their trust responsibilities.
- **National Historic Preservation Act (NHPA) of 1966 (P.L. 89-665, as amended, P.L. 91-423, P.L. 94-422, P.L.94-458 and P.L. 96-515) Regulations 36 CFR Part 800 and 36 CFR 36 CFR Part 7:** This act pertains only to tangible properties (buildings, structures, sites, or objects) which are important in history and prehistory. It requires agencies to consider the effects of undertakings on properties eligible to or listed in the National Register of Historic Places by following the regulatory process specified in 36CFR800.

  The portions of that act that relate specifically to coordination with Indian tribes were added in the 1992 amendments. These additions reflect the increased importance placed on tribal relations. A section of the act directs state and Federal governments to assist in the establishment of preservation programs on Indian lands. These sections include:

  - **Section 2:** It shall be the policy of the Federal Government, in cooperation with other nations and in partnership with the State, local governments, Indian tribes, and private organizations and individuals to:
    - (2) Provide leadership in the preservation of the prehistoric and historic resources of the United States and of the international community of nations and in the administration of the national preservation program.
    - (6) Assist State and local governments, Indian tribes and Native Hawaiian organizations and the National Trust for Historic Preservation in the United States to expand and accelerate their historic preservation programs and activities;

- **National Environmental Policy Act of 1969 (P.L .91-190) and Regulations 40 CFR 1500-1508:** Federal agencies began to invite Indian tribes to participate in forest management projects and activities that may affect them.
- **National Forest Management Act (NFMA) of 1976 (P.L. 4-588):** Directs consultation and coordination of NFS planning with Indian tribes.
- **American Indian Religious Freedom Act of 1978 (AIRFA) (P.L.95-341 as amended, P.L. 103-344):** AIRFA states that "...it shall be the policy of the United States to protect and preserve for American Indians their inherent right for freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to site, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites".

  Agencies must make a good faith effort to understand how Indian religious practices may come into conflict with other forest uses and consider any adverse impacts on these practices in their decision-making practices. The consideration of intangible, religious, ceremonial, or traditional cultural values and concerns which cannot be tied to specific cultural sites/properties could be considered under American Indian Religious Freedom Act.

- **Archaeological Resources Protection Act of 1979 (ARPA) (P.L. 96-95) and Regulations 43 CFR Part 7:** Establishes a permit process for the management of cultural sites on Federal lands which provides for consultation with affected tribal governments.
- **Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (P.L. 101-601, 25 U.S.C. 3001-3013) and Regulations 43 CFR Part 10:** Addresses the rights of lineal descendants and members of Indian tribes, Alaska Native and native Hawaiian organizations to certain human remains and precisely defined cultural items. It covers items currently in Federal repositories as well as future discoveries. The law requires federal agencies and museums to provide an inventory and summary of human remains and associated funerary objects. The law also provides for criminal penalties in the illegal trafficking in Native American human remains and cultural items.
- **Interior Secretarial Order 3175 of 1993:** Establishes responsibility of all agencies to carry out trust responsibilities of the Federal Government and assess the impacts of their actions on Indian trust resources. It requires consultation with tribes when impacts are identified.
- **Executive Order 12866 of 1993, Regulatory Planning and Review:** Enhances planning and coordination with respect to both new and existing regulations. Makes process more accessible and open to the public. Agencies shall seek views of tribal officials before imposing regulatory requirements that might affect them.
- **Religious Freedom Restoration Act of 1993 (P.L. 103-141):** Established a higher standard for justifying government actions that may impact religious liberties.
- **Executive Order 12898 of 1994:** Environmental Justice in Minority Populations and Low-Income Populations directs Federal agencies to focus on the human health and environmental conditions in minority and low-income communities, especially in instances where decisions may adversely impact these populations.
- **Forest Service Tribal Relations Enhancement Act of 2006:**
  - **Reburial of Human Remains and Cultural Items:** The Native American Graves Protection and Repatriation Act provide for repatriation of human remains and cultural items to lineal descendants and Indian tribes but does not address further disposition of these items. New authority would explicitly authorize the reburial of human remains and

associated cultural items on NFS lands, when they were originally recovered from NFS or adjacent lands.

- **Confidentiality of Information:** An increased level of confidentiality would be authorized to protect information relating to reburials, sites, or resources of traditional or cultural importance, including human remains and information relating to traditional and cultural resources and practices provided in the course of research activities.
- **Forest Products for Traditional and Cultural Purposes:** American Indian and Alaska Native tribes have special cultural and traditional needs for forest products located on NFS lands, such as logs and planks for cultural structures. The legislative proposal would create an exception to a NFMA requirement to sell certain forest products by authorizing the Secretary to provide these products free of charge, when used for traditional and cultural purposes.
- **Access to National Forest System Lands:** The legislative proposal would reinforce the Forest Service's commitment to the American Indian Religious Freedom Act for access to NFS lands.

- **Executive Order 13007 of 1996, Indian Sacred Sites:** This order acknowledges the role of federal agencies to protect and preserve the religious practices and places of federally-recognized tribes and enrolled tribal members. It also requires agencies to consult with federally-recognized tribe to address tribal concerns for sacred sites on public land and to ensure access to religious places and avoidance of adverse effects to sacred sites in accordance with existing legislation.
- **Executive Order 13175 of 2000, Consultation and Coordination with Indian Tribal Governments:** Provides direction for consultation with tribal governments for formulating or implementing policies that have tribal implications. Also provides direction regarding consultation and coordination with Indian Tribes relative to fee waivers. Calls upon agencies to use a flexible policy with tribes in cases where proposed waivers are consistent with applicable Federal policy objectives. It directs agencies to grant waivers in areas where the agency has the discretion to do so, when a tribal government makes a request. When a request is denied, the agency must respond to the tribe in writing with the rationale for denial.
- **Executive 13084 of 1998, Consultation and Coordination with Indian Tribes Governments:** Calls upon agencies to utilize flexible policy approaches at the Indian tribal level in cases when a proposed waiver is consistent with applicable Federal policy objectives. The E.O. calls upon agencies to grant waivers in areas where the agency has discretion to do so. This is to be done when a tribal government makes a request; and for those instances where the agency may decline such a request, a reason must be supplied to the tribe.

Code of Federal Regulations (CFR)

- **36 CFR 261 Prohibitions in Areas Designated by Order; Closure of National Forest System Lands to Protect Privacy of Tribal Activities (2011):** "provides regulations regarding special closures to provide for closure of NFS lands to protect the privacy of tribal activities for traditional and cultural purposes to ensure access to NFS land, to the maximum extent practicable, by Indian and Indian tribes for traditional and cultural purposes".

Key Indicator

- The measurement indicators for American Indian Consultation are the effects to tribal interests as defined by Tribes, including tribally affiliated cultural resources, sacred sites, treaty rights, and religious freedom.

Methodology and Analysis Process

Effects to tribal interests are known only through direct tribal consultation. The Confederated Salish and Kootenai Tribes have responded to outreach on Forest Plan revision with expressed interest in consultation throughout the process.

Affected Environment (Existing Condition)

There are five federally-recognized American Indian nations with cultural affiliation on the KNF: the Kootenai Tribe of Idaho, the Kalispel Tribe, the Coeur d'Alene Tribe, the Spokane Tribe, and the Confederated Salish and Kootenai Tribes. Forest Service administered lands today occupies lands that were in traditional aboriginal territory. The aboriginal territory of the Kalispel, Coeur d'Alene, and Spokane Tribes, overlap with the territory now managed by the KNF, along the Clark Fork Valley with the territory used by the Kootenai Tribe of Idaho and the Confederated Salish and Kootenai Tribes. The entire Forest is within aboriginal territory for the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho.

Ethnographic records provide extensive documentation for the past aboriginal use of the Forest. There remains a poignant connection for American Indian Tribes between traditional and contemporary uses on their original aboriginal lands. Tribes continue to rely on ecosystems even as their cultures change, employing both traditional and contemporary ways of relating to their homelands and lands where they traditionally ranged to sustain their way of life. Lands within the KNF help to sustain a way of life, cultural integrity, social cohesion, and economic well-being for Tribes.

The KNF takes an active role on the Tribes behalf, especially in areas of treaty interest, rights, traditional/cultural resources, and ecosystem integrity, maintaining opportunities for traditional American Indian land and resource use. The presence of healthy habitats is fundamental to the achievement of both useable and harvestable levels of resources significant to American Indians, as well as to ecosystem integrity.

The Flathead, Kootenai, and Upper Pend d'Orielles Indian Tribes (Confederated Salish and Kootenai Tribes) reserved rights under the Hellgate Treaty of 1855 (July 16, 1855). These rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land." The federal government has trust responsibilities to Tribes under a government-to-government relationship to ensure that the Tribes reserved rights are protected. Consultation with the Tribes in early phases of project planning helps the Forest Service meet their trust responsibilities.

The federal government has trust responsibilities to Tribes under a government-to-government relationship to ensure that the Tribes reserved rights are protected. Consultation with the Tribes in early phases of project planning helps the Forest Service meet their trust responsibilities. The KNF has been meeting these treaty responsibilities by employing a Tribal Liaison from the Confederated Salish and Kootenai Tribes, a position that has been in place since 1981. The

Tribal Liaison is informed of planned projects on the Forest and coordinates with the appropriate tribal departments and Tribal Council, as well as with members of the Kootenai Tribe of Idaho to identify issues. Issues are discussed with the line officers, who take these issues into consideration in making management decisions.

Consultation on Forest Plan revision began with the five tribes in 2002. The IPNF covered consultation with the Kootenai Tribe of Idaho, the Kalispel Tribe, the Coeur d'Alene Tribe, and the Spokane Tribe as the bulk of aboriginal land for these four tribes on that Forest. The KNF's consultation focused on consultation with the Confederated Salish and Kootenai Tribes. Through that process, the Confederated Salish and Kootenai Tribes identified 28 Special Areas. These Special Areas would require management strategies for managing the resources in the areas. Special Areas may be added by the Confederated Salish and Kootenai Tribes at later dates. The special areas are associated with the traditional beliefs of the Tribe in relation to its origins, cultural history, or the nature of the world; where the Tribes have historically gone, and are known to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; where an American Indian community has traditionally carried out economic, artistic, or other cultural practices important in maintaining their identity.

Environmental Consequences

General Effects

Alternative A – No-action Alternative

Alternative A does not include identified traditional/cultural special areas (i.e., MA3 in the draft Forest Plan); therefore, does not provide the Forest with specific direction for the management of these areas. Alternative A has a forestwide standard for cultural resources that requires the Forest to consult with Native American traditional religious leaders on any project having the potential to affect Native American cultural sites and practices.

Alternatives B, C, and D

Under Alternatives B, C, and D traditional/cultural special areas would be managed under MA3. These alternatives also require the Forest to consult with tribes when management activities may impact treaty rights and/or cultural sites and cultural use areas, according to the consultation protocol (FW-GDL-AI-01). The desired conditions for American Indian Rights and Interests, for all action alternatives, would be for the KNF; to recognize and maintain culturally significant species and the habitat necessary to support healthy, sustainable, and harvestable plant and animal populations to ensure that rights reserved by Tribes in the Hellgate Treaty are not significantly impacted or diminished (FW-DC-AI-01); to recognize, ensure, and accommodate tribal member access to the Forest for the exercise of Treaty Rights and Cultural uses consistent with law, policy, and regulation (FW-DC-AI-02); and to recognize and protect traditional cultural areas as associated with the traditional beliefs of a Tribe about its cultural history (FW-DC-AI-03).

See the "Cultural Resource" section for management specific to traditional/cultural special areas.

Consequences to Tribal Interest and Treaty Rights from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Areas allocated to traditional/cultural areas (MA3) are located across the Forest. They are usually small (less than 1,000 acres). Traditional/cultural areas would emphasize nonmotorized recreation experiences and access. Alternatives B, C, and D would preclude road construction in traditional/cultural areas (MA3-STD-AR-01); and allow mechanized use on designated routes only (MA3-GDL-AR-03). Reconstruction of existing roads would be allowed (MA3-GDL-AR-06). These standards and guidelines would protect those identified special areas (MA3) identified as important to tribal rights and interest. In addition, the Forest would consult with tribes when management activities may impact treaty rights and/or cultural sites and cultural use (FW-GDL-AI-01).

Effects from Vegetation Management

Looking at the overall direction for MAs by alternatives can provide a relative guide to effects to tribal resources, sacred sites, and cultural properties. Vegetation management may cause both beneficial and harmful effects to traditional uses, sacred sites, and cultural properties of interest to the tribes. Depending on the habitat type and management action, specific species of interest to the tribes will fall into one of three categories: 1) on an upward trend; 2) no change in trend; and 3) on a downward trend. For use of traditional resources the differences between alternatives are so complex that they can only be discussed in relative terms; while use and management of sacred sites and cultural properties may be discussed in more specific terms if their location and description are known to the Forest Service.

Alternative B provides a mix of active and natural restoration activities; Alternative C has more concentration on natural vegetation succession patterns (see sections on wildlife, aquatics and botany for additional analysis); and Alternative D uses more active restoration activities than B or C.

Effects from Access and Recreation Management

Effects could be related to management activities such as construction or reconstruction of developed and undeveloped recreation sites, such as adding new campground spurs, waterlines, signs, and outhouses. The management of dead and dying vegetation could also have a direct effect. Other effects could occur from recreation site use and would include such activities such as trampling; which could adversely affect traditional plants, as well as changing the traditional character of an area by introducing negative visual and audio impacts.

Unauthorized, user-created routes and areas could affect tribal resources. A direct effect could be caused by motorized vehicle uses or the consequences of such use; including physical damage resulting in or from erosion, down-cutting, rutting, and damage to tribal resources.

Indirect effects are associated with motorized vehicle uses but occur outside designated routes and areas, such as adjacent dispersed camping areas or areas where travel off of designated routes or areas may occur. The proximity of sensitive tribal resources, such as rock art, rock shelters, and Traditional Cultural Properties, to designated routes or areas is important when determining where resources could be susceptible to greater threats or risks.

Access to traditional resources and sacred sites is a concern of all the tribes. While traditionally they may have reached these places by foot or horseback, today, motorized vehicles are essential

for reaching these locations, especially for elders who can no longer walk long distances. Those alternatives with the least motorized access would cause the greatest effect to tribal access even though lack of access may preserve and protect tribal resources from use and vandalism by non-tribal members. All action alternatives would rely on forestwide elements specific to American Indian Rights and Interests (FW-DC-AI-01 through 03) to recognize impacts that may result from access and recreation management. The Forest would consult with tribes when access and recreation management activities may impact treaty rights and/or cultural sites and cultural use (Alternatives B, C, and D - FW-GDL-AI-01; Alternative A – Forestwide Standard #12). There is some potential risk to sacred sites where American Indians conduct ceremonies that require privacy. If a road were built to or near such a site, the associated increase in visitation could make it difficult to conduct ceremonies there; undermining the important cultural practice. A tribe could request the KNF temporarily close the site to non-tribal members for a short period under the 2008 Farm Bill Authority. Road construction and reconstruction is not allowed in MA1a, b, and c (MA1a-STD-AR-01, 02; MA1b-STD-AR-03, 04; MA1c-STD-AR-03, 04). Road construction is also not allowed in botanical, historical (aka cultural areas), and zoological areas (MA3-STD-AR01), nor in MA5a, b and c (see Plan for exceptions) (MA5a, b, c-STD-AR-01).

Effects from Wilderness and Backcountry Management

The management of wilderness may include camp site maintenance, which can cause damage to tribal resources. The only other potential adverse effect would involve access. Roads provide access for the management of tribal resources and motorized restrictions limit access for that purpose. However, limitations on access into wilderness can contribute to protection of tribal resources by limiting use. All action alternatives would rely on forestwide elements specific to American Indian Rights and Interests (FW-DC-AI-01 through 03) to recognize impacts that may result from wilderness management. The Forest would consult with tribes when access and recreation management activities may impact treaty rights and/or cultural sites and cultural use (Alternatives B, C, and D - FW-GDL-AI-01; Alternative A – Forestwide Standard #12). The exercise of treaty rights and traditional uses of wilderness areas, proposed wilderness, and backcountry areas may be enhanced by maintaining the integrity of landscapes and plant resources in those areas. Sacred sites are likely to be located in these areas. There is still a potential that landscape integrity and sacred sites may be affected because of the activities that are permitted under the action alternatives. However, prior to implementing resource management activities impacts on Tribal government and Tribal practices would be assessed and consultation requirements fulfilled.

Effects from Minerals Management

Hard rock mining has had adverse effects on tribal resources, including the effects on health, integrity, and the general welfare of tribal people and their landscapes. All action alternatives would rely on forestwide elements specific to American Indian Rights and Interests (FW-DC-AI-01 through 03) to recognize impacts that may result from access and recreation management. The Forest would consult with tribes when minerals management activities may impact treaty rights and/or cultural sites and cultural use (Alternatives B, C, and D - FW-GDL-AI-01; Alternative A – Forestwide Standard #12).

Cumulative Effects

The past, present, and foreseeable future impacts to tribal resources are most pronounced in the establishment, current maintenance, and future maintenance of developed and dispersed recreation sites. The cumulative adverse direct and indirect effects of mining on tribal resources include audio and visual effects, as well as natural resource contamination.

There would be limited cumulative effects to tribal interests because of consultation requirements. The effects of other programmatic management and policy decisions would also be limited because they do not approve site-specific actions. Management decisions such as PACFISH, INFISH (USDA Forest Service 1995), the NRLMD (USDA Forest Service 2007), and the management direction for grizzly bears in the motorized access management within the Selkirk and Cabinet-Yaak grizzly bear recovery zones (2011) ensure that projects are conducted in a way that minimize impacts to fish and wildlife habitat. By doing this, these programmatic actions safeguard the exercise of treaty rights and traditional uses of the NFS lands.

Production of Natural Resources

This section includes the following resources:

- Timber
- Minerals
- Livestock Grazing
- Special Forest Products

Timber

Introduction

The KNF contains valuable timber resources. They are important for providing habitat for plants and animals and products that are in demand by the American public. These products include lumber, house logs, pulpwood, posts and poles, and firewood. Because of the value of the timber resource, commercial timber harvest is used to move vegetation towards their desired conditions, improve watershed condition, improve wildlife habitat, and reduce wildfire risk through reduced fuel loads. Timber harvest also provides jobs and income in logging and manufacturing of wood products.

Legal and Administrative Framework

Law and Executive Orders

- **The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act (NFMA) of 1976:** These acts set forth the requirements for Land and Resource Management Plans for the NFS.
- **The Multiple-Use Sustained Yield Act of 1960**: "It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed and wildlife, and fish purposes…The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple-use and sustained yield of several products and services obtained there from…the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land."
- **Organic Administration Act of 1897:** Forests are established "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 citizens of the United States."

Regulation and Policy

- **1982 Planning Rule Procedures:** The procedures of the 1982 NFS Land and Resource Management Planning Rule require the identification of areas suitable for timber production and the ASQ from those lands. In addition, the procedures require the analysis of the supply and demand situation for resource commodities.

Key Indicators

- Number of suitable acres available for timber production;
- Associated allowable sale quantity;
- Acres of predicted harvest; and
- Long term sustained yield capacity.

Methodology and Analysis Process

Timber suitability was determined using various resource data and GIS to apply criteria and identify lands suitable for timber production. Criteria for suitability are defined in the 1982

Planning Rule procedures at 36 CFR 219.14. Data was developed using the latest data sources and requirements to match the criteria defined by resource specialists.

Timber demand is based on a capacity and capability analysis completed by the University of Montana's Bureau of Business and Economic Research (Keegan et al. 2005).

Timber harvest was modeled using Spectrum, a software modeling system designed to assist decision makers in exploring and evaluating multiple resource management choices and objectives. Models constructed with Spectrum apply management actions to landscapes through a time horizon and display resulting outcomes. Management actions are selected to achieve desired goals while complying with all identified management objectives. One of the goals for all action alternatives was the objective to move vegetation towards desired condition. Other goals that were applied for some alternatives included maximizing timber output and present net value. The Spectrum model was used to determine ASQ, predicted timber volume sold, and acres treated by decade for each alternative.

Analysis Area

The analysis area for timber suitability is comprised of the NFS lands administered by the KNF. The analysis area for timber demand consists of five counties comprising the timber impact zone. The analysis area for timber production is the lands suitable for timber production.

Affected Environment

Timber Suitability

Lands suitable for timber production are the land base for determining ASQ and vegetation management for timber production. The 1987 Forest Plan determined 1,263,000 acres to be suitable for timber production. Timber suitability was determined through the use of resource data and computer models and followed the handbook and planning regulations that were in place at the time.

There have been many changes to timber suitability as the Plan has been amended and implemented over the past two decades. These changes include reductions in lands suitable for timber production in grizzly bear core areas, riparian areas, and old growth. There have also been changes in data and land status, resulting in updated figures for timber suitability. As part of the Forest Plan revision, timber suitability was re-calculated to reflect these changes in management and data. Table 78 displays timber suitability at the time the 1987 Plan was adopted and amended as it is currently being implemented.

Table 78 Timber Suitability for the 1987 Plan

Suitability Category	1987 Plan - as Written	1987 Plan - as Amended and Currently Implemented
Total NFS Lands	2,245,000	2,219,100
Non-Forest Land (1)	-82,000	-144,600
Withdrawn Lands (2)	-35,000	-89,000
Irreversible Resource Damage is likely (3)	-340,000	-253,000
Adequate Restocking not assured (3)	0	-20,700

Suitability Category	1987 Plan - as Written	1987 Plan - as Amended and Currently Implemented
Lands Tentatively Suitable for Timber Production	1,788,000	1,711,800
Lands where MA prescriptions preclude timber production, where management requirements cannot be met, or not cost efficient in meeting timber production objectives.	-525,000	-972,500
Lands Suitable for Timber Production	1,263,000	739,300

(1)-Handbook direction at the time the 1987 Plan was developed had lands that were not productive (producing <20 cubic feet/acre/year) classified as "non-forested." The 1982 planning rule procedure does not consider low productive lands as non-forested. Because of this change in definition and updated data, the total forested NFS lands have increased from the 1987 Plan.

(2)-Change in the amount of withdrawn lands is mostly due to a change in the order of subtraction and not a change in actual withdrawn areas.

(3)-The difference between irreversible damage and adequate restocking is mostly due to how these areas were defined and the data used.

Timber Demand

Timber demand was analyzed as part of the 1987 Forest Plan. A potential timber demand of 223 MMBF per year was estimated for the KNF (KNF Forest Plan EIS, page II-57), based on regional goals used in the 1980 Resource Planning Act projections. In addition, analysis of potential timber supply requirements for the KNF was developed for five decades, resulting in ranges from 178 to 224 MMBF in the first two decades.

Timber demand was updated in 2005 using a capacity and capability analysis for the Forest. This analysis was conducted by the University of Montana's Bureau of Business and Economic Research, resulting in a report prepared for the KNF (Keegan et al. 2005). The term "capacity" refers to the volume of timber (excluding pulpwood) that existing mills could utilize annually. The term "capability" refers to the volume of trees of a certain size class that existing mills can efficiently process annually. The following information on timber demand is excerpted from this report.

Virtually all of the KNF non-reserved timberland is located in two Montana counties: Lincoln and Sanders. More than 35 percent of the recent (1998) timber harvest in this two-county area originated from the KNF. Most (84 percent) of the timber harvested from these counties consisted of green (live) trees. The species composition of the harvested volume in this two-county area was: Douglas-fir approximately 38 percent, lodgepole pine 27 percent, and western larch 14 percent, true firs and ponderosa pine each accounted for 8 percent, Engelmann spruce, western red cedar, western hemlock, and western white pine combined accounted for the remaining 6 percent. Sawmills and veneer/plywood manufacturers received over 90 percent of the volume harvested from these two counties. Other products, including house logs, posts and poles, and cedar products accounted for the remaining timber harvest volume.

The KNF identified a five-county area as the "Kootenai National Forest Impact Zone." An impact zone is a geographic area delineated to depict a functioning economy as well as the area influenced by management of the KNF. This impact zone was used to determine the analysis area for the economic environment (see "Economic and Social Environment" for more information). The counties comprising the Kootenai National Forest Impact Zone are Bonner and Boundary counties in Idaho; and Flathead, Lincoln, and Sanders counties in Montana. Within the five-county area there are 63 timber-processing facilities currently operating: 25 sawmills, 17 log

home manufacturers, 8 post and small pole plants, 5 log furniture manufacturers, 3 veneer and plywood facilities, 2 utility pole plants, 2 cedar products manufacturers, and one pulp and paper mill.

As of September 1, 2005, capacity to process timber in the KNF impact zone is 191,020 thousand cubic feet (MCF), with slightly less than 78 percent of capacity being used. Mills in the KNF impact zone are currently using about 148,899 MCF of timber annually (table 79). Slightly less than 87 percent (129,209 MCF) of the volume processed in the impact zone is composed of trees with diameter at breast height (DBH) greater than or equal to 10 inches. Nearly 13 percent (18,977 MCF) of the volume processed comes from trees 7.0 - 9.9 inches DBH, while less than 1 percent (714 MCF) of processed volume comes from trees less than 7 inches DBH.

Table 79. Annual Volume of Timber Processed by Tree Size Class (Excluding Pulpwood) for the Kootenai National Forest Impact Zone

Thousand Cubic Feet of Timber		Thousand Board Feet Scribner of Timber	
Tree DBH (inches)	**Volume Used**	**Tree DBH (inches)**	**Volume Used**
<7	714	<7	714 MCF
7-9.9	18,977	7-9.9	72,872
10+	129,209	10+	547,021
Total	**148,899**	**Total**	**620,607**

About 74 percent (141,203 MCF) of existing capacity in the KNF impact zone is not capable of efficiently utilizing trees less than 10 inches DBH (table 80). Slightly less than 50,000 MCF of timber-processing capacity is capable of utilizing trees less than 10 inches DBH, and nearly all of this is in the 7 to 9.9 inches DBH class.

Table 80. Annual Total Capacity and Capability* to Process Trees by Size Class (Excluding Pulpwood) for the Kootenai National Forest Impact Zone

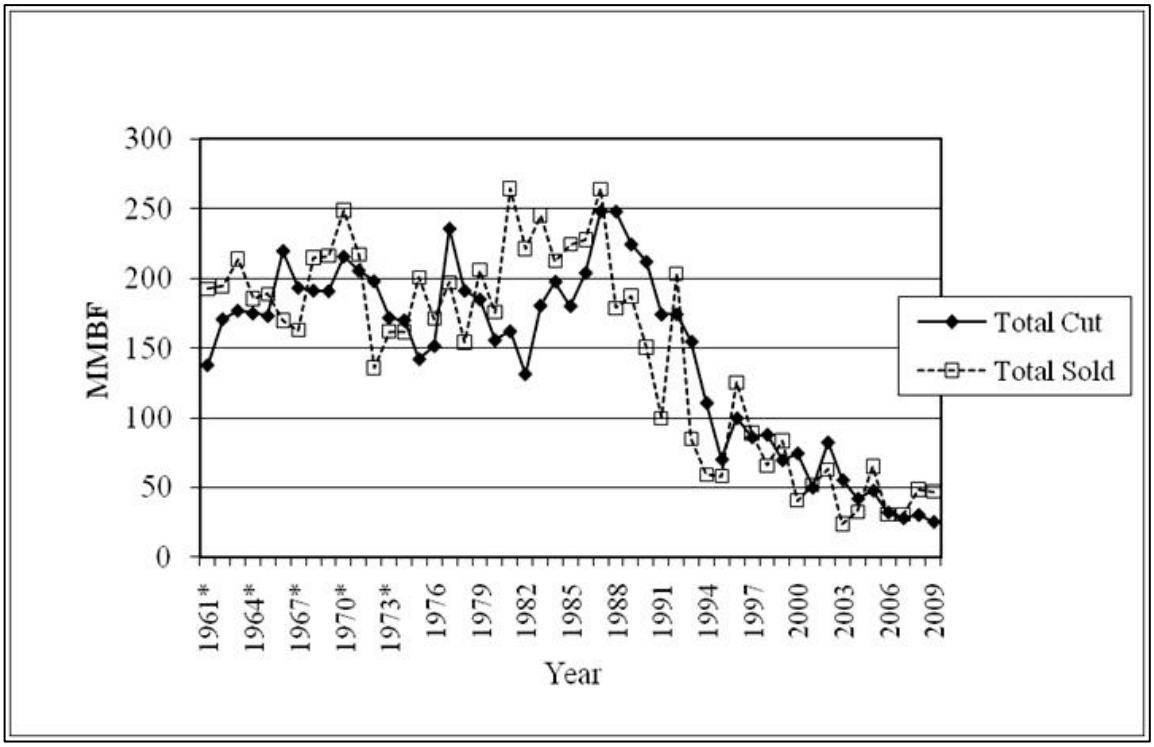
Thousand Cubic Feet of Timber		Thousand Board Feet Scribner of Timber	
Tree DBH (inches)	**Capability**	**Tree DBH (inches)**	**Capability**
<7	1,873	<7	1,873 MCF
7-9.9	47,944	7-9.9	184,105
10+	141,203	10+	610,185
Total Capacity	**191,020**	**Total Capacity**	**796,164**

* Note: Capability in <7 and 7-9.9 inch classes is the maximum volume capable of being used efficiently; capability in 10+ inches class is the portion of total capacity NOT capable of efficiently using trees with DBH <10 inches.

A substantial amount of the capacity capable of utilizing smaller diameter trees is being used to process larger trees or is simply going unused. Only about 38 percent of capacity in the less than 7 inches DBH category is currently utilized to process trees less than 7 inches DBH, and just 40 percent of capacity in the 7 to 9.9 inches DBH category is being used to process trees 7 to 9.9 inches DBH. More than 18,000 MCF of capacity capable of using trees 7 to 9.9 inches DBH are used annually to process trees greater than or equal to 10 inches DBH.

Timber Supply

Before the KNF was established timber was harvested on the Forest to meet the needs of the people living in the area. Like many other national forests, timber harvest on the Forest greatly increased in the 1960s to meet the demands of a rapidly growing economy. Figure 40 displays the total volume of timber cut and sold on the KNF from 1961 to 2009. The amount cut is based on the amount sold by the Forest Service. The amount and timing of harvest from the volume under contract with the Forest Service is in response to market conditions and demand for timber products.



* Timber volumes prior to 1974 did not include the portion of the Kaniksu National Forest now administered by the Kootenai.

Figure 40. Volume Cut and Sold on the KNF (in MMBF)

The 1987 Forest Plan set the ASQ at 2,270 MMBF for the first decade, or 227 MMBF annually. In November 1995, the Chief of the Forest Service issued a decision on a Forest Plan appeal related to a technical error in the calculation of the KNF's ASQ. The issue centered on how timber age classes were cataloged in the inventory information used to calculate ASQ. A description of the problem is in the FY92 Monitoring Report. The decision required that the Forest is not to exceed a sell volume of 150 MMBF per year until the Forest Plan is either amended or revised.

Timber supply under the 1987 Forest Plan was described in the AMS Technical Report (USDA Forest Service 2003) and in Forest Plan monitoring and evaluation reports. These documents show that timber supply levels have been below those projected in the 1987 Forest Plan. Reasons for the difference between projected and actual harvest levels include Forest Plan amendments (e.g., INFISH), new or updated threatened and endangered recovery direction, water quality concerns, and policies regarding entry into IRAs, public controversy, and a reduction in budget. The amount of timber sold on the KNF has averaged 44.4 MMBF/year (2005 to 2009).

Environmental Consequences

General Effects

Timber Suitability

Lands tentatively suitable for timber production are constant for all alternatives. These are lands that are physically capable and have not been administratively withdrawn (such as wilderness) for timber harvest. Analysis identified 1,711,800 acres as tentatively suitable. See table 78 in the "Affected Environment" section above for a listing of acres that are not tentatively suitable for all alternatives (column "1987 Plan as Amended and Currently Implemented").

From the lands tentatively suitable for timber, 811,100 acres were found to have other resource concerns that would preclude timber production as an objective. This includes riparian areas, grizzly bear core areas, and old growth. Depending on the MA, some of these acres may allow timber harvest for resource concerns other than timber production. Any timber harvest off these lands is not scheduled and would not occur on a rotation basis. These acres are not suitable for timber production.

Timber suitability is also affected by MA allocations. Lands in MA6 are suitable for timber production. All other MAs preclude timber production as an objective. Timber harvest may be allowed in other MAs (3, 5a, 5b, 5c, 7, and part of 2), but only to meet other resource objectives. These acres are not suitable for timber production. Table 81 displays timber suitability for each alternative.

Table 81. Timber Suitability by Alternative

Timber Suitability	Alternative A	Alternative B	Alternative C	Alternative D
Acres Tentatively Suitable	1,711,800	1,711,800	1,711,800	1,711,800
Acres where management objectives limit timber harvest where mgmt requirements cannot be met	811,100	811,100	811,100	811,100
Acres where management precludes timber production as an objective	161,400	109,300	146,900	48,000
Acres Suitable for Timber Production	739,300	791,400	753,800	852,700
Percent of NFS Land Suitable for Timber Production	33%	36%	34%	38%

Alternative A is the current Plan as amended and implemented. Timber suitability has been updated to reflect Forest Plan amendments and current conditions (see earlier discussion on timber suitability for the 1987 Forest Plan). Acres suitable for timber production are slightly lower in this alternative than found in the action alternatives. This is because MAs under the 1987 Forest Plan were very small, fragmented, and discretely determined timber suitability. The MA allocation of the 1987 Plan combined with amendments and current conditions limits the acres suitable for timber production below those found in the action alternatives.

As the Plan is implemented on the ground, timber suitability may change based on site-specific analysis. Broad scale information is used in determining lands suitable for timber production in

the Plan. As a result, changes may occur at the project-scale level using site-specific data. Changes to timber suitability will be monitored during implementation of the Plan.

Allowable Sale Quantity and Predicted Volume Sold

The ASQ for each alternative was formulated by considering the lands suitable for timber production, vegetation desired condition, other multiple-use objectives, and the management requirements set forth in NFMA. The ASQ is a ceiling and is not constrained by budget. To develop a predicted volume sold, a budget constraint reflecting current budgets was included for each alternative.

Timber harvest levels for the alternatives were calculated using Spectrum (see appendix B). The model was run with a mix of objective functions, based on the theme of the alternative. Alternative A was run with an objective to maximize timber production while Alternatives B and C had objectives to move towards vegetation desired condition as quickly as possible, while meeting other resource objectives. Alternative D had an objective function to maximize timber and then to move towards vegetation desired condition. All solutions were finally run with an objective to maximize present net value to ensure economic efficiency in vegetation treatments. Table 82 displays the volume offer and ASQ for each alternative. The ASQ is a decadal number, but is shown as a yearly annual figure in this table. Outputs are shown by both million cubic feet (MMCF) and million board feet (MMBF) per year.

Table 82. Allowable Sale Quantity and Volume Sold by Alternative — Decade 1

Measure	Alt A[1]	Alt B	Alt C	Alt D
Annual Allowable Sale Quantity				
MMBF/yr	76.0	70.2	68.6	86.3
MMCF/yr	13.6	13.2	12.9	15.5
Predicted Volume Sold				
MMBF/yr	50.3	47.5	40.2	50.4
MMCF/yr	9.2	8.7	7.6	9.2

Numbers for Alternative A reflect the 1987 Plan as amended and implemented. These numbers are based on the latest data and the Spectrum model developed for plan revision.

Source: Spectrum model analysis

The effects on timber production are directly related to the amount of acres classified as suitable for timber production and acres within MA6. The amount of timber production is also directly related to the objective the model was run under based on the theme of the alternative. Alternative D has the highest and Alternative C the lowest ASQ and volume sold.

Table 83 displays the acres harvested in decade one to achieve the volumes shown in table 82. Acres harvested are a mix of silvicultural prescriptions, including even- or two-aged regeneration, uneven-aged management, and intermediate harvests. Alternative B has the most acres harvested in achieving the ASQ and Alternative A the least. Alternatives B and C have more intermediate harvest acres to move vegetation towards desired condition while Alternatives A and D have more acres with regeneration harvest to maximize timber harvest volume.

Table 83. Acres Harvested to meet ASQ and Volume Sold — Decade 1

	Alt A	Alt B	Alt C	Alt D
Acres to meet ASQ	55,266	74,893	73,389	56,809
Acres to meet Predicted Volume Sold	52,937	56,993	57,405	48,449

Source: Spectrum model analysis

To ensure sustainability, a long-term sustained yield capacity (LTSYC) was calculated for the Forest based on management activities to achieve desired conditions. LTSYC is defined as "the highest uniform wood yield from lands being managed for timber production that may be sustained under specified management intensity consistent with multiple-use objectives" (1982 planning procedures, 36 CFR 219.3). The LTSYC is not constrained by budget. Table 84 displays the LTSYC for the Forest.

Table 84. Long-term Sustained-yield Capacity (LTSYC) by Alternative (MMCF/year)

Measure	Alt A	Alt B	Alt C	Alt D
Long-term Sustained-yield Capacity	15.0	16.8	16.3	17.7

Source: Spectrum model analysis

Figures 41 through 44 display the ASQ and predicted volume sold in relation to the LTSYC for each alternative. Because LTSYC is the highest wood yield sustainable, it is greater than or equal to ASQ. Because volume sold is limited by current budgets, it is well below the LTSYC for each alternative.

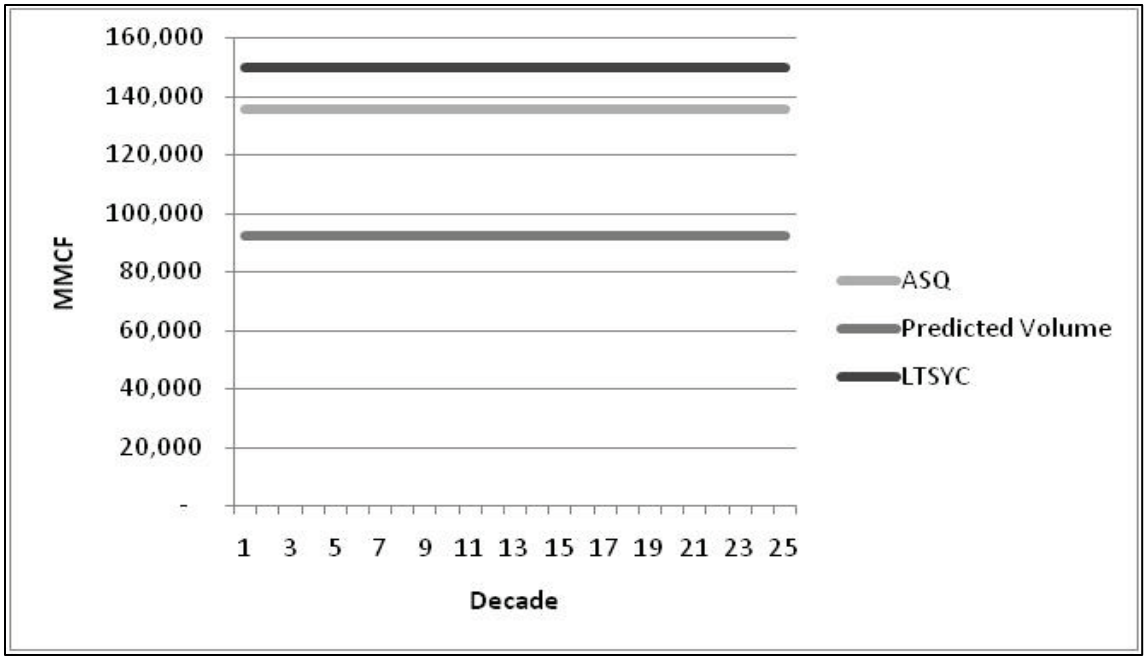


Figure 41. Alternative A – Allowable Sale Quantity, Predicted Volume, and Long-Term Sustained-Yield Capacity

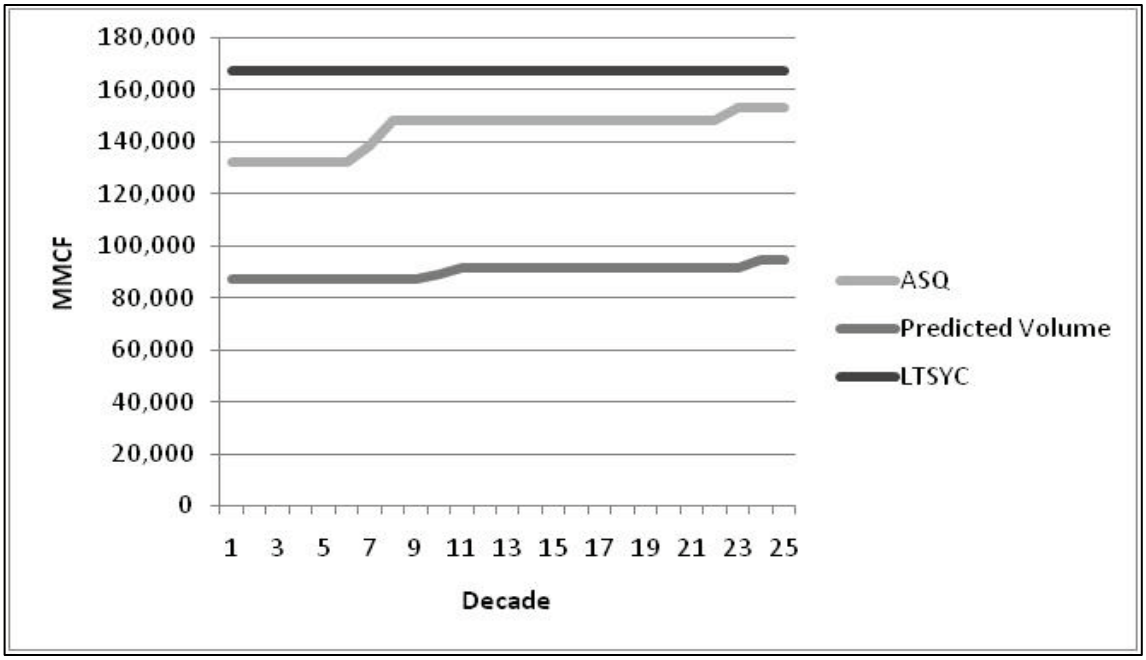


Figure 42. Alternative B – Allowable Sale Quantity, Predicted Volume, and Long-Term Sustained-Yield Capacity

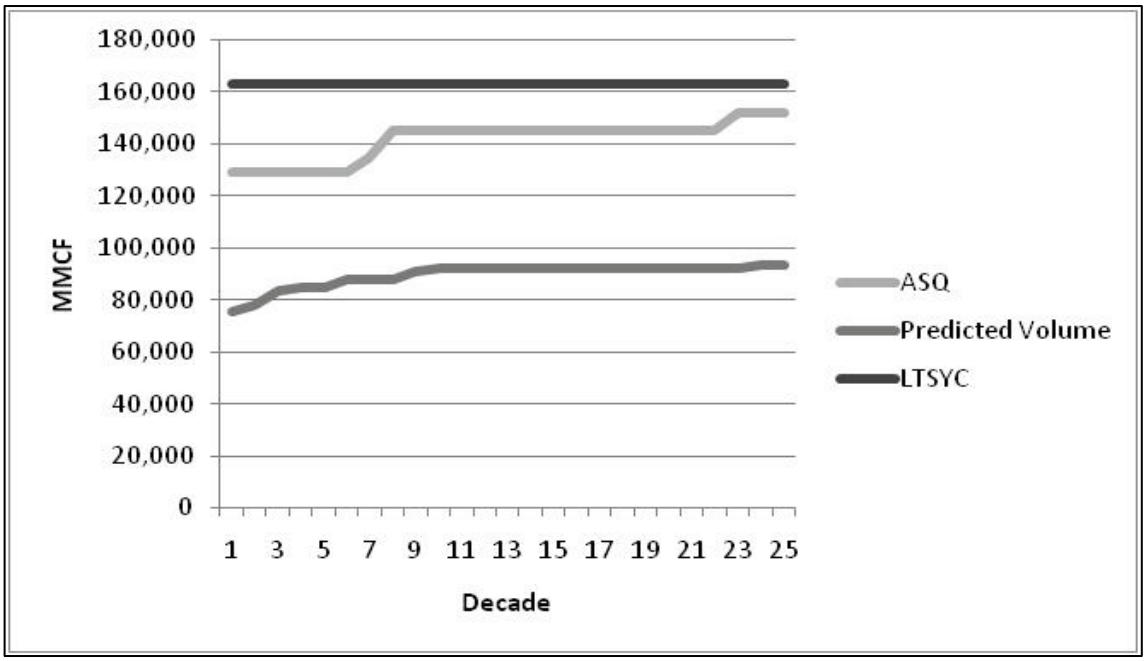


Figure 43. Alternative C – Allowable Sale Quantity, Predicted Volume, and Long-Term Sustained-Yield Capacity

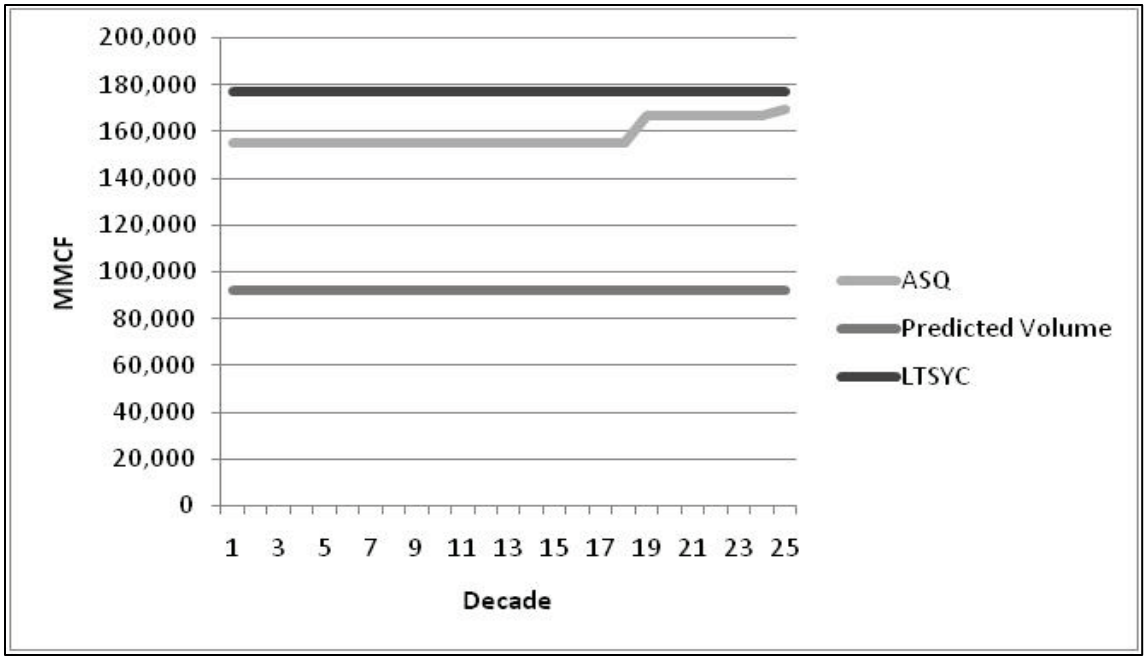


Figure 44. Alternative D – Allowable Sale Quantity, Predicted Volume, and Long-Term Sustained-Yield Capacity

Alternative D has the highest LTSYC, followed by Alternatives B and C. The ASQ in Alternative D comes closest to reaching the LTSYC while Alternatives B and A are the furthest from LTSYC.

Additional analysis was conducted to meet the requirements of the 1982 planning procedures, including analysis on costs, benefits, and the efficiency of management prescriptions. See appendix B for a description of the analysis and documentation of the results.

Consequences to Timber from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Fire and Fuels

Fire and fuels management generally has a positive effect on timber management. The objectives for fuel reduction are consistent with commercial timber harvest. Timber harvest is often the tool for reducing fire risk through a reduction in fuel loading. Timber harvest also moves vegetation towards desired conditions that are more resilient and less fire-prone. Alternative D has the most management activities for fire and the most positive impact on timber harvest.

Effects from Aquatic Habitat, Riparian, Watershed, and Wildlife

Measures to protect aquatic habitat, riparian areas, watersheds, and wildlife limit the amount of timber that may be harvested. Riparian areas and certain wildlife areas (such as grizzly bear core areas) are not suitable for timber production. This reduces the amount of land available for scheduled timber harvest. Protection measures for watersheds, aquatic habitat, and wildlife limit the amount of openings and the type of harvest. All of these factors reduce the amount of timber harvest. The reduction in timber harvest is the same for all alternatives.

Effects from Inventoried Roadless Areas

The amount of IRAs that are allocated to MAs suitable for timber production varies by alternative. Table 85 displays acres suitable for timber production that are within IRAs. The table also shows the acres of IRAs that are scheduled for harvest sometime over the planning horizon (250 years) and the amount of timber harvest from these areas in the first decade. For the predicted volume sold level, no alternative shows any timber harvest in IRAs in the first decade and minimal acres are scheduled for harvest over the planning horizon.

Table 85. Acres Suitable for Timber Production, Percent Scheduled for Harvest, and First Decade Harvest within Inventoried Roadless Areas

Alternative	Acres Suitable for Timber Production in IRA	Percent Scheduled for Harvest (over 250 years)	Timber Harvest from IRA Decade 1 (MMBF/yr)
ASQ Level			
A	37,100	66%	2.0
B	4,900	84%	2.9
C	2,000	82%	1.9
D	61,200	71%	10.2
Predicted Volume Sold			
A	37,100	11%	0.0
B	4,900	39%	0.0
C	2,000	29%	0.0
D	61,200	7%	0.0

Timber harvest within IRAs is limited; requires additional analysis, and receives a great deal of public and agency scrutiny. Because of limited access and the additional analysis and public/agency involvement, unit costs for timber harvest are much higher within an IRA. No alternative schedules all IRA acres for timber harvest, with fewer acres scheduled under constrained budgets (the predicted timber volume level). Alternatives B and C have the fewest acres of IRA suitable for timber production and have little timber volume generated from these lands. Alternative D has the most acres of IRA suitable for timber production, with a large percentage of those lands scheduled for harvest under the ASQ run. However, management opportunities are expected to continue to be limited within IRAs and harvest within these areas may be infeasible.

Effects from Budget

The budget has a large affect on the amount of timber that can be harvested from the KNF. As described previously, the ASQ is unconstrained by budget while the predicted volume sold is constrained by current budget levels. The budget that would be necessary to achieve ASQ would range from minimum of 70 percent higher (Alternatives B and C) to more than double (Alternative D) current budgets.

Effects from Natural Disturbance

Insects, disease, and wildfire can affect the production of timber by killing and damaging trees. The Spectrum model included a predicted amount of wildfire on the Forest based on current fire suppression success and fire starts. See appendix B for more information on the Spectrum model.

Under all alternatives, there exists potential for salvage/sanitation cuts to harvest dead and damaged timber and to attempt to slow or impede infestations from spreading. The degree to which these harvests are undertaken will largely depend upon the risks associated with wildfire potential, infestation spread into healthy stands, public safety, the presence of high value resources, and the resource emphasis of the infected or adjoining area.

Under Alternatives B and C, where there are more acres in recommended wilderness and backcountry management, there is a greater potential for infestations from insects and disease. There is also the potential for more wildfire. This could result in a short-term increase in timber harvest through salvage sales.

Catastrophic events, such as large wildfires and epidemic insect outbreaks, were not included in the modeling because of uncertainty in the extent or timing of such an occurrence. If a catastrophic event does occur in the future, analysis would need to be conducted to determine if the event would warrant a Forest Plan amendment for changed conditions.

Cumulative Effects

There are many factors that influence and affect timber harvest. The demand for timber products, supply from other sources, laws, and regulations all affect the amount of timber that may be harvested from the KNF. Budgets and court decisions also impact timber supply potential. Following is a brief description of some items that are changing or may change in the future, adding to the effects on timber harvest from the alternatives.

Demand and Future Timber Products

The demand for timber products is a driver in the amount of wood fiber supplied from the KNF. Diversification of wood product manufacturing has historically allowed Montana mills to be more resilient in changing markets (Montana DNRC 2010). This diversification leads to new products and new processing techniques, and affects the demand for wood fiber. If markets improve and demand for wood products increases, there will be the desire for more wood fiber from the KNF. If demand decreases and mills close, there may be less desire for wood fiber from the KNF. A decrease in demand may reduce the amount of timber sold from the KNF under all alternatives.

Alternative Sources for Wood Fiber

The supply of wood fiber from private and state lands and adjacent national forests impacts KNF demand. If wood fiber supplies decrease from private and state lands and adjacent national forests, there will be an increasing demand for wood fiber from the KNF. If supplies increase from private and state lands and adjacent national forests, there may be a decrease in demand for wood fiber from the KNF. A decrease in demand may reduce the amount of timber sold from the KNF under all alternatives.

Subdividing corporate timberlands

Montana, like many states across the West, is experiencing a massive divestiture of commercial timberlands for development and subdivisions (Montana DNRC 2010). Corporate timberland has become more valuable for recreational or residential real estate than for timber production. This development results in increased fragmentation of forested landscapes and decreased timber harvest on private lands. The increased fragmentation limits the amount of harvest that may occur on adjacent national forest lands, while the decreased supply from private lands increases

the demand for timber harvest from the KNF. The limit on timber harvest from fragmentation of adjacent lands would limit the amount of timber sold from the KNF under all alternatives.

Minerals

Introduction

The 192-million-acre NFS is an important part of the nation's resource base. As directed by the Organic Administration Act of 1897 and the Multiple Use-Sustained Yield Act of 1960, the national forests are managed by the USDA's Forest Service for continuous production of their renewable resources – timber, clean water, wildlife habitat, forage for livestock, and outdoor recreation.

Although not renewable, minerals are resources of the national forests and are important to the nation's welfare. The national forests contain much of the country's remaining stores of mineral resources. Prime examples include: the national forests of the Rocky Mountains, the Basin and Range Province, the Cascade-Sierra Nevada Ranges, and the Alaska Coast range.

Geologically, NFS lands contain some of the most favorable host rocks for mineral deposits. Approximately 6.5 million acres are known to be underlain by coal. Approximately 45 million acres, or one-quarter of NFS lands, have potential for oil and gas; while about 300,000 acres within the Pacific Coast and Great Basin States have potential for geothermal resource development.

Within the past few years, the energy use and demand in this country has reminded us that the nation's mineral resources are limited. As with oil supplies, there will likely be tightening of world supplies of minerals. Such a trend is leading to considerable expansion of domestic mineral prospecting, exploration, and development. Much of this increased activity is on NFS lands where they are available for mineral exploration and development.

Forest Service Role in Minerals Management

In the Mining and Minerals Policy Act of 1970, Congress declared that it is the continuing policy of the Federal Government, in the national interest, to foster and encourage private enterprise in (among other goals) the development of domestic mineral resources and the reclamation of mined land. This Federal policy applies to NFS lands.

The Forest Service recognizes the importance of NFS mineral resources to the well-being of the nation, and encourages bona-fide mineral exploration and development. But, it also recognizes its responsibility to protect the surface resources of the lands under its care. Thus, the Forest Service is faced with a double task: to make minerals from national forest lands available to the national economy; and, at the same time, minimize the adverse impacts of mining activities on other resources.

Land management planning, as mandated by the NFMA of 1976, is a principal tool for assuring that mineral resources are given proper consideration. Before plans are approved, specialists evaluate resource activities including existing and potential mineral development. Planners and decision makers then formulate plans to minimize potential resource conflicts and maximize the various uses and values of NFS lands. Since mineral resources are often sub-surface, relatively rare, and are governed by certain preferential laws, the land management planning procedures provide for the availability of minerals and development of mineral operations where possible.

Minerals management of NFS lands requires interagency coordination and co-operation. Although the Forest Service is responsible for the management of surface resources of NFS lands, the BLM in the USDI is primarily responsible for management of government-owned

minerals. Since it is not possible to separate mineral operations from surface management, the agencies have developed cooperative procedures to accommodate their respective responsibilities.

Legal and Administrative Framework

The following statutory authorities provide direction under which exploration and development of mineral and energy resources on NFS lands may be conducted:

Law and Executive Orders

Surface Management Authority

- **Organic Administration Act of June 4, 1897 (30 Stat. 11, as amended; 16 U.S.C. § 473 et seq.):** This act provides the Secretary of Agriculture the authority to regulate the occupancy and use of NFS lands. It provides for the continuing right to conduct mining activities under the general mining laws if the rules and regulations covering NFS lands are complied with. This act recognizes the rights of miners and prospectors to access NFS lands for all proper and lawful purposes, including prospecting, locating, and developing mineral resources.
- **Multiple-Use Sustained-Yield Act of June 12, 1960 (P.L. 86-517, 74 Stat. 215; 16 U.S.C. 528 et seq.):** This act requires that NFS lands be administered in a manner that considers the values of the various resources when making management decisions and specifically provides that nothing in the act be construed to affect the use or administration of the mineral resources on NFS lands.
- **Wilderness Act of September 3, 1964 (P.L. 88-577, 78 Stat. 890; 16 U.S.C. § 1121, et seq.):** This act provides that, subject to valid rights existing prior to January 1, 1984, wilderness areas are withdrawn from all forms of appropriation and disposition under the mining and mineral leasing laws. Subsequent acts designating additional NFS lands as wilderness may contain specific provisions concerning mineral activities. Patents issued under the mining laws for mining claims staked after passage of this act within wilderness areas shall reserve the surface rights to the United States. The act provides for reasonable access to valid mining claims and other valid occupancies inside wilderness areas. The act also requires the survey of wilderness areas by the U.S. Geological Survey on a planned, recurring basis consistent with the concept of wilderness preservation to determine the mineral values that may be present.
- **National Environmental Policy Act of 1969, January 1, 1970 (P.L.91-190, 83 Stat. 852; 42 U.S.C. § 4331 et seq.):** This act requires Federal agencies to use a systematic interdisciplinary approach to ensure the integrated use of natural and social sciences in planning and decision making. It also requires an analysis of probable environmental effects of proposed Federal actions. Generally, decisions on mineral and energy development are subject to this law.
- **Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (P.L. 93-378, 88 Stat. 476; 16 U.S.C. § 1600 et seq.):** This act directs the assessment of all resources on NFS lands to determine the desired level of future production from Forest Service programs. Once approved, the policy statement and recommended program serve as a guide to future Forest Service planning and a basis for future budget proposals.
- **National Forest Management Act (NFMA) of October 22, 1976 (P.L. 94-588, 90 Stat. 2949; 16 U.S.C. § 1600 et seq.):** The act requires the Forest Service to establish a comprehensive system of land and resource planning, including the development and maintenance of a comprehensive and detailed inventory of lands and resources. The act also

specifies the use of a systematic interdisciplinary approach to achieve integrated consideration of the physical sciences into planning for the management and use of NFS lands and resources.

Mineral Management Authorities

- **U.S. Mining Laws Act of May 10, 1872 (17 Stat. 91, as amended, 30 U.S.C. § 22 et seq):** This act (often referred to as the General Mining Act of 1872) sets forth the principles of discovery, right of possession, assessment work, and patent for hard-rock minerals on lands reserved from the public domain. The law applies to lode, placer, mill-site claims, and tunnel sites. Except as otherwise provided, all valuable mineral deposits, and the lands in which they are found, are free and open to exploration, occupation, and purchase under regulations prescribed by law.
- **Organic Administration Act of 1897 (30 Stat. 11, as amended, 16 U.S.C. § 473 et seq):** Reserved lands for national forests purposes and opened them to the operations under U.S. mining laws, provided individuals/operators comply with the rules and regulations of the Secretary of Agriculture. This act authorizes the Secretary of Agriculture to regulate occupancy and use of the national forests. The act permits access to national forests for all lawful purposes, including prospecting and locating and developing mineral resources.
- **Weeks Law Act of March 1, 1911 (P.L. 61-435, 72 Stat. 1571, as amended, 16 U.S.C. § 480 et seq):** This act authorized the federal government to purchase lands for stream-flow protection, and maintain the acquired lands as national forests.
- **Mineral Resources on Weeks Law Lands Act of March 4, 1917 (P.L. 64-390, 39 Stat. 1149, 16 U.S.C. § 520):** This act authorizes the Secretary of Agriculture to issue permits and leases for prospecting, developing, and utilizing hard-rock minerals on lands acquired under the authority of the act. This authority was later transferred to the Secretary of the Interior.
- **Mineral Leasing Act of February 25, 1920 (P.L. 66-146, 41 Stat. 437 as amended, 30 U.S.C. § 181 et seq.):** This act authorizes the Secretary of the Interior to issue leases for the disposal of certain minerals (coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, and gas). The act applies to NFS lands reserved from the public domain, including lands received in exchange for timber or other public domain lands, and lands with minerals reserved under special authority.
- **Clarke-McNary Act of June 7, 1924 (P.L. 68-270, 43 Stat. 653 as amended, 16 U.S.C. § 505 et seq.):** All lands to which title is accepted under section 7 of this act become national forest lands, subject to all laws applicable to the lands acquired under the Weeks Act of March 1, 1911.
- **Mineral Materials Act of July 31, 1947 (P.L. 80-291, 61 Stat. 681, as amended, 30 U.S.C. § 601 et seq.):** This act provides for the disposal of mineral materials on the public lands through bidding, negotiated contracts, and free use.
- **Mineral Leasing Act for Acquired Lands of August 7, 1947 (P.L. 80-382, 61 Stat. 913, as amended, 30 U.S.C. § 351 et seq.):** This act extends the provisions of the mineral leasing laws to federally owned mineral deposits on acquired NFS lands and requires the consent of the Secretary of Agriculture prior to leasing.
- **Multiple Use Mining Act of July 23, 1955 (P.L. 84-167, 69 Stat. 368, as amended, 30 U.S.C § 601 et seq.):** This act requires the disposal of common varieties of sand, stone, gravel, pumice, pumicite, and cinders under the provisions of the Materials Act of July 31, 1947, and gives to the Secretary of Agriculture the authority to dispose of these materials. It

also provides that rights under any mining claim located under the mining laws are subject to the right of the United States to manage and dispose of surface resources.

- **Geothermal Steam Act of December 24, 1970 (P.L. 91-581, 84 Stat. 1566, 30 U.S.C. § 1001-1025):** This act provides the Secretary of the Interior the authority to lease NFS lands for geothermal steam development, subject to the consent and conditions the Secretary of Agriculture may prescribe.
- **Mining and Minerals Policy Act of December 31, 1970 (P.L. 91-631, 84 Stat.1876, 30 U.S.C. § 21a):** This act states that the continuing policy of the Federal Government is to foster and encourage private enterprise in the development of economically sound and stable domestic mining and minerals industries and the orderly and economic development of domestic mineral resources.
- **Federal Coal Leasing Amendments Act of August 4, 1976 (90 Stat. 1083; 30 U.S.C. § 201 et seq.):** This act amended the Mineral Lands Leasing Act of February 25, 1920 (para. 3) by specifying that coal leases on NFS lands may be issued only after the consent of the Secretary of Agriculture and adherence to conditions the Secretary may prescribe. The act also provides that no lease shall be issued unless the lands involved in the lease have been included in a comprehensive forest land and resource management plan and the sale is compatible with the Plan. The act authorizes the issuance of a license to conduct exploration for coal.
- **Federal Land Policy and Management Act of October 21, 1976 (P.L. 94-579, 90 Stat. 2713, 43 U.S.C. § 1701 et seq., 7 U.S.C. § 1212a, 16 U.S.C. § 478a, 1338a):** This act defines procedures for the withdrawal of lands from mineral entry. It reserves to the United States the rights to prospect for, mine, and remove the minerals in lands conveyed to others and requires the recordation of claims with the BLM.
- **Surface Mining Control and Reclamation Act of August 3, 1977 (P.L. 95-87, 91 Stat. 445, 30 U.S.C. § 1201-1328):** This act provides for cooperation between the Secretary of the Interior and states in the regulation of surface coal mining. It also restricts or prohibits surface coal mining operations on NFS lands, subject to valid existing rights and compatibility determinations.
- **Energy Security Act of June 30, 1980 (P.L. 96-294, 94 Stat. 611, 42 U.S.C. § 8855):** This act directs the Secretary of Agriculture to process applications for leases and permits to explore, drill, and develop resources on NFS lands, notwithstanding the current status of the forest land and resource management plan.
- **National Materials and Minerals Policy, Research and Development Act of October 2, 1980 (94 Stat. 2305; 30 U.S.C. §1601-1605):** This act restates congressional intent to promote policies that provide for an adequate and stable supply of materials while considering long-term needs, a healthy environment, and natural resource conservation. The act also requires the Secretary of the Interior to improve the availability and analysis of mineral data in federal land use decision making.
- **Omnibus Parks and Public Lands Management Act of 1996 (P.L. 104-333, 110 Stat. 4093, 16 U.S.C. § 497c):** This act automatically withdraws from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral and geothermal leasing all lands located within the boundaries of ski area permits.
- **Federal Onshore Oil and Gas Leasing Reform Act of 1987 (30 U.S.C. § 181 et seq.):** This act expands the authority of the Secretary of Agriculture in the management of oil and gas resources on NFS lands. The BLM cannot issue leases for oil and gas on NFS lands over

the objection of the Forest Service. The Forest Service must approve all surface disturbing activities on NFS lands before operations commence.

- **Federal Cave Resources Protection Act of 1988 (102 Stat. 4546; 16 U.S.C. § 4301-4309):** Provides for protection and preservation of caves on Federal lands.
- **Energy Policy Act of 2005 (PL 109-58):** Directs Federal agencies to undertake efforts to ensure energy efficiency, and the production of secure, affordable, and reliable domestic energy.
- **Executive Order 13211 issued May 18, 2001:** This executive order titled "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" requires Federal agencies to prepare and submit a Statement of Energy Effects to the Office of Management and Budget describing the effects of certain regulatory actions on energy supply, distribution, or use.
- **Executive Order 13212 issued May 18, 2001:** This executive order titled "Actions to Expedite Energy-Related Projects" requires Federal agencies to take actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.
- **The Reorganization Plan No. 3 of 1946 (60 Stat. 1097; 5 U.S.C. Appendix):** This transferred the functions of the Secretary of Agriculture with respect to permits and leases for hard-rock minerals on acquired Weeks Law land to the Secretary of the Interior. However, Secretary of Agriculture Consent to the issuance of permits or leases is required.

Code of Federal Regulations (CFR)

- **36 CFR 219 – Planning:** These regulations implement the NFMA of 1976 (16 U.S.C. 1600 et seq.), require consideration of the relationship of nonrenewable resources, such as minerals, to renewable resources, and set forth the minimum requirements for integrating the nonrenewable mineral resource into a forest plan.
- **36 CFR 228 – Minerals:** These regulations set forth rules and procedures governing use of the surface of NFS lands in conjunction with operations authorized by the general mining laws, oil and gas leasing, and mineral material disposal laws.
  - Subpart A: Locatable Minerals
  - Subpart B: Leasable Minerals (reserved)
  - Subpart C: Disposal of Mineral Materials
  - Subpart D: Miscellaneous Minerals Provisions
  - Subpart E: Oil and Gas Resources
- **36 CFR 251 –** Land Uses
- **43 CFR 2300 –** Land Withdrawals

Interagency Agreements

The Forest Service has entered into interagency agreements with agencies within the USDI to cooperate and coordinate in the management of federally owned minerals within NFS lands. The principal agreements include:

- A November 8, 1946, agreement with the BLM detailing procedures for mineral leases and permits administered under section 402 of the President's Reorganization Plan No. 3 of 1946.
- A May 18, 1957, MOU with the BLM describing work procedures for land applications, mining claims, and patents.
- A March 4, 1977, cooperative agreement with the U.S. Geological Survey concerning oil and gas operations.
- A May 20, 1980, MOU with the BLM describing the coordination of activities under the federal coal management program.
- A November 26, 1980, cooperative agreement with the U.S. Geological Survey for operations under solid mineral leases and permits.
- A December 3, 1981, MOU with the U.S. Geological Survey and the BLM for the geothermal steam leasing program.
- A December 11, 1989 MOU with the Montana Department of Environmental Quality (formerly Department of State Lands) to promote efficiency and effectiveness in administration and regulation of mineral resources.
- A July 31, 1990, MOU with the Office of Surface Mining Reclamation and Enforcement describing the management of surface coal mining operations on NFS lands.
- A November 11, 1991, interagency agreement with the BLM describing the procedures by which the Forest Service could authorize the BLM to offer NFS lands for oil and gas leasing.
- A November 19, 1991, interagency agreement with the BLM describing the procedures for coordinated administration of oil and gas operations on Federal leases within the NFS.

Key Indicators

- Locatable minerals − acres available for mineral development;
- Leasable minerals − acres available for leasing proposals; and
- Mineral materials − acres available for disposal of mineral materials.

Methodology and Analysis Process

The acres that are available for locatable mineral resource development are determined by subtracting the number of acres that are withdrawn from the total number of acres for the KNF.

The number of acres that are withdrawn from mineral entry is a matter of record. By law, the BLM keeps official records in the General Land Office. Current records are kept in the LR2000 database. These records are the source for the documentation of withdrawn lands on the KNF.

The number of acres that are available for leasing proposals is determined by subtracting the number of acres that are legally unavailable from the total number of acres on the KNF.

Lands which are legally unavailable for leasing are:

- Lands withdrawn from mineral leasing by an act of Congress or by an order of the Secretary of the Interior;
- Lands recommended for wilderness allocation by the Secretary of Agriculture;
- Lands designated by statute as WSAs, unless oil and gas leasing is specifically allowed by the statute designating the study area; and
- Lands within areas allocated for wilderness or further planning in Executive Communication 1504.

The number of acres that are available for disposal of mineral materials is determined by subtracting from the total number of acres on the KNF, the number of acres where the Forest Service has exercised its discretion to refrain from authorizing the disposal of mineral materials.

Affected Environment (Existing Condition)

A variety of mineral deposit types and mineral resources, including gold, silver, and copper, occur within the boundaries of the KNF. The Forest Service recognizes that minerals are fundamental to the nation's well being and, as policy, encourages the exploration and development of the mineral resources it is authorized to manage. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on NFS lands. Please refer to figure 45 which shows mineral potential on the KNF and figure 46 which displays oil and gas potential on the KNF.

With respect to national forest management, mineral resources are divided into three groups: locatable minerals, leasable minerals, and mineral materials. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group.

Locatable Minerals

Locatable minerals are those valuable deposits subject to exploration and development under the General Mining Law of 1872 (as amended). These resources are commonly referred to as hard-rock minerals; and include gold, silver, and copper.

Lands open to operations under the General Mining Law include all areas of the national forests except those formally withdrawn from mineral entry either by Congress or the Secretary of the Interior or otherwise exempted.

On the KNF, there are about 150,100 acres currently withdrawn, leaving approximately 2,069,900 acres available for locatable mineral resource development.

The General Mining Law of 1872, as amended, grants every United States citizen the right to prospect and explore lands reserved from the public domain and open to mineral entry. The right of access is guaranteed and is not at the discretion of the Forest Service.

Upon discovering a valuable mineral deposit, citizens have the right to locate a mining claim and remove the mineral resources. The citizen holding a mining claim is the claimant. The claimant is responsible for initiating mining activities and investing the capital required to conduct mineral exploration, developing the site, operating the site, and reclaiming the site.

The Forest Service works with mining claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining plan of operations submitted by the claimant; disclosing impacts of the proposed mining operations in a site-specific environmental document; approving only those activities that are reasonably necessary for the proposed operation; monitoring operations to ensure environmental standards are met; and ensuring prompt and reasonable reclamation of disturbed areas.

By law, certain lands such as: lands withdrawn by an act of Congress (i.e., through the Wilderness Act of 1964 or the Wild and Scenic Rivers Act of 1968); lands withdrawn by an order of the Secretary of the Interior; are withdrawn from mining claim location. These withdrawn areas are; however, subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future.

Current Mining Operations

There are three large scale locatable mineral operations at different levels of development and/or permitting. They are:

- Troy Mine − In production under an approved Plan of Operations. Federal and State agencies preparing environmental documents for an updated reclamation plan.
- Rock Creek Mine − Forest Service in the process of completing a supplemental final EIS.
- Montanore − Federal and State agencies in the process of completing a supplemental draft EIS.

Across the KNF there are approximately 27 approved Plans of Operations for various small scale locatable mineral operations (lode and placer mining sites). Before approval, or before these types of mining activities can occur a NOI is typically submitted by a proponent to the ranger district where the proposed operations would occur. The district ranger determines whether a more detailed Plan of Operations is required, based on whether such operations will likely cause significant disturbance of surface resources. The KNF annually receives around 10 to 15 of these NOIs per year.

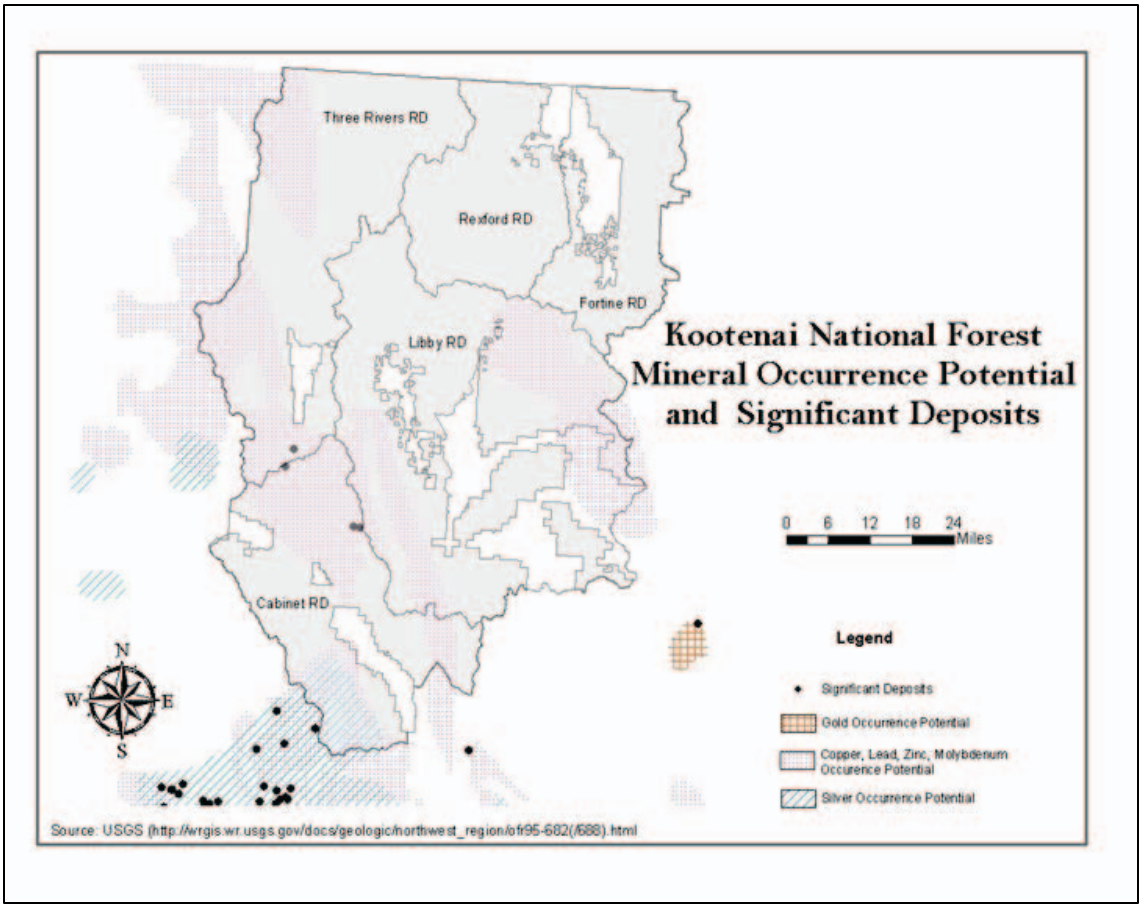


Figure 45. Displays the Locatable Minerals Potential for the KNF

Leasable Minerals (Oil and Gas)

Certain types of minerals, primarily energy resources, are not subject to mining claim location, but are available for exploration and development under provisions of the Mineral Leasing Act of 1920 (as amended). Access to these types of minerals is provided through leases, permits, or licenses that include fee and/or royalty payment conditions. Federally owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates, oil shale, and sulfur.

The authority to manage these minerals is presently administered by the USDI and BLM. The USDI is statutorily required to obtain consent from the Forest Service before it issues leases for leasable minerals on NFS lands.

Two environmental assessments (one in 1980, and one in 1982) analyzed oil and gas leasing on the KNF. The KNF is not proposing to do any additional leasing analysis in this EIS. As per 36 CFR 228.102 (c), any further leasing analysis will be done under a separate environmental document.

No leasable minerals are presently being produced on the KNF, and the anticipated demand for leases is expected to remain low. Geothermal resources are not known to occur on the KNF.

Idaho Roadless Area Management direction in 36 CFR 294 Subpart C prohibits the Forest Service from recommending, authorizing, or consenting to road construction/reconstruction for new mineral or energy leases in Idaho Roadless Areas managed under the backcountry

restoration theme. Approximately 35,000 acres of IRAs administered by the KNF lie within Idaho and are in the backcountry/restoration theme. Idaho Roadless Area Management direction permits surface use or occupancy without road construction or reconstruction for all mineral leasing in the backcountry/restoration theme unless prohibited in the LMP.

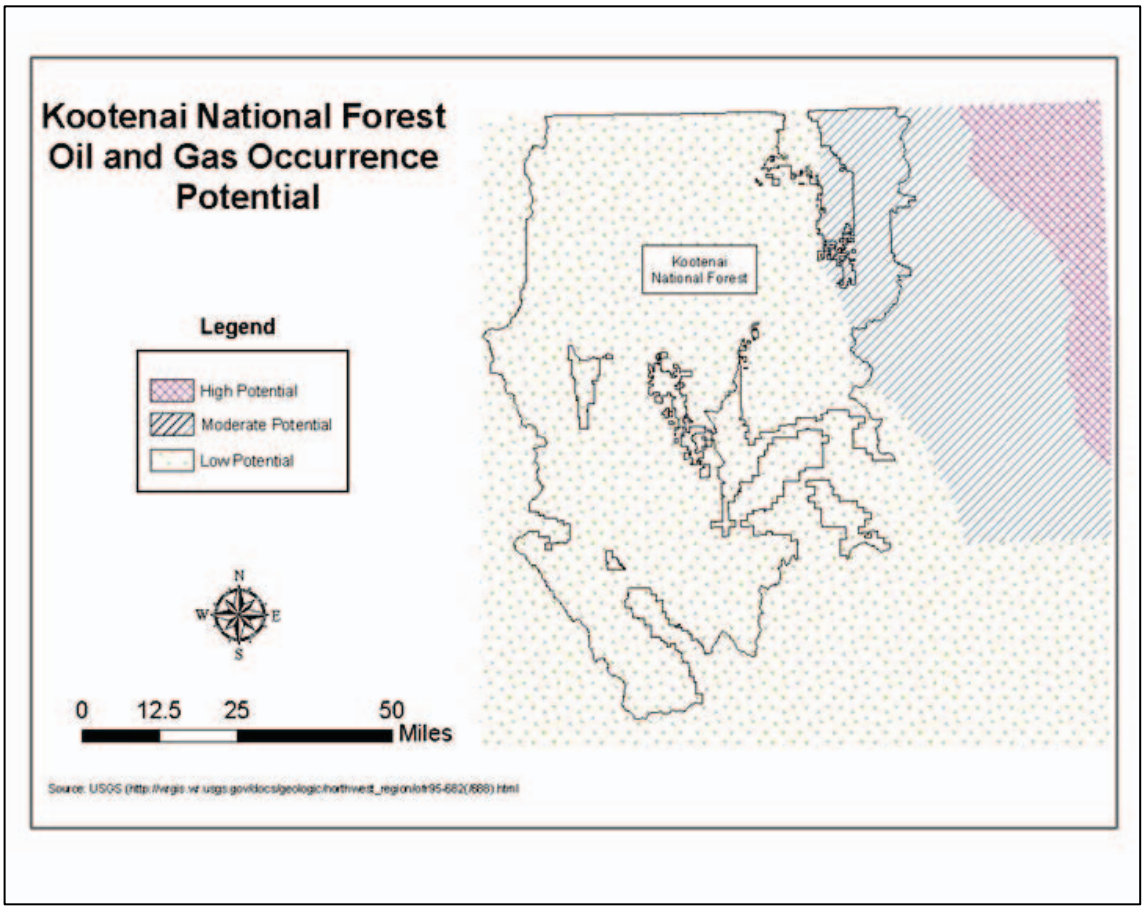


Figure 46. Displays the Oil and Gas Potential for the KNF

About 37,300 acres are under lease(s) on the KNF at this time (see figure 47 below). All leases are currently suspended in accordance with the 1985 court decision of Conner vs. Burford.

By regulation (36 CFR 228.102) certain lands are legally unavailable for leasing: lands withdrawn from mineral leasing by an act of Congress or by the Secretary of the Interior; lands recommended for wilderness allocation by the Secretary of Agriculture; and lands designated by statute as WSAs (unless oil and gas leasing is specifically allowed by the statute designating the study area). On the KNF there are about 127,800 acres that are legally unavailable for mineral leasing, leaving approximately 2,091,200 acres available for mineral leasing proposals.

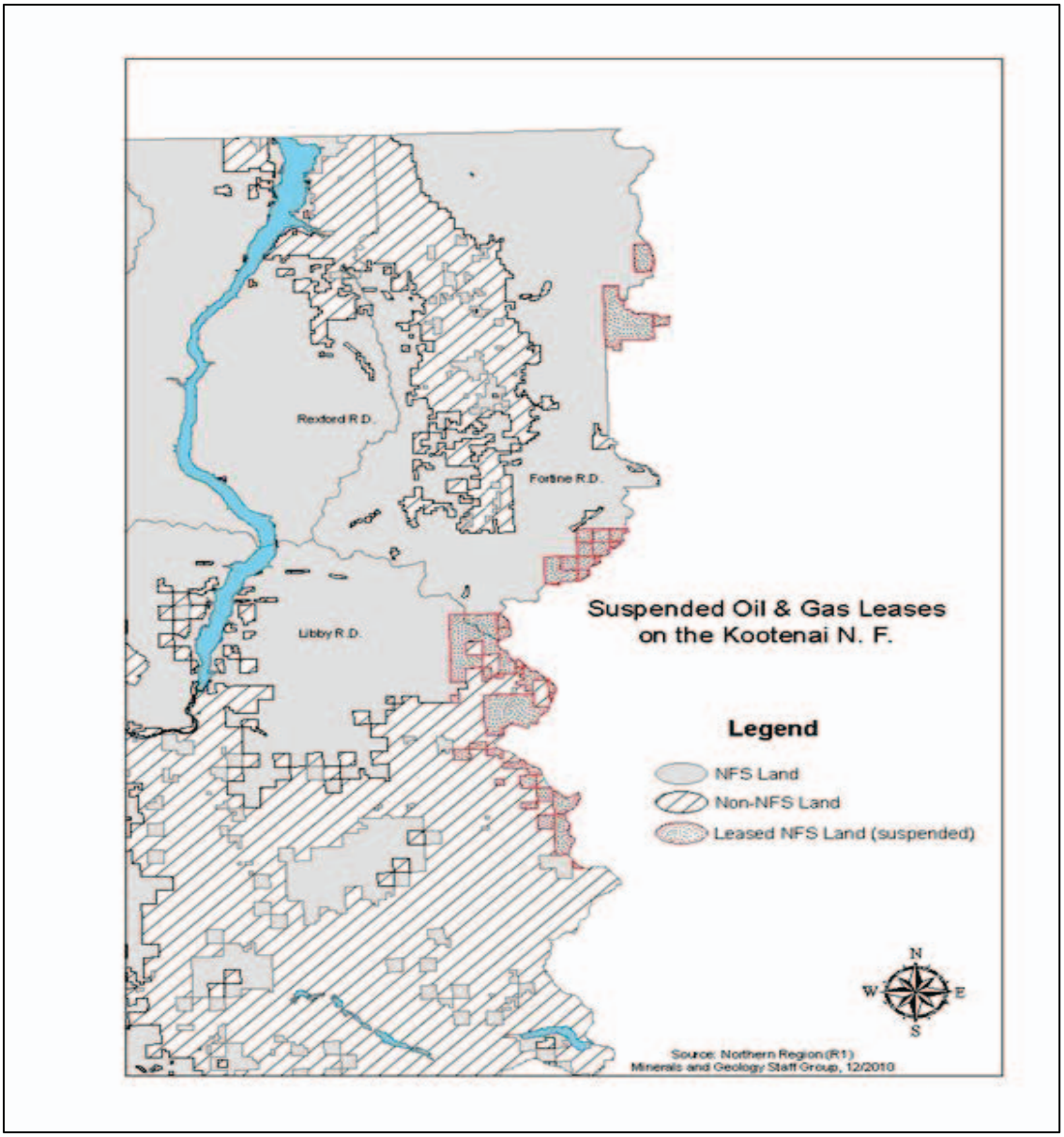


Figure 47. Suspended Oil & Gas Leases on the KNF

Mineral Materials

Often referred to as salable minerals, or "common variety" minerals, they are subject to the Mineral Materials Act of 1947 (as amended). These minerals are disposed of by sale, issuance of free-use permits, or under contracts for in-service needs. These minerals include petrified wood, common varieties of sand, rock, stone, cinders, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits that, although they have economic value, tend to be relatively widely available and do not have a distinct and special value. These minerals are most commonly used as building, landscaping, and construction materials.

The predominant salable material extracted on the KNF is crushed rock for in-service purposes used for road surfacing. The demand for quality rock sources is often dependent upon the locations of active management operations and the needs for resource protection. Presently there

is an adequate supply of rock sources of suitable quality (hardness and durability) across the Forest for in-service construction uses. There is a public demand for salable materials predominantly used for construction and landscaping purposes. On average, there are approximately 175 contracts administered annually on the KNF for personal use, public works, or commercial uses.

About 1,998,000 acres on the KNF currently allow for the disposal of mineral materials leaving approximately 221,000 acres where it is not permitted.

Mine Reclamation

An assessment completed by the Montana Bureau of Mines and Geology (Hargrave et al. 1999) summarized the abandoned mines on the KNF and identified those sites that may pose human health and environmental risks. Approximately 32 sites on, or partially on, NFS lands were identified as having potential safety problems. Several mine reclamation projects have been completed in the last 5 to 10 years and there are currently several projects scheduled to start in 2011, including closure of abandoned portals. The remaining sites are candidates for further assessments and consideration for reclamation work.

Environmental Consequences

General Effects

None of the alternatives propose to make any site specific changes to the existing availability of land for locatable minerals or leasable minerals on the KNF. No need for new withdrawals has been identified and no additional areas are proposed for withdrawal. No changes to existing access are proposed.

Consequences to Minerals from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Management Area Prescriptions

Locatable Minerals

Alternative A recommends that approximately 264,000 acres be formally withdrawn from mineral entry.

Alternatives B, C, and D do not propose any lands for withdrawal to mineral entry. There is no difference between Alternatives B, C, or D regarding the lands available for locatable mineral development.

Leasable Minerals

Alternative A does not make any lands administratively unavailable for mineral leasing although it does identify approximately 515,000 acres where a no surface occupancy stipulations would apply and approximately 227,00 acres where leasing was not compatible with long-term goals.

Alternatives B, C, and D do not propose to make any lands administratively unavailable for mineral leasing. Neither do they make any stipulations as to surface use or occupancy. Any stipulations would be identified at the site specific level through the NEPA process.

In relation to access, Alternatives A, B, C, and D is impacted the same by the Idaho Roadless Area Management regulations. Road construction or reconstruction associated with mineral leases may not occur in Inventoried Roadless Area that lies within Idaho and are designated as backcountry/restoration.

Mineral Materials

The availability of mineral materials would vary by alternative in that any areas allocated as recommended wilderness (MA1b) would not allow for disposal of mineral materials (see table 86). Alternative C would be most limiting followed by Alternative B, D, and A.

Table 86. Summary of Lands Available for Disposal of Mineral Materials

	Disposal of Mineral Materials Available	Disposal of Mineral Materials Not Allowed of Should Not Occur
Alt. A	1,995,200 ac. (90%)	223,900 ac. (10%)
Alt. B	1,447,000 ac. (65%)	772,000 ac. (35%)
Alt. C	1,343,000 ac. (61%)	875,900 ac. (39%)
Alt. D	1,720,600 ac. (78%)	498,500 ac. (22%)

Effects from Wildlife Management

Wildlife management direction in any of the four alternatives would not result in any change in the lands available for locatable minerals, leasable minerals, or mineral materials development.

Habitat security requirements for grizzly bear can be expected to affect locatable mineral exploration and development. Where roads, and the access they provide, are necessary, limitations on road construction and operating seasons can be expected to have the effect of prolonging exploration or development work. Areas most affected would be BMUs in the Cabinet- Yaak Recovery Zone and mapped areas of grizzly bear occupancy outside of but adjacent to the Cabinet-Yaak Recovery Zone.

Mineral and energy exploration and development is likely to be affected in lynx analysis units in occupied habitat. Guideline HU G12 in the NRLMD ROD (USDA Forest Service 2007) gives direction that winter access should be limited to designated routes or designated over-the-snow routes.

Effects from Aquatic Management

Aquatic management direction in any of the four alternatives would not result in any change in the lands available for locatable minerals, leasable minerals, or mineral materials development.

Surface occupancy associated with leasable minerals would not be allowed in Riparian Habitat Conservation Areas unless there are no other options for location, and the riparian management objectives can be attained and adverse effects to inland native fish can be avoided (INFISH Standard MM-4). This limitation on surface occupancy does not vary between alternatives since Riparian Habitat Conservation Areas do not vary between alternatives. Because of the low occurrence potential, and the expected low demand for leases, there is likely to be little to no effect to leasable minerals.

Effects from Recreation Management

Recreation management direction in any of the four alternatives would not result in any change in the lands available for locatable minerals, leasable minerals, or mineral materials development.

Effects from Fire and Fuels Management

Fire and fuels management direction in any of the four alternatives would not result in any change in the lands available for locatable minerals, leasable minerals, or mineral materials development.

Effects from Lands and Special Uses Management

Lands and Special Uses direction in any of the four alternatives would not result in any changes in the lands available for locatable minerals, leasable minerals, or mineral materials development.

Cumulative Effects

Cumulative effects evaluate the potential impacts to mineral resources from the proposed action when combined with past, present, and reasonably foreseeable actions. The lands within the KNF boundary form the geographic scope for cumulative effects since this is the scope for the proposed action (Alternative B). The temporal bound would be the life of the draft Forest Plan which is estimated to be a 15 year time span.

In order to integrate the contribution of past actions to the cumulative effects of the proposed action and alternatives, existing conditions are used as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior actions that have affected access and might contribute to cumulative effects.

Mineral resources across the Forest are likely to be influenced by a variety of factors, and as described in the “Affected Environment” section, there are a number of actions that may occur over the life of the Plan.

If either the Rock Creek or Montanore mining proposals begin operations it can be anticipated that a portion of non-renewable resources would be depleted as a result of being extracted and processed. Requests for approval of small lode and placer mining operations can be expected to continue but it is not possible to predict how many may be submitted in any given year or how many might be approved. Since Congress has imposed a moratorium on patenting of mining claims, there would be no changes in the acres of patented lands unless Congress was to lift the moratorium.

Given the low probable occurrence of leasable minerals on the KNF, and the court decision in Conner vs. Burford, there is little likelihood of mineral lease applications being made on the KNF.

Mineral material use can be expected to continue for in-service needs (e.g., road maintenance and watershed improvement activities) and as a salable commodity and would result in the further depletion of that non-renewable mineral resource from NFS lands.

Final reclamation work would be expected once the Troy mine ceases production operations. Reclamation work is likely to occur on select abandoned mine sites as well as on mineral material sites that have reached the end of their useful life.

Livestock Grazing

Introduction

Suitable rangelands are lands capable of producing forage for livestock and wildlife. Rangelands may consist of meadows, riparian areas, alpine areas, or open-canopy forest. Wildlife depends upon rangelands for forage and cover throughout the year.

Livestock producers, as well as outfitters, guides, and visitors, depend upon forage for their riding and pack stock. Range vegetation is managed to provide high quality wildlife habitat and forage for both livestock and wildlife.

Legal and Administrative Framework

Law and Executive Orders

- **The Granger-Thye Act (1950):** Provides for the issuance of term grazing permits for up to 10 years. It also provides for the use of grazing receipts for range improvement work.
- **The Multiple-Use Sustained-Yield Act (1960):** Provides that national forests are established and administered for several purposes, including livestock grazing. This act also authorizes the Secretary of Agriculture to develop the surface renewable resources of national forests for multiple uses and sustained yield of the services and products to be obtained from these lands, without impairment of the productivity of the land.
- **The Wilderness Act (1964):** Provides that livestock grazing, and the activities and facilities needed to support it, are allowed to continue in wilderness areas when such grazing was established before designation.
- **The Forest and Rangeland Renewable Resource Planning Act (1974):** Directs the Secretary of Agriculture to develop a process for the revision of national forest land and resource management plans, including the identification of the suitability of lands for resource management.
- **The Federal Land Policy and Management Act (1976):** States that public lands will be managed in a manner that will provide food and habitat for fish, wildlife, and domestic animals.
- **The Public Rangelands Improvement Act (1978):** Recognizes the need to correct unsatisfactory conditions on public rangelands by increasing funding for maintenance and management of these lands.
- **The Rescission Bill (1995):** Directs the Forest Service to complete site-specific NEPA analyses and decisions on allotments on a scheduled basis.

Other

- **Allotment Management Plans:** Developed through site-specific environmental analysis, an allotment management plan uses Forest Plan direction and current issues to determine desired conditions, areas suitable for grazing, and a broad strategy on how to meet desired conditions. They describe site-specific grazing strategies, stocking, structural and non-structural range improvement needs, and coordination with other resources. The output, or animal unit months (AUMs), is a result of the allotment management plan requirements, range improvements, and the ability of the permit holder to manage forage and livestock.

Key Indicators

- Acres of suitable range; and
- Animal Unit Months (AUMs) of livestock grazing.

Methodology and Analysis Process

The analysis area for range is the NFS lands of the KNF, particularly the range allotments.

The NFMA of 1976 requires the identification of the suitability of lands for resource management. An analysis to determine lands suitable to produce forage for grazing animals (suitable for rangelands) was completed as part of the Forest Plan revision. Although an area may be deemed suitable for use by livestock in the Forest Plan, a project-level analysis evaluating the site-specific impacts of the grazing activity, in conformance with NEPA, is required in order to authorize livestock grazing on specific allotment(s).

The assessment of suitable rangelands was accomplished using GIS. Use of GIS resulted in consistent identification of each step in determining suitability. This process is described in detail in appendix B.

Affected Environment (Existing Condition)

Livestock grazing has long been a historic use of the Forest and was being used to meet the needs of the area's inhabitants prior to the creation of the KNF. For example, settlers utilized horses to work their farms and as a means of transportation, while cattle provided them with beef, milk, and butter. Some families also raised sheep, hogs, and goats in small numbers. A few farmers specialized in livestock production, especially on the Tobacco Plains (Miss et al. 1994).

Limited grazing lands and insufficient hay supplies needed for wintering large numbers of animals; however, hindered livestock production on NFS lands. Settlers living near NFS boundaries could obtain a free use permit to graze up to ten domestic animals on government land during the specified season. In addition, ranchers could graze larger numbers of animals on NFS lands, providing they purchased a permit, confined their animals to the allotted area, and salted them according to established guidelines.

Livestock grazing on the KNF is limited by the following:

- The nature of available range (transitory forage);
- The lack of over-wintering facilities;
- The remoteness of the available range; and
- The expense of providing adequate water and range developments.

The 1987 KNF Forest Plan projected permitted livestock use at 12,600 AUMs per year on 45 allotments. Since most of the range program on the KNF is dependent on transitory range (land which produces forage or has inherent forage producing capabilities and can become available on a temporary basis as a result of partial or complete removal of the overstory vegetation through fire, logging, or other events) this number could vary over the years. As the type of timber removal changed from clear cutting/seed tree to shelterwood/improvement cuts, the amount of available forage dropped. This combined with other factors (e.g., reduction in the number of full time ranchers, property subdivision, and market prices) has reduced the number of AUMs to approximately 4,713 in 2009. Figure 48 displays the authorized (actual use) AUMs from the Forest since the 1987 KNF Forest Plan went into effect. The average actual use for the

past 10 years (1999 through 2009) was at 5,092 AUMs or 40 percent of the 1987 Forest Plan projected use.

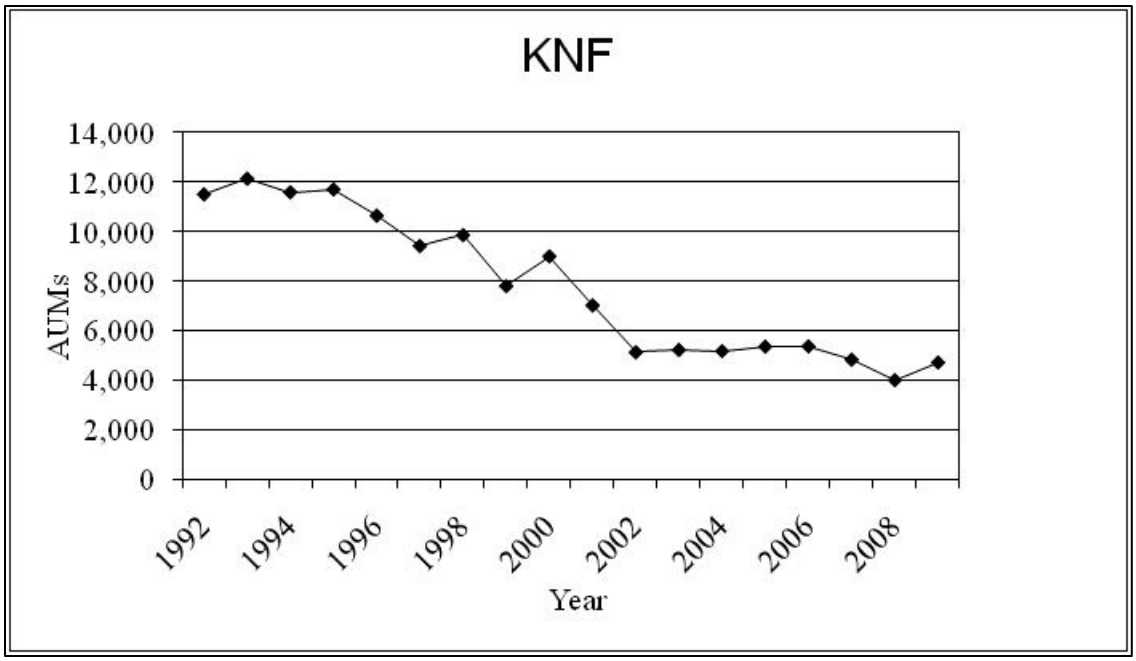


Figure 48. Actual Grazing Use on the Kootenai National Forest

As a result of reduced grazing levels, many allotments have become inactive or vacant. Since the 1987 Forest Plan, one allotment (Swamp Creek) was closed as the result of a land exchange. The Roberts allotment was combined with the Loon allotment to create the Loon-Roberts allotment, reducing the number of allotments to 43. Of the 43 remaining allotments on the Forest, 26 are vacant and one is inactive. The Fiscal Year 2009 Monitoring and Evaluation Report identifies and recommends termination of the vacant allotments: Mud Griffith Creeks, Upper Grave Creek, Seventeen Mile, South Fork, Upper Ford, Yaak River, Bobtail, Elliot-Cowell, Granite-Cherry, Jumbo-Bayhorse, Libby Creek, McMillan, Barron, Quartz, Prospect, Schrieber, Sheldon Mountain, Surprise, Swede Mountain, West Fisher, Canyon Creek, Cripple Horse, Marten Creek, Big Beaver, Green Mountain, and Tuscor Creek. The Pinkham Ridge allotment has been inactive; however, it is not being considered for closure. The monitoring report identified that no change to the Plan was needed for the active allotments.

A rangeland suitability analysis was completed for the draft Forest Plan and DEIS. The suitability determination provides basic information regarding the potential of the land to produce forage in a sustainable manner for livestock and wildlife without damage to the soil and water resources.

The suitability analysis began with a review of the capability of the land to produce forage. Capability was primarily based on soil types capable of producing forage. The analysis then determined the suitability for grazing based on lands capable of producing forage and management decisions. Areas not suitable for grazing were identified based on other resource concerns (e.g., riparian areas), density of forested lands precluding forage production, accessibility to forage (e.g., fenced areas), and allowable uses by MA. Private land within allotments was not analyzed for suitability and would be considered only at the allotment

management plan level if there is a permit request. See appendix B for more information on the process used in determining rangeland suitability.

The rangeland suitability analysis identified 921,700 acres capable of grazing on the KNF. There are approximately 149,000 acres on the KNF that are suitable for livestock grazing. This represents about 7 percent of the KNF.

Acres of suitability for rangeland by allotment are displayed in table 87. All acres were generated by GIS and may not exactly match actual allotment acres. Even though some allotments contain very small amounts of suitable acres, grazing may still be occurring based on site-specific conditions not covered in this strategic analysis of suitability. Therefore, changes to suitability may occur at the project-scale, using site-specific data.

Table 87. KNF Allotments – Suitability Determination and Status, Existing Condition

Allotment	Status	Allotment Acres	Capable Acres	Percent Capable	Suitable Acres	Percent Suitable
Barren	vacant[1]	3,985	1,464	37%	398	10%
Big Beaver Cr	vacant[1]	611	122	20%	43	7%
Bobtail	vacant[1]	4,893	3,265	67%	2,082	43%
Canyon Cr	vacant[1]	11,860	4,342	37%	3,003	25%
Cripple Horse	vacant[1]	18,258	10,004	55%	6,923	38%
Dead Horse	active	809	441	54%	357	44%
Edna	active	4,549	2,058	45%	948	21%
Elliot-Cowell	vacant[1]	9,437	3,812	40%	2,295	24%
Fairview	active	64,438	14,340	22%	10,413	16%
Five Mile	active	6,725	1,307	19%	706	10%
Granite-Cherry	vacant[1]	8,337	4,588	55%	3,296	40%
Grave Creek	active	5,414	4,535	84%	2,645	49%
Green Mountain	vacant[1]	870	241	28%	70	8%
Jumbo Bayhorse	vacant[1]	5,963	552	9%	330	6%
Lake Creek	active	6,820	3,072	45%	2,262	33%
Libby Creek	vacant[1]	5,764	3,100	54%	1,897	33%
Loon-Roberts	active	7,838	4,947	63%	1,839	23%
Martin Creek	vacant[1]	952	61	6%	15	2%
McMillan	vacant[1]	33,319	10,013	30%	7,410	22%
Mud Griffith Crks	vacant[1]	6,198	2,103	34%	801	13%
Pinkham Creek	active	53,191	29,871	56%	16,134	30%
Pinkham Ridge	vacant	18,178	13,842	76%	6,740	37%
Prospect	vacant[1]	6,768	1,043	15%	804	12%
Quartz Creek	vacant[1]	6,755	2,075	31%	1,201	18%
Rondo-Mud Lake	active	11,638	4,129	35%	3,169	27%
Scalp Mountain	active	25,372	13,433	53%	8,301	33%
Schrieber	vacant[1]	2,230	1,153	52%	716	32%
Seventeen Mile	vacant[1]	225	7	3%	5	2%

Allotment	Status	Allotment Acres	Capable Acres	Percent Capable	Suitable Acres	Percent Suitable
Sheldon Mountain	vacant[1]	7,936	4,239	53%	3,510	44%
South Fork	vacant[1]	1,020	194	19%	69	7%
Sunday Creek	active	26,526	22,663	85%	12,075	46%
Surprise	vacant[1]	4,447	1,911	43%	1,617	36%
Swamp Creek	vacant	1,796	0	0%	0	0%
Swamp Fortine	active	61,344	35,604	58%	19,672	32%
Swede Mountain	vacant[1]	19,605	5,163	26%	2,722	14%
Tobacco Siding	active	212	97	46%	65	31%
Trego	active	8,678	7,251	84%	4,255	49%
Tuscor Creek	vacant[1]	404	84	21%	15	4%
Upper Ford	vacant[1]	3,996	1,261	32%	813	20%
Upper Grave Creek	vacant[1]	31,401	8,160	26%	1,380	4%
Warland	active	8,800	3,898	44%	2,441	28%
West Fisher	vacant[1]	1,911	1,108	58%	734	38%
West Kootenai	active	32,275	21,101	65%	14,828	46%
Yaak River	vacant[1]	730	0	0%	0	0%
TOTAL		**542,479**	**252,652**	**47%**	**149,002**	**27%**

1 Vacant and recommended to close in the 2009 Forest Plan monitoring report

Environmental Consequences

General Effects

Each alternative allows for slightly different levels of expected permitted livestock numbers. Grazing use is managed similarly in all alternatives. The forestwide standards and guidelines are designed to protect both upland and riparian resources in all alternatives. Effects are expected to be consistent between all alternatives. Based on recent trends identified through monitoring reports AUMs would not be expected to change from existing condition under all alternatives.

Under Alternative A, grazing would generally[1] be allowed under all MAs except: 2 – Semi-primitive nonmotorized; 6 – Developed Recreation Sites; 7 – Existing Wilderness; 8 – Recommended Wilderness; 9 – Wilderness Study Area, 19 – Steep lands; 20 – Administrative Sites; 21 − Special Areas for Research Natural Areas, SA, BOT and RIP); 24 – Low Productivity Areas, 29 – Primitive Recreation; and 30 – Lake Koocanusa Drawdown Area. There would be no new grazing allotments identified.

Existing allotments would not change by action alternative. Under Alternatives B, C, and D, desired conditions for grazing (FW-DC-GRZ-01 through 03) would be the same. Grazing[2] as an

[1] See the 1987 Forest Plan for specifics related to grazing for each management area
[2] As discussed in the Glossary, the term Grazing refers to livestock grazing in permitted allotments only. It does not address uses such as the incidental grazing by pack-stock during recreational pursuits

allowable use for MA5a, 5b, 5c, 6 and 7[1], would not vary by alternative. It is not considered an allowable use for the other MAs, nor are there any existing allotments within these MAs.

Considering environmental consequences and alternative MA allocations, rangeland suitability was determined for each action alternative (table 88). Alternative D would have the largest acreage of suitable rangeland; Alternative C would have the least acreage of suitable rangeland.

Because suitable rangelands are similar for all alternatives, the amount of AUMs produced from lands is not expected to vary by alternative. Current use levels are expected to continue for the 10 to 15 years at approximately 5,000 AUMs.

[1] For MA7 – Primary Recreation Area – grazing is allowed to continue within the West Kootenai allotment

Table 88. Range Capability and Suitability by Allotment and Alternative B, C, and D

Allotment	Status	Suitable Acres	Capable Acres	Percent Capable	Suitable Alt B Acres	Percent Suitable Alt B	Suitable Alt C Acres	Percent Suitable Alt C	Suitable Alt D Acres	Percent Suitable Alt D
Barren	vacant[1]	3,985	1,464	37%	465	12%	416	10%	465	12%
Big Beaver Cr	vacant[1]	611	122	20%	43	7%	43	7%	43	7%
Bobtail	vacant[1]	4,893	3,265	67%	2,082	43%	2,082	43%	2,082	43%
Canyon Cr	vacant[1]	11,860	4,342	37%	3,038	26%	3,038	26%	3,038	26%
Cripple Horse	vacant[1]	18,258	10,004	55%	6,940	38%	6,940	38%	6,940	38%
Dead Horse	active	809	441	54%	387	48%	387	48%	387	48%
Edna	active	4,549	2,058	45%	951	21%	951	21%	951	21%
Elliot-Cowell	vacant[1]	9,437	3,812	40%	2,291	24%	2,291	24%	2,291	24%
Fairview	active	64,438	14,340	22%	10,461	16%	10,461	16%	10,461	16%
Five Mile	active	6,725	1,307	19%	753	11%	753	11%	753	11%
Granite-Cherry	vacant[1]	8,337	4,588	55%	3,296	40%	3,290	39%	3,296	40%
Grave Creek	active	5,414	4,535	84%	2,370	44%	2,349	43%	2,370	44%
Green Mountain	vacant[1]	870	241	28%	70	8%	70	8%	41	5%
Jumbo Bayhorse	vacant[1]	5,963	552	9%	381	6%	381	6%	381	6%
Lake Creek	active	6,820	3,072	45%	2,433	36%	2,433	36%	2,433	36%
Libby Creek	vacant[1]	5,764	3,100	54%	1,898	33%	1,898	33%	1,898	33%
Loon-Roberts	active	7,838	4,947	63%	1,839	23%	1,839	23%	1,839	23%
Martin Creek	vacant[1]	952	61	6%	16	2%	16	2%	16	2%
McMillan	vacant[1]	33,319	10,013	30%	7,413	22%	7,413	22%	7,413	22%
Mud Griffith Crks	vacant[1]	6,198	2,103	34%	881	14%	850	14%	881	14%
Pinkham Creek	active	53,191	29,871	56%	16,670	31%	16,670	31%	16,670	31%
Pinkham Ridge	vacant	18,178	13,842	76%	6,785	37%	6,785	37%	6,785	37%
Prospect	vacant[1]	6,768	1,043	15%	808	12%	808	12%	808	12%
Quartz Creek	vacant[1]	6,755	2,075	31%	922	14%	922	14%	922	14%

Allotment	Status	Suitable Acres	Capable Acres	Percent Capable	Suitable Alt B Acres	Percent Suitable Alt B	Suitable Alt C Acres	Percent Suitable Alt C	Suitable Alt D Acres	Percent Suitable Alt D
Rondo-Mud Lake	active	11,638	4,129	35%	3,171	27%	3,171	27%	3,171	27%
Scalp Mountain	active	25,372	13,433	53%	8,538	34%	8,536	34%	8,538	34%
Schrieber	vacant[1]	2,230	1,153	52%	716	32%	716	32%	716	32%
Seventeen Mile	vacant[1]	225	7	3%	5	2%	5	2%	5	2%
Sheldon Mountain	vacant[1]	7,936	4,239	53%	3,495	44%	3,495	44%	3,495	44%
South Fork	vacant[1]	1,020	194	19%	69	7%	69	7%	69	7%
Sunday Creek	active	26,526	22,663	85%	12,148	46%	12,148	46%	12,148	46%
Surprise	vacant[1]	4,447	1,911	43%	1,625	37%	1,625	37%	1,625	37%
Swamp Creek	vacant	1,796	0	0%	0	0%	0	0%	0	0%
Swamp Fortine	active	61,344	35,604	58%	20,077	33%	20,077	33%	20,077	33%
Swede Mountain	vacant[1]	19,605	5,163	26%	2,720	14%	2,712	14%	2,720	14%
Tobacco Siding	active	212	97	46%	65	31%	65	31%	65	31%
Trego	active	8,678	7,251	84%	4,325	50%	4,325	50%	4,325	50%
Tuscor Creek	vacant[1]	404	84	21%	15	4%	15	4%	15	4%
Upper Ford	vacant[1]	3,996	1,261	32%	775	19%	775	19%	775	19%
Upper Grave Creek	vacant[1]	31,401	8,160	26%	1,229	4%	399	1%	2,170	7%
Warland	active	8,800	3,898	44%	2,449	28%	2,449	28%	2,449	28%
West Fisher	vacant[1]	1,911	1,108	58%	734	38%	734	38%	734	38%
West Kootenai	active	32,275	21,101	65%	13,172	41%	13,172	41%	13,172	41%
Yaak River	vacant[1]	730	0	0%	0	0%	0	0%	0	0%
Total		**542,479**	**252,652**	**47%**	**148,523**	**27%**	**147,577**	**27%**	**149,435**	**28%**

1 Vacant and recommended to close in the 2009 Forest Plan monitoring report.

Consequences to Livestock Grazing from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Aquatic Resources Management

Under all alternatives, management and protection of riparian areas and wetlands are emphasized. The objectives and standards for the protection of the aquatic resources, particularly riparian areas, have had some of the greatest impact on the forest grazing program. Over the last 10 to 15 years much has been accomplished through altering grazing practices to protect aquatic resources. This occurred on the KNF through implementation of INFISH (USDA Forest Service 1995) standards.

Effects from Access and Recreation

The impact to livestock grazing from recreation and travel management is mainly limited by the grazing permit holder's ability for vehicle access to the allotment. Motorized vehicle access into areas allocated for nonmotorized settings can be authorized by line officers. These decisions are discretionary and are made on a case-by-case review of the proposal and circumstances. The intent of the nonmotorized areas is not to prevent allotment management. Some of the motorized vehicle access needs include transportation of fence and/or water development materials, noxious weed control, and salt distribution. During particular times of the year, or as some routes grow in from lack of use or maintenance; vehicle access may be more restrictive than what is currently available.

Of the action alternatives, Alternative D would allow for the greatest percent of motor vehicle use (82 percent) and mechanized use (95 percent) across the KNF, followed by Alternative B (75 percent for Wheeled Motor Vehicle Use; 91 percent for Mechanized Use), and Alternative C, which would allow the least amount of wheeled motor vehicle use (68 percent) and mechanized use (87 percent) of the action alternatives. Opportunities for these types of uses could increase recreational use, which may complicate livestock management and make it more expensive. For example, more gates may be left open and livestock are inadvertently or purposely moved.

There is no effect on livestock grazing from winter recreation and winter travel management activities since very little grazing takes place during this time period. This is common for all alternatives.

Range improvements could generally receive less disturbance and vandalism with vehicles restricted to designated roads and trails; however, permit holders would need more time to obtain prior authorization to travel off roads or trails in their allotment. Management effectiveness decreases with fewer motorized opportunities for them to observe stock, check fences and water developments, distribute salt, etc.

Since there are no new developed recreation areas proposed in any alternative, the effects of developed recreation on livestock grazing would be the same for each alternative. All of the action alternatives provide for improved trail and road systems, which will reduce conflicts between forest visitors and livestock grazing. The differences of effects to livestock grazing between alternatives are minimal.

Effects from Timber Harvest

Timber harvest can provide increased forage that can be made available for livestock and wildlife grazing. As timber is harvested, it may open up areas to livestock that were not available before. While AUMs are not expected to increase, as this is transitory range and will gradually

be replaced by forested cover types, the newly available areas can reduce grazing pressure on other ranges. Under a constrained budget, Alternative C is predicted to have the most acres with regeneration harvest (about 1,740 acres), followed by Alternative D (1,660 acres), Alternative A (about 1,640 acres) and Alternative B (about 1,600 acres). Based on the unconstrained budget scenario, Alternative C would have the least acres with regeneration harvest (2,983 acres), followed by Alternative B (3,128 acres), Alternative A (4,812 acres), and Alternative D (5,353 acres).

Effects from Vegetation Management

Management practices to trend toward desired future conditions for vegetation will rely on a variety of passive and active management techniques. Alternative C would place more emphasis on passive management than any of the other alternatives. Alternative C would treat the most acres for vegetation condition for a constrained budget than any of the other alternatives. In Alternative C, it can be expected that more treatments under this alternative would rely on prescribed fire and natural, unplanned wildfire than in the other alternatives. Both Alternatives B and C have about 22 percent of land allocations in MA5, which is greater than for Alternative D. Wildfire will continue to be an influence on the Forest. Larger fires are usually in remote areas of dense timber and can sometimes occur at the edge of allotments. The KNF wouldn't expect much of an increase in forage for livestock, but would expect increased forage for big game. This could reduce competition between big game and livestock for forage.

Cumulative Effects

The analysis area for cumulative effects includes all three counties identified for the KNF, including lands administered by the BLM, and the State of Montana adjacent to the KNF, and the communities which depend on livestock production from public lands. Protection of threatened or endangered species habitat may have the largest influence on livestock grazing on Federal lands. Some permit holders could be severely affected if conditions on their federal allotment require a substantial reduction. At this time, predicting any future reductions are outside the scope of this analysis but would be addressed with an analysis if additional species are listed.

Grazing on private land depends on the market, drought conditions, and needs of the owner. There would likely be a net loss of forage, and in some cases, loss of big-game winter and spring range, as ranches are sold and subdivided. One scenario that could occur on ranches adjacent to this Forest is that they could be sub-divided and sold as home sites. These conditions could likely continue to occur in the short term for the two major counties that the KNF lays within (Sanders and Lincoln counties). As a result, marginal winter habitat may be used more frequently by big game and may increase localized competition between livestock and wildlife on private lands.

Special Forest Products

Introduction

Special forest and botanical products are mainly plant and fungi materials that are gathered from NFS lands for personal use, for commercial resale, or for sale as a craft product. They can generally be categorized under five general areas: residential comfort and use, food, herbs and medicinal, decorative, and specialty items. As demand for these special products increases and new markets are created, harvest pressure on them may increase.

Legal and Administrative Framework

Code of Federal Regulations (CFR)

- **36 CFR 223.1:** Trees, portions of trees, and other forest products on NFS lands may be sold for the purpose of achieving the policies set forth in the Multiple Use Sustained Yield Act as amended and the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended.
- **36 CFR 261.6:** Lists activities regarding timber and other products that are prohibited.

Key Indicator

- Management area allocation.

Methodology and Analysis Process

The analysis included a review of rules and regulations for special forest and botanical products and effects based on MA allocation for each alternative. Management areas with more access allow for increased supply of special forest products and the potential for over-harvest.

Analysis Area

The analysis area is the NFS lands within the KNF boundaries.

Affected Environment (Existing Condition)

Special forest and botanical products include plant and fungal material that may be collected from NFS lands. Special forest and botanical products include, but are not limited to, mosses, fungi (including mushrooms), bryophytes, roots, bulbs, berries, seeds, wildflowers, forbs, sedges, grasses, nuts, ferns, tree sap, boughs, bark, cones, burls, transplants, pine straw, Christmas trees, firewood, posts and poles, mine props, and rails. These products are available through commercial harvest and sale and through free use. Historically, the Forest has granted commercial and free use of special forest and botanical products to individuals and Tribes with treaty and other reserved rights.

Special forest and botanical products may be collected forestwide, unless an area has been closed for a specific reason. Existing uses are often tied to historical knowledge and patterns of use. The most popular special forest and botanical products on the Forest include huckleberries, firewood, Christmas trees, and boughs. Mushroom picking is a popular activity following wildfires. In recent years, requests from the general public for commercial and free use collection of special forest and botanical products have increased.

Special forest and botanical products have importance to the Tribes as traditional and cultural uses. As per current handbook direction (2409.18, section 87.13), the KNF considers "treaty rights, customary and traditional uses (including subsistence and other historical uses of plant material by Tribes), the federal trust responsibility to Tribes, and competitive market demands in determining which products would be excluded from or allowed for sale to commercial harvesters. When there is a shortage of any particular special forest product for tribal use, commercial permits will be issued only to the extent that the tribal use can be accommodated."

The KNF consults and coordinates with tribal governments prior to issuing any permits, contracts, or other authorized instrument when there is a possible impact to tribal treaty and other rights and interests in the permitted or contracted area (handbook direction 2409.18, section 87.18). The KNF honors the unique legal relationship, including the trust relationship, between the federal government and Indian tribal governments.

In addition, the Forest Service has the responsibility to honor Indian Tribes' reserved rights (handbook direction 2409.18, section 87.2). The gathering of forest products by the Confederated Salish and Kootenai Tribe is a reserved right on the KNF. The Salish Kootenai may remove special forest and botanical products without charge or permit (36 CFR 223.239(e)).

The supply of desired products is dependent on ecological conditions and existing distributions of potential habitat. Forest management can increase the supply of certain products. The opening of stands, timber harvest, and prescribed burning can increase huckleberry production in those habitats supporting this species. Thinning and regeneration harvest can also increase production of Christmas trees. Firewood is often a by-product of a commercial timber harvest.

Environmental Consequences

General Effects

Special forest and botanical products may be collected for personal use forestwide except in some special areas (botanical and historical special areas) and RNAs. Commercial use of special forest and botanical products is not allowed in designated wilderness; recommended wilderness; wilderness study area; wild, scenic and recreational rivers; special areas; or RNAs.

Table 89. Acres of Management Areas where Commercial Use of Special Forest and Botanical Products is Not Allowed by Alternative

Management Area		Alt A	Alt B	Alt C	Alt D
MA1a	Wilderness	93,700	93,700	93,700	93,700
MA1b	Recommended Wilderness	76,500	110,200	214,800	36,100
MA1c	Wilderness Study Areas	34,100	34,100	34,100	34,100
MA2	Eligible Wild and Scenic Rivers	38,100	47,300	45,100	50,200
MA3	Botanical, Geological, Historical, Recreational, Scenic, or Zoological Areas [1]	15,900	31,600	30,500	31,700
MA4	Established and Recommended Research Natural Areas [2]		8,400	8,400	8,400
Total		**258,300**	**325,300**	**426,600**	**254,200**

1 Personal use also not allowed in botanical and historical special areas

2 Personal use also not allowed in this MA

Table 89 displays the acres by MA where commercial use of special forest and botanical products is not allowed. Alternative C has the most acres and Alternative D the least acres where commercial use of these products is not allowed. Acres not allowed for personal use remain constant for all action alternatives. Alternative A has the least acres where personal use is not allowed.

The requests for and use of special forest and botanical products will continue to increase regardless of the alternative, although the allowable collection of them, access to them, and habitat conditions will vary. Alternative D provides the most areas with allowable use, the most access, and the most management activities to improve habitat conditions for special forest and botanical products.

Consequences to Special Forest Products from Forest Plan Components Associated with other Resource Programs or Revision Topics

Effects from Access

The opportunity for collecting special forest and botanical products is affected by the amount of motorized access to the Forest. Areas with no motorized access limit opportunities and reduce the ability to collect products. Alternative C has the most nonmotorized access; thus, reduced opportunities for use. Alternative D has the most motorized access; thus, the best opportunities for use.

Effects from Fire

Fire increases the potential availability of some special botanical products, such as mushrooms and huckleberries. The amount of wildfire is not expected to change by alternative. Prescribed fire is expected to be highest under Alternative C; thus, the best potential habitat for some botanical products.

Effects from Timber

Timber harvest increases the potential availability of some special botanical products, such as huckleberries. Opening the stand increases the amount of sun, improving conditions for growing huckleberries and other shrubs. The amount of timber harvest is the highest under Alternative D, providing the best conditions for huckleberry growth. Alternative D would also provide the most commercial timber harvest, providing for more firewood cutting.

Cumulative Effects

The West has been the fastest growing region in the country, and this trend is expected to continue for the next 20 years (U.S. Census 2000 data and projections). With this increased growth rate comes an increased use of special forest and botanical resources. The sustainable use of these resources may become increasingly vulnerable, requiring permitting and limitation of use.

The increased population also results in increased housing density on lands adjacent to the KNF. This increased housing density leads to fragmented landscapes and degradation of habitat for some special botanical species. The increased housing density also limits access for commercial or personal use of special forest and botanical products.

Economic and Social Environment

Social and Economic

Introduction

National forests are public lands that influence and are influenced by local and national publics. Local publics are represented in the communities of place and interest adjacent to national forest lands. Many of these communities were formed from the development of timber, gold, silver, grazing lands, and other natural resources. Historically, individuals in these communities developed strong place attachments to public lands that provided recreational, aesthetic, employment, and other contributions to their social environment. Work, place, and lifestyles became an integral part of the culture and social characteristics of such communities. These communities developed particular interests in the interactions of public lands with their ways of life and their economic present and future. These interests are expressed in their interactions with public lands in addition to the actions and comments of local interest groups.

National publics also have interests and concerns about public lands in general as well as particular public lands such as those of the KNF. These interests are expressed in public comments to management actions as well as in direct experiences recreating, visiting, or otherwise using public lands. Some of these publics also express their interest through national organizations with both broad-based concerns about the management of public lands and in specific resources such as old growth forests, grizzly bears, or other threatened and endangered species. Thus, they are part of the social environment of public lands through the values and beliefs that motivate actions about particular places and by their comments and actions related to these places.

Legal and Administrative Framework

Law and Executive Orders

- **Multiple-Use Sustained Yield Act of 1960:** Identifies principles for managing the resources of the NFS. The direction to manage these resources for the greatest good over time includes the use of economic and social analysis to determine management of the NFS.
- **National Environmental Policy Act of 1969:** Mandates consideration of the consequences to the quality of the human environment from proposed management actions. The agency must examine the potential impacts to physical and biological resources as well as potential socioeconomic impacts (40 CFR 1508.14).
- **Forest and Rangeland Renewable Resources Planning Act of 1974:** As amended by the NFMA of 1976, requires consideration of potential economic consequences of land management planning.
- **Office of Management and Budget Circular A-116 (issued August 16, 1978):** Requires executive branch agencies to conduct long range planning and impact analysis associated with major initiatives.
- **Executive Order No. 12898 on Environmental Justice (issued February 11, 1994):** Mandates federal agencies to make achieving environmental justice part of their mission. This includes identification and response to disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

- **National Forest Revenue Act (amended 1908):** Requires 25 percent of revenues generated by NFS lands to be paid to the States for use by the counties in which the lands are situated for the benefit of public schools and roads.
- **Secure Rural Schools and Community Self-Determination Act of 2000:** Was designed to stabilize annual payments to state and counties containing NFS lands and public domain lands managed by the BLM. Funds distributed under the provisions of this act are for the benefit of public schools, roads, and related purposes.

Regulation and Policy

- **1982 Planning Rule Procedures:** The procedures of the 1982 NFS Land and Resource Management Planning Rule requires the comprehensive consideration of economic benefits and costs, specifically identifying the social sciences, economic considerations, cost-efficient alternatives, impacts on present net value, and impacts on local employment.

Key Indicators

Social Indicators

- Population demographics;
- Land ownership and use;
- Lifestyle, attitude, values and beliefs; and
- Communities and change.

Economic Indicators

- Change in number of jobs;
- Change in income;
- Federal payments to counties; and
- Present net value.

Methodology and Analysis Process

Social assessments were completed to determine lifestyles, and values and issues regarding forest management. Analysis was conducted by sociologists. Primary data was collected using a discussion guide with an open-ended format. Discussants represented diverse stakeholder groups including recreation groups, business owners, loggers, mill owners, economic development staff, local government officials, Forest Service staff, teachers, environmental groups, and other community opinion leaders. Findings were summarized in the social assessments (Russell and Adams-Russell 2003, Parker, Wulfhorst and Kamm 2002, Russell and Downs 1995).

An assessment of social conditions and trends for the planning zone was also completed. This document compiled findings of the social assessments for the KNF with demographic data for the planning area. This document also presented data and information for a larger, regional area outside the Forest boundaries. Findings were presented in the document *Conditions and Trends: Social and Economic Systems for the Kootenai and Idaho Panhandle Plan Revision Zone* by Russell et al. 2006.

Various data sources were used to describe population, land ownership, employment, income, and county payments. These data sources include U.S. Census, the Bureau of Economic

Analysis, Bureau of Labor Statistics, Montana Natural Resource Information, and the Economic Profile System − Human Dimensions Toolkit.

National forest contributions to employment and income and changes by alternative were estimated with input-output analysis using the IMPLAN (IMpact analysis for PLANning) modeling system (MIG 2003) and Forest Economic Analysis Spreadsheet Tool) (Alward et al. 2010). The IMPLAN modeling system allows the user to build regional economic models of one or more counties for a particular year. The model for this analysis used the 2008 IMPLAN data. Forest economic analysis spreadsheet tool (FEAST) is a spreadsheet modeling tool that serves as an interface between user inputs and imported data from an existing IMPLAN model.

Input-output analysis is a means of examining relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. Economic contribution analysis is defined as "the gross change in economic activity associated with an industry, event, or policy in an existing regional economy (Watson et al. 2007). By using Forest Service expenditure data, resource output data, and other economic information, IMPLAN can describe, among other things, the jobs and income that are supported by NFS management activities. The direct employment and labor income benefit employees and their families and, therefore, directly affect the local economy. Additional indirect and induced, multiplier effects (ripple effects) are generated by the direct activities. Together the direct and multiplier effects comprise the total economic contribution to the local economy. The data used to estimate the direct effects from timber harvest is information provided by University of Montana's Bureau of Business and Economic Research. The economic effects tied to other Forest Service programs and the multiplier effects were estimated using IMPLAN. Resource specific data (recreation visits, range head months, timber volume harvested, etc.) were collected and input into the IMPLAN and FEAST models. For current management levels, a 3-year average using 2007 – 2009 data was calculated for resources to eliminate the year to year variability inherent in the data.

Present net value was calculated using a spreadsheet (MS-Excel) and estimated costs and values for goods and services for each alternative. Present net value combines benefits and costs that occur at different times and discounts them into an amount that is equivalent to all economic activity in a single year. Costs and values for anticipated activities, goods, and services over the next fifty years for each alternative were derived by resource specialists.

Analysis Area

The KNF contains portions of five counties in two states: Flathead, Lincoln, and Sanders counties in Montana and Bonner and Boundary counties in Idaho (see table 90 and figure 49). As shown in table 90, more than 95 percent of the KNF is located within Lincoln and Sanders counties in Montana. Lincoln County contains the highest acreage of national forest land, with 72 percent of the county administered by the KNF.

The analysis area for the social and economic environment is comprised of counties within a zone of influence for KNF management. Counties were selected based on the concept of a functional economy (Johnson 1995). Counties were also selected based on the potential impact KNF management may have on local communities. Information used to assist in the delineation consisted of; 1) component economic areas as defined by the Bureau of Economic Analysis; 2) recent log flow information from the KNF provided by the University of Montana's Bureau of Business and Economic Research; and 3) personal communications with regional office and

forest-level staffs. The resulting social and economic analysis area is comprised of Lincoln, Sanders, and Flathead counties in Montana and Boundary and Bonner counties in Idaho.

Table 90. Counties within the Analysis Area: Acreage and Percent Administered by KNF

County	Total County Acres	Total FS Acres	% of County FS Acres	Acres Admin. by KNF	% of County Admin. by KNF
Flathead County, MT	3,365,600	1,781,000	53%	49,100	1%
Lincoln County, MT	2,351,000	1,753,600	75%	1,690,300	72%
Sanders County, MT	1,785,100	921,300	52%	428,500	24%
Bonner County, ID	1,227,600	472,600	38%	39,200	3%
Boundary County, ID	817,300	490,800	60%	10,300	1%

Source: Idaho: County Profiles of Idaho, 2001; Montana: Montana Natural Resource Information System

An assessment on condition and trends of the social and economic systems for the KIPZ was completed in 2006 (Russell et al. 2006). Analysis for the Plan draws on this in-depth assessment, especially for the social environment. For purposes of description, the 2006 assessment breaks the local counties down into two categories: Direct and Regional. The Direct counties have borders within the KIPZ Forests, receive payments, and have other economic and social benefits from management of the KNF or IPNF. The Regional Counties have limited or no lands within the boundaries of the KIPZ Forests and KIPZ contributions to socioeconomic conditions in those counties are generally subordinate to other local and regional influences.

The five counties for the KNF analysis area are all categorized as direct counties in the 2006 assessment with the exception of Flathead County. Flathead County is not heavily influenced socially or economically by management of the KNF. This county contains only a small portion of lands administered by the KNF. It is also more urban, with a diverse economic composition, and is thus less impacted by KNF management. However, Flathead County is important as part of the functional economy for the KNF and is thus included in the analysis area for the Plan.

Regional Economy

The social and economic environment is influenced by a larger, regional economy. The regional economy will not be described in this EIS. Only the counties directly impacted by management of the KNF are included in the analysis areas. This larger regional economy for the KNF is described in the document *Conditions and Trends: Social and Economic Systems for the Kootenai and Idaho Panhandle Plan Revision Zone* by Russell et al. 2006.

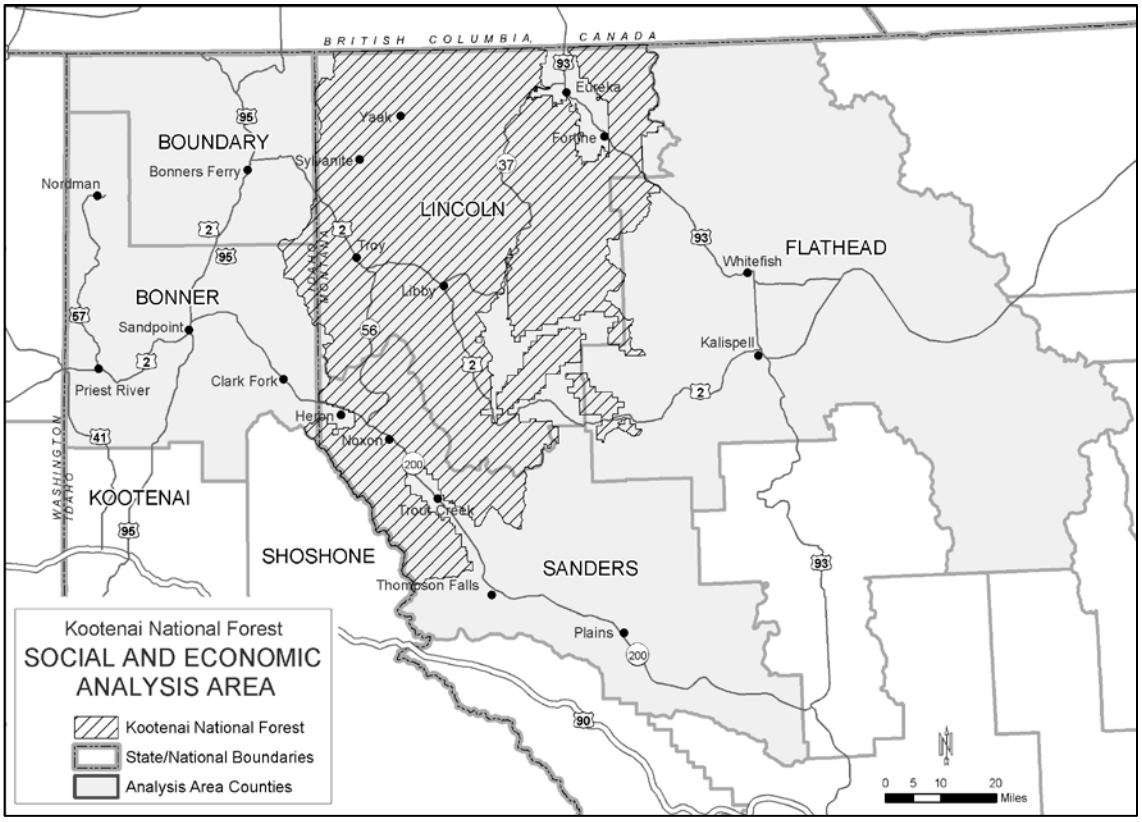


Figure 49. Counties in the Analysis Area

Affected Environment (Existing Condition)

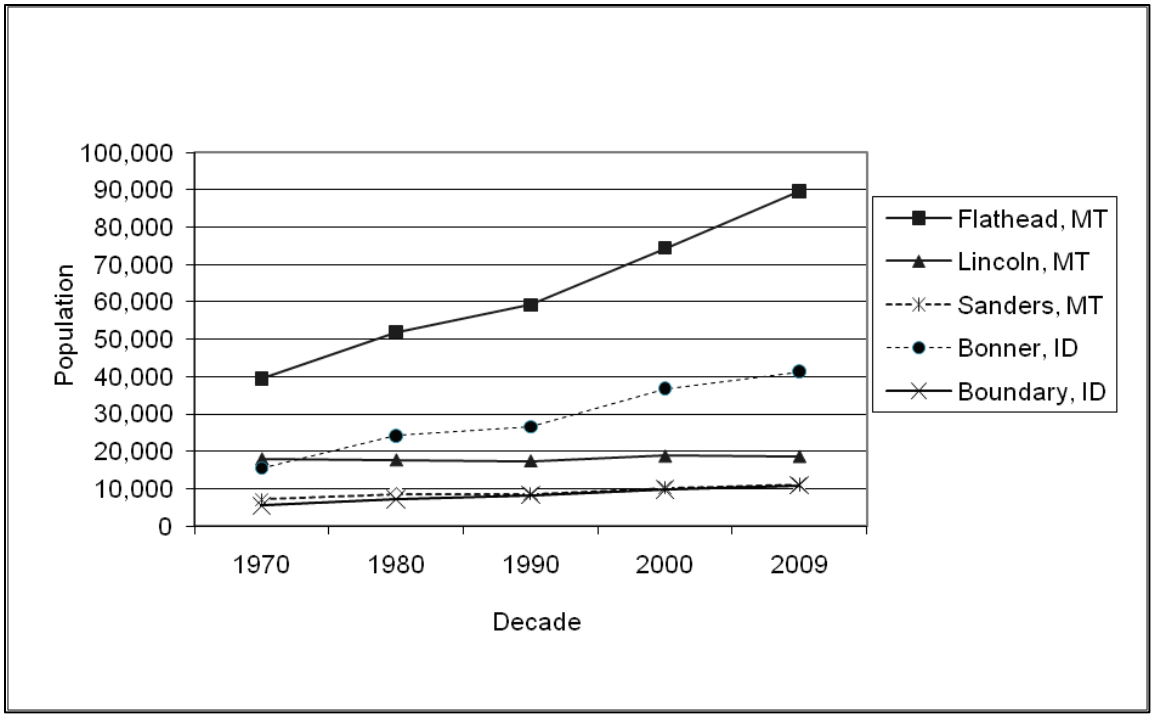
Population Demographics

The population of all five counties increased from 1980 to 2009 (see table 91 and figure 50). The growth rates in Flathead, Sanders, and Bonner counties exceed those of their respective states, while Boundary and Lincoln counties are growing at a slower rate. Flathead and Bonner counties experienced the most growth and Lincoln County the least growth. Lincoln County is estimated to have a decline in population from 2000 to 2009.

Table 91. Change in Population by County and State

Region	1980	1990	2000	Estimated 2009	Percent Change (1980-2009)
Montana	786,690	799,065	902,195	974,989	23.9%
Flathead, MT	51,966	59,218	74,471	89,624	72.5%
Lincoln, MT	17,752	17,481	18,837	18,717	5.4%
Sanders, MT	8,675	8,669	10,227	11,096	27.9%
Idaho	947,983	1,006,749	1,293,953	1,545,801	63.1%
Bonner, ID	24,163	26,622	36,835	41,403	71.3%
Boundary, ID	7,289	8,332	9,871	10,951	50.2%

Source: U.S. Bureau of the Census



Source: U.S. Bureau of the Census

Figure 50. Population by County by Decade

The growth in population experienced by Flathead County is reflective of the increasing development and economic diversification of Kalispell, Montana and its close proximity to the major trade center of Missoula, Montana. The growth in Bonner County is similarly reflective of increasing economic development in Sandpoint, Idaho and its close proximity to major trade centers of Coeur d'Alene, Idaho and Spokane, Washington.

All counties saw an increase in median age from 1990 to 2000. In 2000, the median age for Flathead was 39, Lincoln 42.1, Sanders 44.2, Bonner 40.8, and Boundary 38.3. This is consistent with the overall aging of the population in the United States, which had a median age of 35.3. All counties have a higher median age than the national average.

The ethnic composition of all counties is fairly homogenous and predominantly white, (see table 92) with Bonner County having the highest percentage (96.6 percent) and Sanders County the lowest percentage (91.9 percent). Within all counties, American Indian is the next largest ethnic group (for a single race), with Sanders County having the highest percentage (4.7 percent) and Bonner County the lowest percentage (0.9 percent).

Table 92. Population by Race, 2000

	Flathead County, MT	Lincoln County, MT	Sanders County, MT	Bonner County, ID	Boundary County, ID
Total Population	74,471	18,837	10,227	36,835	9,871
White alone	71,689	18,100	9,400	35,574	9,401
Black or African American alone	113	21	13	40	16
American Indian	856	226	485	322	199

	Flathead County, MT	Lincoln County, MT	Sanders County, MT	Bonner County, ID	Boundary County, ID
alone					
Asian alone	346	59	31	101	57
Native Hawaiian & Other Pacific Is. alone	44	7	1	17	7
Some other race	305	74	27	155	85
Two or more races	1,118	350	270	626	106
Percent of Total					
White alone	96.3%	96.1%	91.9%	96.6%	95.2%
Black or African American alone	0.2%	0.1%	0.1%	0.1%	0.2%
American Indian alone	1.1%	1.2%	4.7%	0.9%	2.0%
Asian alone	0.5%	0.3%	0.3%	0.3%	0.6%
Native Hawaiian & Other Pacific Is. alone	0.1%	0.0%	0.0%	0.0%	0.1%
Some other race	0.4%	0.4%	0.3%	0.4%	0.9%
Two or more races	1.5%	1.9%	2.6%	1.7%	1.1%

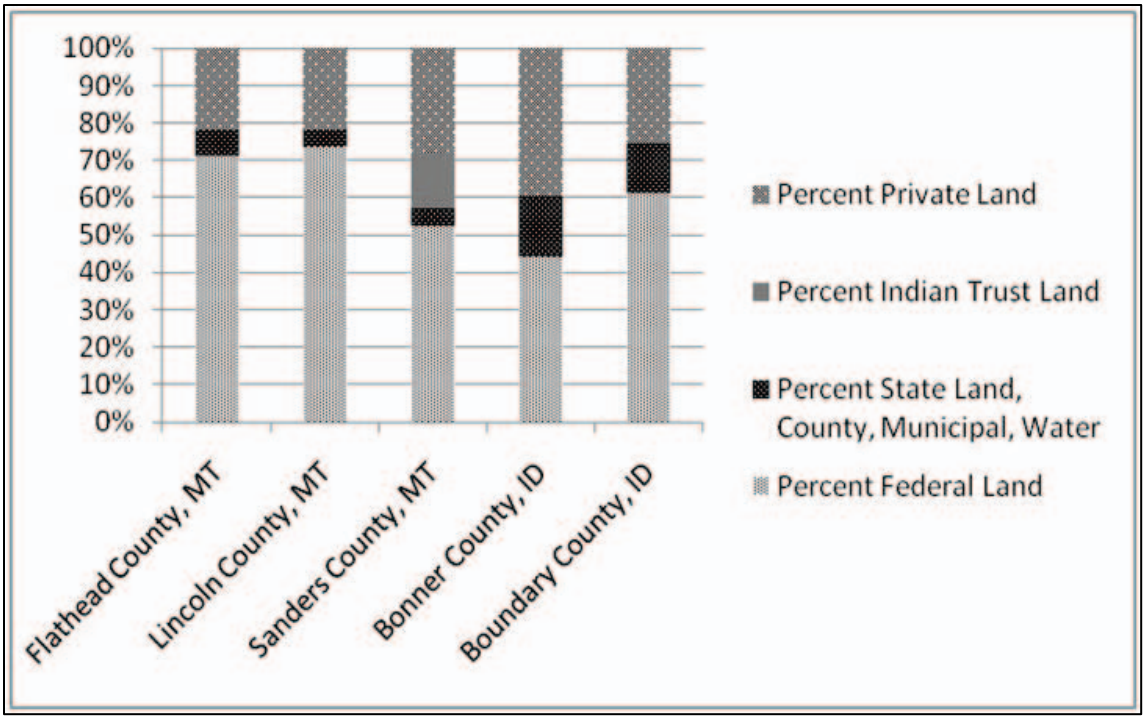
Source: U.S. Bureau of the Census

Land Ownership and Use

Many counties in the western United States contain a large amount of federal land and are influenced by management actions on these public lands. Within the analysis area, Lincoln and Flathead counties have the largest percentage of land under federal ownership at 75 and 71 percent respectively. Boundary County has the next largest at 61 percent. Sanders County is 52 percent federally owned with an additional 15 percent under tribal ownership. Bonner County has the least amount of federally owned land, at 44 percent. Figure 51 displays the percent by land ownership for each county.

For all counties, most of the federal ownership is NFS lands. The exception is Flathead County, where a large portion of the federal ownership is National Park Service land. As stated earlier, the KNF administers the largest portion of lands in Kootenai and Sanders counties. NFS lands in Flathead County are predominantly Flathead National Forest while the majority of NFS lands in Bonner and Boundary counties are administered by the IPNF. Approximately one-half of Sanders County NFS lands are administered by the Lolo National Forest.

Traditionally, the five counties in the analysis area have relied on the use of natural resources in activities such as farming, ranching, mining, and timber production. Recreation has also been an important use of forest resources among the residents of nearby communities as well as others from more distant urban areas such as Spokane, Missoula, and elsewhere. The institution of the Forest Service has also been a part of the social environment of communities in this region since development of the NFS.



Source: Montana Natural Resource Information and Idaho County Profiles

Figure 51. Percent Land Ownership by County

The five counties in the analysis area are noted for their natural resources. The counties are heavily forested, ranging from 70 percent (Flathead County) to 95 percent (Lincoln County) forestland. Timber harvest has been an important land use for all five counties.

The water resources of the area have had a significant influence, carving the river valleys that provide the major areas for settlement. The many rivers, lakes, reservoirs, and streams also provide fishing and recreation opportunities to local residents and draw visitors to the area.

In addition, the area has a wide array of wildlife; including moose, elk, white-tail deer, black bears, grizzly bears, wolves, lynx, coyotes, bird life, and a variety of fish species (please see the "Wildlife" and "Aquatics" sections for additional information). Therefore, hunting and fishing has had a large influence on settlement of the area and remains a major activity for local residents and visitors to the area.

Lincoln and Sanders counties have mineral deposits that have been mined since the early days of settlement. The most important of these mining resources are silver and copper. Even though mining in the area has declined, there is some new interest in mining. The Revett silver mine, south of Troy Montana, is currently operating, and there is consideration for opening two new mines in Lincoln and Sanders counties. The Revett Corporation is considering development of the Rock Creek mine for silver and copper extraction. This site is located in Sanders County near the Idaho and Montana border. The Noranda Corporation has indicated interest in development of the Montanore Mine, also for silver and copper extraction. The ore deposits are located in Sanders County under the Cabinet Mountains Wilderness area, but the mine site will be located in Lincoln County.

Ranching and agriculture have traditionally been important uses of land. Recently, however, land has been taken out of agricultural and corporate forest use and put into subdivision and housing

developments. As a result of this trend, the demand for land and land prices increase, assessed value and taxes increase, and agricultural and private forestry lands become more expensive to maintain and more tempting to sell for profit (Russell and Downs 1995).

For more information on historic and current trends in land uses in the five counties, see the document *Conditions and Trends: Social and Economic Systems for the Kootenai and Idaho Panhandle Plan Revision Zone* by (Russell et al. 2006).

Lifestyle, Attitude, Values, and Beliefs

Social assessments were completed for the KNF (Russell and Downs 1995, Russell and Adams-Russell 2003), covering Lincoln and Sanders counties in Montana. A social assessment was also completed for the IPNF (Parker, Wulfhorst, and Kamm 2002), encompassing communities within Boundary, Bonner, Kootenai, Benewah, and Shoshone counties in Idaho. These studies included information on lifestyles, and values and issues regarding forest management. The following summarizes the findings from these studies (excerpted from Russell et al. 2006):

- Communities have a strong rural identity and value rural lifestyles and communities. The values about rural communities include:
  - Face-to-face interpersonal relationships and knowing neighbors.
  - Personal safety and living in what is perceived to be a low-crime region in which family and children are safe.
  - Volunteerism that supports community enrichment and ways of life.
  - Mutual support for neighbors and other community members in times of need.
  - Opportunity for self-reliance and the exercise of personal freedom.
  - Preference for limited government regulation and other influence on the lifestyles and property rights of individuals.
  - The importance of the "local place" as a reference for assessing what is meaningful and valued.
- Lifestyles vary, but there are some common characteristics:
  - Individuals choose to live in these communities because of the lifestyle and benefits offered.
  - This choice often entails an economic compromise because of limited job opportunities and other means to make a living.
  - This is compensated for by the aesthetic, scenic, and open space resources of rural areas close to public lands. This results in a strong sense of place attachment.
  - Occupations have traditionally focused on resource extraction such as logging, log truck driving, mill work, equipment repair, mining, farming, and ranching. These occupations have structured the activity patterns and interactions with natural resources for many community members.
  - Individual and community identities are based on the occupational lifestyles of resource extraction such as logging, mining, and mill work.
  - Hunting, fishing, berry gathering, wildlife viewing, trail riding, and other outdoor activities are important activities valued by residents as accessible away from work activities.

  - Hunting is an especially important characteristic of local lifestyles. It has some direct economic benefit in providing food resources, but it also expresses the fundamental values of self-reliance and engagement with and appreciation of the natural world.
  - Attending church and participation in school activities, especially athletic events, are common activities expressing support for community.
- National forest lands and resources are evaluated as important local resources that contribute to the quality of lifestyles in the region. The Forest Service and the public lands they manage are perceived as providing a range of benefits to local communities, including the following:
  - The agency contributes leadership, organizational, facility, and other resources to communities. Agency personnel also participate as community members in clubs, organizations, volunteer efforts, and other elements of community life.
  - Recreational opportunities are an important perceived benefit of forest lands. Individuals and groups with diverse recreational interests value the available opportunities to pursue outdoor activities close to their residence and place of work.
  - Open space is also a significant value for residents who see forest lands as integral to the qualities of community and place of this region. Open space contributes to the rural character of communities.
  - Economic value exists in the resources that can be extracted from public lands (e.g., minerals, timber, and other plant material) and in the scenic, amenity, and recreational resources that attract tourists. Among some interest groups there is strong sentiment the national forest management is inhibiting community development by limiting timber harvests, which is believed to result in fewer jobs in local communities.
  - Fiscal benefits accrue to counties from Payments in Lieu of Taxes, funds from the Secure Rural Schools and Self-Determination Act of 2000, timber tax, and other federal payments related to public lands. These fiscal benefits often offset taxes that would otherwise be required to provide funding for schools, roads, and other state and local government programs.
  - Existence benefits are associated with special places (e.g., wilderness and roadless areas) and resources (e.g., grizzly bear) as well as with the Forest as a whole. For example, providing habitat for diverse plants and wildlife and ecological conditions that contribute to water quality.

The integration of community, place, work, recreation, and lifestyle characterizes the social environment of this region. Occupationally-based identities for individuals and communities express the history and traditions of logging, mining, mill work, and agriculture. These identities also incorporate values about the use of, and attachment to natural resources that enrich rural lifestyles and the opportunity to express personal freedom.

Communities and Change

Change characterizes the communities within the analysis area. An important source of change is the decline of the wood products and mining industries and associated businesses. Other sources of change include new residents, especially retirees and seasonal home owners, whose values and lifestyles are not always the same as those of longer-term residents. Retirees and other newcomers are sometimes perceived as demanding services and having “preservationist” values that favor limiting resource extraction from public lands. This increasing diversity of views and lifestyles is perceived to be altering the rural character of communities and personal freedom valued by longer term residents.

The Social and Economic Conditions and Trends document (Russell et al. 2006) defined and described six "community ideal types," based on categories that linked the communities to forest management (see pages 50 to 57). These categories included geographic proximity, economic, social, and cultural (values and lifestyles) criteria that link communities to forested lands and resources. Communities were then categorized by these six ideal types and current affects from forest management described.

Native American Communities — These communities will continue to have strong ties to forest management, through political, economic, social, and cultural linkages.

Urban Regional Centers — These communities are tied to forest management primarily through recreational use and the existence and amenity values of nearby national forest(s).

Commodity Communities — These communities are tied to forest management through commodity production or processing. Forest management under the alternatives is expected to continue to provide wood fiber, grazing, and minerals close to current levels.

Transition Communities — These communities are tied to forest management through the production of both commodities and recreation values.

Diversity Communities — These communities are tied to forest management primarily through recreation, sense of place (aesthetics and place meanings and values), and access to forested lands.

Rural Forest Communities — These communities are tied to forest management through the production of commodities, recreation, place, and lifestyle. This type of community has similar linkages to forest management as commodity and transition communities.

The Social and Economic Conditions and Trends document also included a table with a suggested categorization of communities within the study area. Table 93 lists those communities from Russell et al. (2006) that are within the planning area.

Table 93. Planning Area Communities by Ideal Type

Place	Community Ideal Type
Bonner County, ID	
Clark Fork	Rural Forest
Dover	Diversity
East Hope	Rural Forest
Kootenai	Diversity
Oldtown	Transition
Ponderay	Diversity
Priest River	Transition
Sandpoint	Diversity
Boundary County, ID	
Bonners Ferry	Transition
Moyie Springs	Rural Forest
Lincoln County, MT	

Place	Community Ideal Type
Eureka	Transition
Fortine	Transition
Libby	Transition
Rexford	Rural Forest
Troy	Transition
Sanders County, MT	
Dixon	Rural Forest
Heron	Rural Forest
Hot Springs	Rural Forest
Lonepine	Rural Forest
Noxon	Rural Forest
Paradise	Rural Forest
Plains	Transition
Thompson Falls	Transition
Trout Creek	Rural Forest
Associated Communities Outside of the Study Area	
Spokane, WA	Urban Regional Center
Kalispell, MT	Urban Regional Center
Missoula, MT	Urban Regional Center

Source: Russell et al. 2006

Employment and Income

Employment by industry describes the distribution of jobs by economic sector. The Bureau of Economic Analysis maintains and updates these data. The most current information (for the year 2008) uses the North American Industry Classification System. This classification system has been used since 2001. Table 94 displays employment by industry for 2001 and 2008.

Proprietor employment increased in all five counties from 2001 to 2008 and is significantly higher than found for the entire U.S., which was 21.3 percent in 2008. Sanders County had the highest percentage in proprietor employment (42.7 percent) and Flathead County the lowest (31.2 percent) in 2008.

The Government sector was one of the top three employers in all five counties. All counties saw a decline in the percentage of employment in Government from 2001 to 2008. In 2008, Lincoln and Boundary counties were above the percent of Government employment for the entire U.S. (13.5 percent), while the remaining three counties were below the national figure.

Retail trade, health care, and construction are also top employers in all five counties. Retail trade fell from 2001 to 2008 in Flathead, Sanders, and Bonner. Health care also decreased in all counties except Lincoln. Construction increased in all five counties. All counties except Bonner County also saw a decline in manufacturing employment from 2001 to 2008.

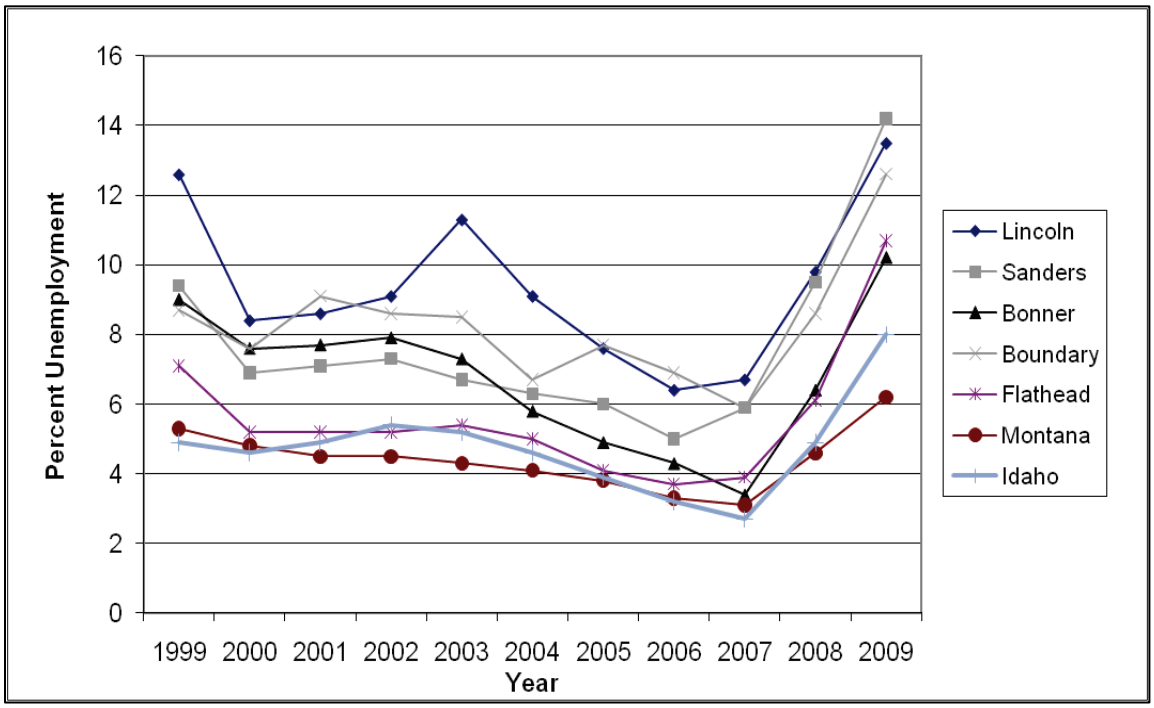
Table 94. Employment by Industry, 2001 and 2008

	Flathead		Lincoln		Sanders		Bonner		Boundary	
	2001	2008	2001	2008	2001	2008	2001	2008	2001	2008
Employment by Place of Work										
Total Employment	50,173	63,713	8,742	9,833	5,162	5,924	20,258	25,272	5,021	5,810
By Type (percent of total employment)										
Wage and salary employment	70.9%	68.8%	64.8%	61.0%	60.2%	57.3%	64.7%	60.5%	70.7%	66.5%
Proprietors employment	29.1%	31.2%	35.2%	39.0%	39.8%	42.7%	35.3%	39.5%	29.3%	33.5%
By Industry (percent of total employment)										
Farm employment	2.3%	1.7%	3.6%	3.5%	10.2%	9.3%	3.1%	2.8%	8.1%	9.4%
Non-farm employment	97.7%	98.3%	96.4%	96.5%	89.8%	90.7%	96.9%	97.2%	91.9%	90.6%
Private employment	88.3%	90.2%	79.5%	82.9%	75.2%	78.4%	85.1%	87.2%	70.4%	70.9%
Forestry, fishing, related activities, and	1.5%	1.2%	7.2%	5.4%	5.2%	4.3%	3.9%	2.7%	6.7%	(D)
Mining	0.6%	1.0%	0.5%	3.0%	1.2%	2.1%	0.6%	0.9%	0.2%	(D)
Utilities	0.3%	0.3%	(L)	(D)	1.1%	0.7%	(D)	0.5%	(D)	0.2%
Construction	9.6%	11.5%	7.6%	9.6%	6.8%	9.5%	10.4%	11.5%	6.9%	10.4%
Manufacturing	8.2%	6.4%	9.4%	4.5%	6.8%	6.0%	9.3%	9.9%	9.9%	6.0%
Wholesale trade	1.9%	2.1%	1.0%	(D)	1.7%	1.6%	(D)	1.4%	1.3%	0.9%
Retail trade	13.2%	12.5%	12.0%	12.4%	9.5%	9.1%	16.0%	13.7%	10.9%	11.5%
Transportation and warehousing	2.8%	2.2%	2.7%	2.8%	3.4%	3.3%	2.3%	2.0%	3.5%	3.4%
Information	1.5%	1.4%	1.6%	1.0%	1.0%	0.8%	1.2%	1.2%	0.9%	0.7%
Finance and insurance	3.5%	4.0%	2.6%	2.2%	2.1%	2.2%	2.9%	3.0%	1.0%	2.1%
Real estate and rental and leasing	4.7%	7.2%	4.1%	5.7%	4.0%	6.1%	4.5%	7.6%	(D)	3.6%
Professional and technical services	6.6%	5.0%	3.1%	(D)	(D)	3.1%	5.1%	5.6%	3.8%	3.9%
Management of companies and	0.3%	0.3%	(D)	(D)	(D)	0.2%	0.3%	(D)	0.0%	0.0%
Administrative and waste services	5.5%	6.4%	(D)	3.4%	(D)	1.7%	2.3%	(D)	1.7%	3.3%
Educational services	0.9%	1.2%	0.4%	0.7%	(D)	3.1%	1.3%	1.1%	1.1%	1.8%
Health care and social assistance	8.6%	9.5%	9.7%	11.7%	(D)	9.6%	6.2%	6.0%	11.2%	8.6%
Arts, entertainment, and recreation	3.1%	3.6%	2.0%	2.6%	1.4%	1.9%	3.9%	3.6%	0.9%	0.8%
Accommodation and food services	9.3%	8.8%	6.9%	6.3%	6.6%	7.5%	6.5%	6.3%	3.3%	2.5%
Other services, except public admin.	6.2%	5.7%	6.7%	7.4%	5.0%	5.7%	6.6%	6.6%	4.6%	5.0%
Government and government. enterprises	9.4%	8.1%	17.0%	13.7%	14.6%	12.4%	11.7%	10.0%	21.4%	19.7%
Federal, civilian	1.7%	1.3%	5.4%	4.9%	2.5%	2.3%	1.3%	0.8%	2.5%	2.6%
Military	0.8%	0.7%	1.1%	1.0%	1.1%	0.9%	0.7%	0.6%	0.8%	0.8%
State and local	6.9%	6.1%	10.5%	7.9%	11.0%	9.1%	9.7%	8.6%	18.1%	16.3%

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals; (L) less than 10 jobs

Source: Bureau of Economic Analysis website http://www.bea.gov/regional/reis/, table CA25

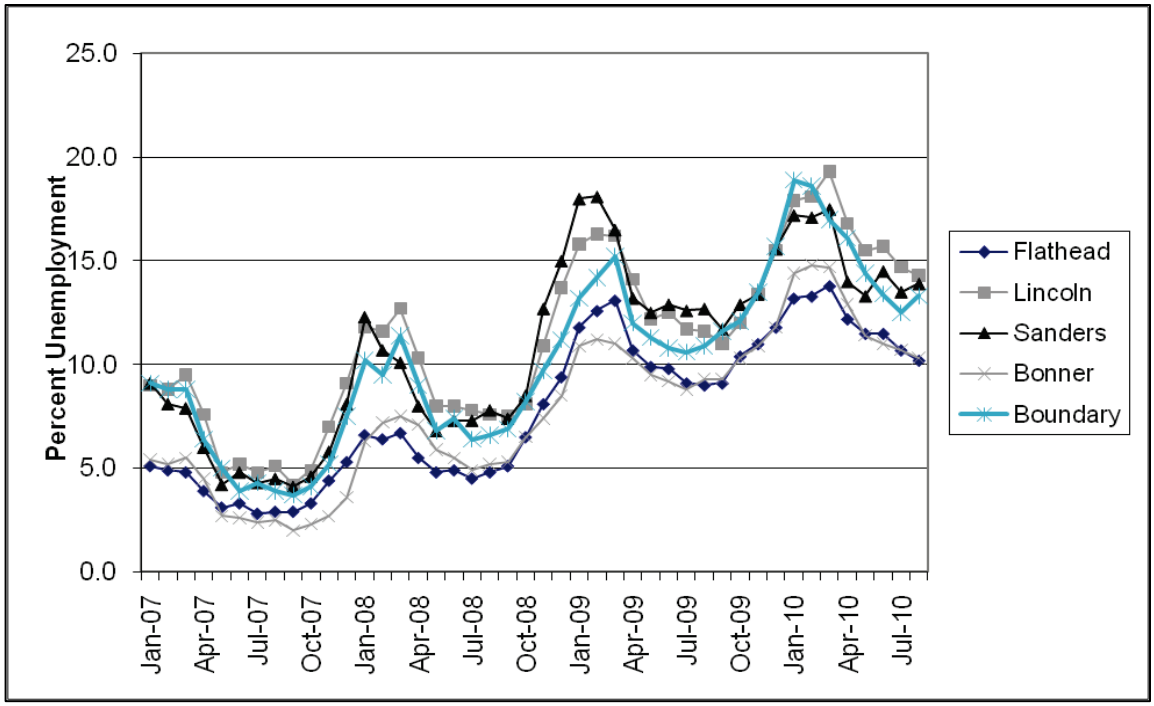
The Bureau of Labor Statistics maintains information about annual unemployment rates for counties, states, and regions. These data are a consistent and comparable source of information about county unemployment rates, although they do not include information about some data, such as discouraged workers. Average annual unemployment data for an eleven year period (figure 52) indicates that all counties show higher than average annual unemployment rates when compared to State rates. Lincoln, Sanders, and Boundary counties have the highest unemployment rates while Flathead and Bonner are lower.



Source: Bureau of Labor Statistics at http://www.bls.gov/lau

Figure 52. Percent Unemployment by County

Unemployment has a strong seasonal pattern among the counties as indicated in figure 53. As the chart shows, around March unemployment begins to drop and continues to drop until about September. The highest months of unemployment are from November through April. These seasonal variations are probably related to jobs in construction, agriculture, and natural resource related employment.



Source: Bureau of Labor Statistics at http://www.bls.gov/lau

Figure 53. Percent Unemployment by Month by County

The per capita income by county and state is displayed in table 95. Of the five counties, only Flathead County, Montana is above the State's average per capita income. In 2008, Flathead County had the highest and Boundary County the lowest per capita income. All five counties and both states were below the national per capita income level of $40,166 in 2008. Lincoln County experienced the highest average annual growth in per capita income from 1998 to 2008, exceeding the State average and the national average (4.0 percent). Bonner and Boundary counties have the lowest average annual growth in per capita income from 1998 to 2008.

Table 95. Per Capita Income by County and State

County/State	1998 Per Capita Income	2008 Per Capita Income	1998 – 2008 Average Annual Growth Rate
Flathead County	$23,125	$34,982	4.2%
Lincoln County	$16,438	$27,191	5.2%
Sanders County	$15,748	$25,162	4.8%
Montana State	$21,459	$34,622	4.9%
Bonner County	$18,938	$31,127	3.8%
Boundary County	$16,728	$24,382	3.8%
Idaho State	$22,234	$32,944	4.0%

Source: U.S. Department of Commerce, Bureau of Economic Analysis website http://www.bea.gov/bea/regional/bearfacts

Income by industry describes the distribution of earning among the categories of employment used by the Bureau of Economic Analysis. Table 96 displays the percentage of income generated by major industries in 2001 and 2008.

Table 96. Compensation by Industry, 2001 and 2008

	Flathead		Lincoln		Sanders		Bonner		Boundary	
	2001	2008	2001	2008	2001	2008	2001	2008	2001	2008
Earnings by Place of Work										
Total Earnings (thousands of dollars)	1,103,520	1,791,163	160,282	232,988	78,004	115,123	370,991	605,381	101,403	148,794
By Industry (percent of total earnings)										
Farm earnings	0.3%	0.2%	0.2%	0.3%	3.1%	2.2%	0.3%	0.3%	2.7%	6.3%
Nonfarm earnings	99.7%	99.8%	99.8%	99.7%	96.9%	97.8%	99.7%	99.7%	97.3%	93.7%
Private earnings	83.1%	84.2%	62.8%	65.4%	65.6%	68.5%	77.8%	80.0%	63.8%	59.7%
Forestry, fishing, related activities, and other	1.0%	0.7%	6.2%	4.7%	2.7%	1.6%	2.8%	1.4%	6.4%	(D)
Mining	0.6%	0.9%	0.2%	6.4%	1.6%	3.0%	1.0%	1.3%	0.0%	(D)
Utilities	1.0%	0.9%	0%	(D)	4.1%	3.3%	(D)	1.8%	(D)	0.1%
Construction	8.4%	10.2%	4.6%	5.8%	3.6%	5.4%	7.2%	8.1%	3.9%	7.7%
Manufacturing	15.4%	10.9%	16.1%	4.7%	9.4%	8.2%	15.7%	15.9%	16.3%	8.6%
Wholesale trade	2.4%	3.3%	0.8%	(D)	1.7%	1.4%	(D)	1.9%	1.5%	1.7%
Retail trade	10.9%	10.6%	7.4%	8.2%	5.8%	7.3%	17.9%	18.5%	8.4%	9.9%
Transportation and warehousing	4.9%	3.6%	3.4%	2.7%	3.5%	3.4%	2.7%	1.9%	4.0%	4.0%
Information	2.0%	1.9%	2.2%	1.2%	1.9%	0.9%	1.6%	1.3%	0.5%	0.3%
Finance and insurance	4.7%	5.9%	2.9%	1.9%	2.9%	2.6%	3.7%	3.7%	0.8%	2.5%
Real estate and rental and leasing	1.0%	1.4%	0.4%	1.4%	0.5%	0.4%	0.8%	1.2%	(D)	0.5%
Professional and technical services	5.5%	4.1%	1.7%	(D)	(D)	2.8%	3.8%	4.6%	4.3%	3.1%
Management of companies and enterprises	0.5%	0.9%	(D)	(D)	(D)	0%	0.5%	(D)	0.0%	0.0%
Administrative and waste services	3.7%	4.7%	(D)	2.5%	(D)	0.4%	0.7%	(D)	0.6%	1.5%
Educational services	0.6%	1.0%	0.2%	0.3%	(D)	5.4%	1.1%	0.8%	0.9%	1.8%
Health care and social assistance	10.7%	13.0%	9.7%	14.4%	(D)	14.3%	5.7%	6.0%	12.6%	9.1%

	Flathead		Lincoln		Sanders		Bonner		Boundary	
	2001	2008	2001	2008	2001	2008	2001	2008	2001	2008
Arts, entertainment, and recreation	1.4%	1.8%	0.8%	1.5%	0.3%	0.7%	2.2%	2.5%	0.1%	0.2%
Accommodation and food services	5.7%	5.7%	3.2%	3.7%	3.4%	4.4%	3.4%	3.5%	1.3%	1.0%
Other services, except public admin.	2.8%	2.7%	2.6%	2.8%	2.2%	3.1%	3.4%	3.5%	1.7%	2.3%
Government and gov't. enterprises	16.7%	15.6%	37.0%	34.3%	31.3%	29.2%	22.0%	19.6%	33.5%	34.0%
Federal, civilian	4.7%	3.6%	18.0%	18.3%	9.1%	9.3%	3.9%	2.6%	7.8%	9.7%
Military	0.6%	1.0%	1.0%	1.7%	1.2%	2.0%	0.7%	1.1%	0.6%	1.2%
State and local	11.3%	10.9%	18.0%	14.3%	21.0%	17.9%	17.4%	15.9%	25.0%	21.3%

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals

Source: Bureau of Economic Analysis website http://www.bea/gov/regioma;/reis/ , table CA06

Several of these industries connect local economies to national forests. For example, Farm Earnings may include income from individuals with grazing permits and the forestry, fishing, and related activities industry, as well as manufacturing, may include earnings from persons in the wood processing industry. Retail and wholesale trade, accommodations, and arts and entertainment include earnings from persons who provide services to tourists as well as to local residents. U.S. Forest Service earnings are captured in the Government and Government Enterprises industry.

Table 96 shows that Government generates the largest portion of income in all counties. The manufacturing industry, which includes wood processing mills and facilities, was the second or third highest contributor of private earnings in all counties in 2001. By 2008, manufacturing's contribution had decreased in all but Bonner County and was no longer in the top three industries for earnings in Lincoln and Boundary counties. Collectively, sectors associated with tourism (retail and whole sale trade, accommodations and food services, arts and entertainment) are also among the important contributors to private earnings. The percentage of earnings in these industries typically increased in all five counties from 2001 to 2008.

Wildland Economic Dependency

The National Forest-Dependent Rural Communities Economic Diversification Act of 1990 (Public Law 101-624) defined a county as being wildland dependent if 15 percent or more of their total county labor income (primary and secondary income) came from industries associated with forest resources. Primary income is income derived directly from the industrial sectors constituting the primary wildland industries and secondary income is that derived from indirect and induced effects associated with primary income (the multiplier effect) (Gebert and Odell 2007). Economic dependency on wildland natural resources can be assessed by estimating the proportion of primary and secondary labor income generated in natural resource industries relative to the labor income for all industries. A reliable source of county-level labor income data by industry is found in the IMPLAN input-output modeling system. Primary (direct) labor income is defined as the sum of employee compensation and proprietor income. Secondary labor income is calculated by using an IMPLAN Type II labor income multiplier that includes "indirect" and "induced" effects derived from primary labor income. Total labor income effects are the sum of primary plus secondary labor income.

Natural resource (or wildland) dependency was measured for the following industries: 1) grazing, 2) timber, 3) mining, 4) wildland federal government management (e.g., Forest Service and BLM employment, etc.), and 5) recreation expenditures tied to recreation activity occurring on all private and public wildland (Gebert and Odell 2007).

Table 97 shows wildland economic dependency by county based on the relationship of labor income generated by the natural resource industries to total labor income. The table indicates the total wildland dependency is highest in Lincoln County (56.8 percent) and lowest in Flathead and Bonner counties. For all counties, timber is the largest contributor to wildland income, while grazing and mining are much less than three percent. Data in the table is based on economic activity in the year 2000. Current dependency on timber is probably less in all counties except Bonner, given the decrease in employment and income in this industry since 2000.

Table 97. Wildland Dependency —Total Labor Income by Category (2000 data)

County	% Total Non-Wildland	% Grazing	% Timber	% Mining	% Wildland Government	% Recreation
Flathead	79.8%	0.1%	9.9%	0.8%	7.7%	1.7%
Lincoln	43.2%	0.2%	42.1%	0.2%	7.4%	6.9%
Sanders	72.1%	2.5%	13.8%	0.7%	4.0%	6.9%
Bonner	71.6%	0.2%	24.0%	1.1%	1.2%	1.2%
Boundary	55.7%	0.3%	38.1%	0.1%	2.0%	3.8%

Source: Results from Gebert and Odell 2000 data set (Gebert and Odell, 2007)

Economic Contribution of the National Forests to the Economic Study Area

Management of national forests contributes to the local economies by the products (e.g., timber, minerals, etc.) that are produced on the national forests and processed in the local economy; by uses (e.g., recreation visits, etc.) that occur on the national forests; and by the service provided by employees of the national forests. This analysis is similar to the wildland dependency analysis with the exception that only Forest Service related products, uses, and services are considered.

An IMPLAN input-output model was constructed to estimate the economic contribution of the national forests to the analysis area economy. The IMPLAN model was constructed using 2008 IMPLAN data (the most recent IMPLAN data available).

The results for the contribution analysis for the KNF are displayed in table 98, which shows employment and labor income for the analysis area (columns labeled “Area Totals”) and the employment and labor income attributable to Forest Service related activities (columns labeled “FS-Related”). The results indicate there are approximately 1,190 full- and part-time jobs and $55 million in labor income in the study area attributable to the KNF activities. This is 1.2 percent of the employment and 1.5 percent of the labor income of the study area economy. The products, uses, and services of the KNF have its largest effect in the government sector with 373 (31 percent) of the 1,188 jobs and $20.3 million (37 percent) of the $55.46 million labor income. The five sectors with the most employment attributable to KNF activities are government; accommodation and food services; forestry and related activities; manufacturing; and retail trade. For labor income, the top five sectors are government; mining; manufacturing; forestry and related activities; and health care.

The dependency analysis presented earlier indicated that some of the counties in the study area were highly dependent on wildland activities, with the total impact area showing 29 percent dependency on wildland-based industries. The analysis of jobs and income attributable to KNF activities indicates there is only a small portion (just over 1 percent) of the study area jobs and income generated by Forest Service activities. The contributions results suggest that the wildland-dependent activities are tied to non-Forest Service lands.

Table 98. Current Role of the KNF-Related Contribution to the Area Economy

	Employment (jobs)		Labor Income (Thousands of 2009 dollars)	
Industry	**Area Totals**	**FS-Related**	**Area Totals**	**FS-Related**
Forestry, fishing, related activities, other	4,605	96	$119,007	$3,480
Mining	802	72	$63,030	$9,316
Utilities	412	3	$89,746	$747
Construction	11,404	57	$388,853	$2,144
Manufacturing	7,014	81	$382,163	$4,481
Wholesale Trade	1,815	21	$91,028	$1,062
Retail Trade	12,683	80	$378,225	$2,261
Transportation & Warehousing	2,189	17	$110,890	$756
Information	1,329	8	$51,701	$326
Finance & Insurance	3,158	17	$153,467	$843
Real Estate & Rental & Leasing	5,091	31	$126,489	$785
Prof, Scientific, & Tech Services	4,528	29	$221,722	$1,383
Mgmt of Companies	263	3	$21,423	$238
Admin, Waste Mgmt & Rem Serv	4,652	26	$115,297	$649
Educational Services	1,285	7	$27,338	$146
Health Care & Social Assistance	9,329	72	$382,391	$2,941
Arts, Entertainment, and Rec	3,221	23	$61,447	$448
Accommodation & Food Services	8,034	128	$141,502	$2,353
Other Services	6,514	44	$112,453	$783
Government	11,299	373	$582,102	$20,312
Total	**99,631**	**1,188**	**3,620,274**	**55,455**
Forest Service as Percent of Total	---	1.2%	---	1.5%

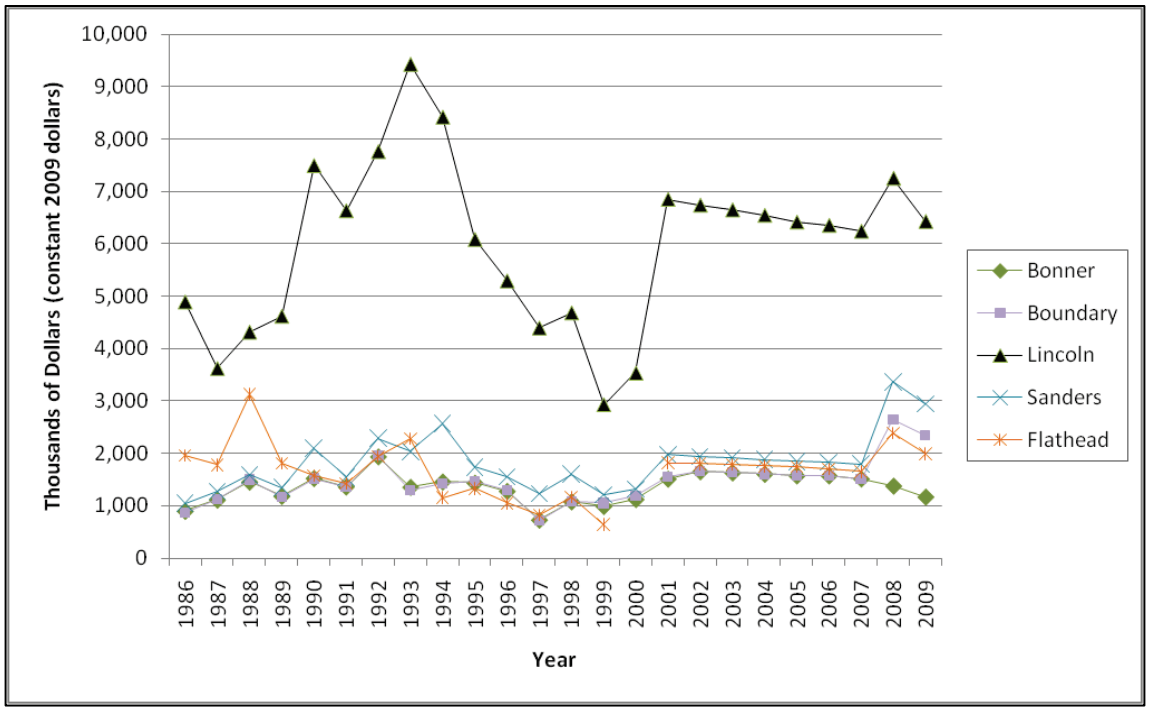
Payments to Counties

Counties containing NFS lands receive payments from the federal government to compensate for critical services they provide to both county residents and visitors to these federal lands. Congress enacted in 1908 and subsequently amended a law (the National Forest Revenue Act) that requires that 25 percent of the revenues derived from NFS lands be paid to States for use by the counties in which the lands are situated for the benefit of public schools and roads. Since 1908, the affected counties have received these payments. Under this act, payments to counties changed from year to year due to the fluctuation in volume and revenues generated by timber sales.

The Secure Rural Schools and Community Self-Determination Act (Public Law 106-393) was enacted in October 2000. The purpose of this act was to stabilize payments to counties. Under this law, for fiscal years 2001 through 2006, counties had the choice of receiving either (1) the 25-percent payment as under the Act of 1908 or (2) an amount equal to their proportion of the average of the State's three highest 25-percent payments from fiscal year 1986 through fiscal year 1999. All counties in the planning area chose option 2. The law was extended in 2007 for

one year. The law was then reauthorized in 2008 with some changes and provides payments through 2011.

Payments to the counties for 1986 to 2009 are shown in figure 54. The graph shows the payments to counties have fluctuated greatly over the last two decades. Payments somewhat stabilized in 2001 under the Secure Rural School Act. In the analysis area, Lincoln County has received the highest payments since 1986, with payments substantially higher than the other counties.



Source: U.S. Forest Service at https://fsplaces.fs.fed.us/fsfiles/unit/r4/payments_to_states.nsf

Figure 54. Forest Service Payments by County — 1986 to 2009 (in constant, 2009 dollars)

Counties also receive payments in lieu of taxes. Under the Payments in Lieu of Taxes Act of 1976, Congress provided payments to units of local government, typically counties, containing federal lands. These payments are designed to supplement other federal land receipt sharing payments that local governments may receive. The act authorizes payments under one of two alternatives, with formulas that consider such factors as other forms of revenue sharing, acreage, and population. These payments are made directly to counties and may be used for any purpose. Payments in Lieu of Taxes can be and recently have been limited by Congress through the appropriations process. Congress has not appropriated sufficient funds to fund the full payments to counties since 1994. Payments increased in 2008 under the Emergency Economic Stabilization Act of 2008.

Table 99 shows total federal payments to counties for 2009. Flathead County received the highest and Boundary County the lowest payments in lieu of taxes. Lincoln County has the highest total federal payments.

Table 99. Federal Land Payments to Analysis Area Counties, 2009

	Flathead County, MT	Lincoln County, MT	Sanders County, MT	Bonner County, ID	Boundary County, ID
Total Federal Land Payments by Geography of Origin ($)	4,248,027	7,003,860	3,243,246	1,463,137	2,551,205
PILT	2,253,122	570,558	298,584	289,913	210,551
Forest Service Payments	1,994,905	6,433,277	2,944,657	1,174,639	2,340,554
BLM Payments	0	25	5	-1,415	100

Source: U.S. Department of Interior, 2009. Payments in Lieu of Taxes (PILT), Washington D.C.; U.S. Department of Agriculture, 2009. Forest Service, Washington, D.C.; U.S. Department of Interior. 2009. Bureau of Land Management, Washington, D.C.

The contribution of federal land payments to county budgets is illustrated in table 100. Lincoln County is the most affected by the payments to government, with almost 25 percent of the county revenues generated by federal land payments. Bonner and Flathead counties are the least affected, with less than five percent of their county revenue generated by federal land payments.

Table 100. Federal Land Payments as a Share of Total General Government Revenue, FY2007 (2009 dollars)

	Flathead County, MT	Lincoln County, MT	Sanders County, MT	Bonner County, ID	Boundary County, ID
Total General Revenue	59,997	16,337	10,768	35,989	19,726
Taxes	34,012	5,912	5,752	19,609	3,989
Intergovernmental Revenue	9,965	6,392	3,202	8,337	4,713
Total Charges	12,809	2,496	1,152	5,932	10,556
All Other (Miscellaneous)	3,212	1,537	662	2,112	468
Federal Land Payments (FY 2006)	2,401	4,072	1,284	1,034	1,064
Percent of Total					
Taxes	56.7%	36.2%	53.4%	54.5%	20.2%
Intergovernmental Revenue	16.6%	39.1%	29.7%	23.2%	23.9%
Total Charges	21.3%	15.3%	10.7%	16.5%	53.5%
All Other (Miscellaneous)	5.4%	9.4%	6.1%	5.9%	2.4%
Federal Land Payments (FY 2006)	4.0%	24.9%	11.9%	2.9%	5.4%

Source: U.S. Department of Commerce. 2009. Census of Governments Survey of State and Local Government Finances, Washington, D.C.; U.S. Department of Interior, 2006. Payments in Lieu of Taxes (PILT), Washington D.C; U.S. Department of Agriculture, 2006. Forest Service, Washington, D.C.; U.S. Department of Interior. 2006. Bureau of Land Management, Washington, D.C.

Environmental Consequences

General Effects

The KNF provides a variety of uses, values, benefits, products, services, and visitor opportunities (termed “outputs and values”). Under all alternatives, these outputs and values will be provided in a sustainable manner, supplying outputs and values for current and future generations. These

outputs and values contribute to the sustainability of the social and economic systems within the analysis area.

While the analysis area is affected by the management activities, uses, and outputs of the KNF, there are also many external factors that affect local counties and communities. These external factors include national and regional population trends, national trade agreements, state and national laws and regulations, technological advances in manufacturing, technological advances in recreation equipment, cultural trends, and changes in societal values. These external factors often have a larger impact on the social and economic environment than does management of the KNF. This section addresses the potential effects from KNF management decisions from the alternatives.

Population

Population is not expected to vary by alternative. Current trends are expected to continue over the life of the Plan, with slower population growth in Lincoln, Sanders, and Boundary counties and faster growth in Flathead and Bonner counties.

Land Ownership and Use

Land ownership is not expected to change under any alternative. There may be some land exchanges in the future, but it is not expected to result in any net increase in lands administered by the KNF. Any future land exchanges or sales would be assessed to determine specific impacts.

Some land uses will vary by alternative. Timber harvest levels vary based on MA allocation and management intensity as determined by the theme of the alternative. See chapter 2 for a description of the alternatives. Total recreation numbers are not expected to change by alternative, but the opportunities and quality of the experiences may vary. Acres and miles available for wheeled motor vehicle use do not change by alternative. Opportunities for over-snow vehicle use vary by alternative. Mining and grazing uses do not change by alternative.

Alternative C has the greatest amount of land in recommended wilderness, with an emphasis on backcountry, nonmotorized recreation. This alternative has the least amount of active management, with the lowest timber harvest level. Alternative B has the second highest amount of land in recommended wilderness and nonmotorized recreation, with the second lowest timber harvest level. Alternative D has the greatest amount of land in general forest management, with an emphasis on timber harvest and motorized recreation. This alternative has the least amount of recommended wilderness and backcountry uses, with the highest timber harvest level. Alternative A has the second lowest amount of land in recommended wilderness and the second highest timber harvest level and motorized recreation opportunities.

Lifestyles, Attitudes, Values, and Beliefs

The outputs and values provided by the KNF contribute to the quality of lifestyles found in the planning area. Some of these outputs and values vary by alternative.

For those valuing timber harvest or having a lifestyle that is tied to the logging or manufacturing industries, the alternative with the most timber harvest would add to their quality of life more than those alternatives with lower timber harvest levels. Alternative D provides the highest, Alternatives A and B the next highest levels, while Alternative C provides the lowest amount of timber harvest.

Although total recreation use numbers are not expected to change by alternative, opportunities for specific types of recreation and the quality of the experience will vary based on management allocation and the emphasis of the alternative. For those valuing nonmotorized and wilderness recreation, the existence of special places, scenery and open spaces, the alternative with the most recommended wilderness and backcountry MAs would add to their quality of life more than the other alternatives. Alternative C provides the greatest opportunity for these types of values, followed by Alternative B and A. Alternative D provides the least opportunity for these types of values.

For those valuing motorized recreation opportunities, the alternative with the most general forest and motorized backcountry MAs would add to their quality of life more than other alternatives. Alternative D provides the most opportunity for this type of recreation, followed by Alternative A and B. Alternative C provides the least opportunity for this type of recreation.

Communities and Change

As described above, an important source of change in the communities within the analysis area has been a decline in the wood products industries. Alternative D would provide for the most timber harvest, which may help to slow some of this change. Alternative C would provide the least amount of timber harvest; and thus, may result in increased change.

The following is a description of the trends expected under the alternatives for the six community types (as described in the "Affected Environment"):

Native American Communities – Under all alternatives, forest managers are expected to continue to coordinate with and provide for Native American rights and interests.

Urban Regional Centers – Forest management under the alternatives is expected to continue to provide for a variety of recreational opportunities, at or above current levels, as well as other amenities such as scenery and solitude. The types of recreation opportunities vary under alternatives, with Alternative C providing for the greatest amount of nonmotorized recreation and least amount of motorized recreation opportunities. Alternative D provides the most motorized recreation and the least amount of nonmotorized recreation opportunities. Some decrease in the quality of recreational experiences may occur as populations increase, causing crowding of popular sites. These urban regional centers are expected to continue to expand, diversify, and grow into the future.

Commodity Communities – Forest management under the alternatives is expected to continue to provide wood fiber, grazing, and minerals close to current levels. Alternative D would provide the highest level of commodity production and Alternative C the lowest level. These communities are expected to continue to change as new residents move in, bringing different attitudes, values, and beliefs. This change in community values, beliefs, and identities creates social tension related to resource management issues. These communities are expected to evolve into Transition Communities (described below) as their populations and businesses change.

Transition Communities – Forest management under the alternatives is expected to continue to provide commodities and recreation opportunities close to current levels. Alternative D would provide the highest level of access and commodity production and Alternative C the lowest levels. Access to the Forest will continue to be an issue and source of conflict, with a desire by some for more access, a desire by others for less, and resource concerns limiting management decisions. The ability to increase access opportunities will remain limited under all

alternatives. These communities will continue to undergo a great deal of change, as populations and businesses diversify, and economic structures, patterns of use, and values about forest resources change.

Diversity Communities – Forest management under the alternatives is expected to continue to provide a variety of recreational opportunities at or above current levels. The types of recreation opportunities vary under alternatives, with Alternative C providing for the greatest amount of nonmotorized recreation and least amount of motorized recreation opportunities. Alternative D provides the most motorized recreation and the least amount of nonmotorized recreation opportunities. Access will continue to be a management challenge under the alternatives, with limited or no ability to provide increased opportunities due to other resource concerns. Changes in access may occur to specific areas, roads, or trails. Due to their economic and social diversity, these communities more easily able to adapt to changing conditions with increased population and forest management than Transition or Commodity communities.

Rural Forest Communities – Outcomes under the alternatives would be similar to Commodity and Transition communities, with commodity and recreation use close to current levels for all alternatives and highest under Alternative D. New residents to these communities will continue to affect change through a diversification of attitudes, values, and beliefs.

Employment and Income

Local employment and income is affected by changes in outputs and uses on the Forest. As described in the "Methodologies" section above, the IMPLAN modeling system was used to estimate changes to jobs and income from expected output and use levels for each alternative. Economic effects were predicted with and without extension of county payments under the Secure Rural Schools and Community Self-Determination Act.

Although the differences between the alternatives in many cases are relatively small, the impacts may be considerable to individuals, families, or businesses. In very small communities, the loss of a single job may be very important, yet negligible across the analysis area.

Table 101 displays the employment and table 102 the income associated with KNF management for the five-county analysis area by alternative. These tables compare the alternatives to current levels of employment and income.

Table 101. Employment by Program for Current Management and by Alternative (average annual, decade 1)

Resource	Current Mgmt	Alt A	Alt B	Alt C	Alt D
Recreation: non-local only	122	138	138	138	138
Wildlife and Fish: non-local only	68	77	77	77	77
Grazing	4	4	4	4	4
Timber	210	497	469	407	496
Minerals	157	157	157	157	157
Payments to States/Counties	139	139	139	139	139
Forest Service Expenditures	488	488	488	488	488
Total Forest Management	1,188	1,501	1,473	1,410	1,499
Percent Change from Current	---	26.3%	23.9%	18.7%	26.2%

Table 102. Labor Income by Program for Current Management and by Alternative (average annual, decade 1; Thousands of Dollars)

Resource	Current Mgmt	Alt A	Alt B	Alt C	Alt D
Recreation: non-local only	$3,203	$3,619	$3,619	$3,619	$3,619
Wildlife and Fish: non-local only	$1,928	$2,178	$2,178	$2,178	$2,178
Grazing	$36	$36	$36	$36	$36
Timber	$9,666	$23,330	$22,032	$19,100	$23,278
Minerals	$12,462	$12,462	$12,462	$12,462	$12,462
Payments to States/Counties	$4,938	$4,938	$4,938	$4,938	$4,938
Forest Service Expenditures	$23,223	$23,223	$23,223	$23,223	$23,223
Total Forest Management	**$55,455**	**$69,786**	**$68,488**	**$65,556**	**$69,734**
Percent Change from Current	---	25.8%	23.5%	18.2%	25.7%

The largest difference between the alternatives and the current amounts is based on changes to timber. The timber output for current management is an average of the amount that was harvested in fiscal years 2007, 2008, and 2009. Timber harvest during this time period was very low because of poor market conditions following the decline in the housing market. For the alternatives, the timber output is the average annual first decade timber sold as modeled in Spectrum. The timber sold level for the alternatives is similar to the amount of timber sold over the last five years. However, timber harvest levels have been greatly reduced based on market conditions. See the “Timber” section in chapter 3 and appendix B for more information on the modeling and results for predicted timber volume sold.

Recreation, wildlife, and fish outputs are constant for all alternatives. Levels are expected to increase by 13 percent over current levels based on expected population growth over the next 10 years in the western U.S. (2000 U.S. Census data, Population Projections table 6).

Grazing and minerals are constant for current management and all alternatives. Decisions made in the Forest Plan are not expected to change grazing or mineral output levels, so these levels remained constant. Forest Service Expenditures also remain constant for all alternatives because the analysis on output levels was conducted with the assumption that current level of budgets would continue under the Forest Plan.

Payments to State/Counties remains constant for current management and all alternatives based on expected continuation of the Secure Rural Schools and Community Self-Determination Act. Under this act, forest management does not affect federal payments to states and counties. An analysis was conducted to determine the effect if this act was not extended and payments reverted to the 25 percent Payments. If this was to occur, employment would be decreased by approximately 110 jobs and $4,000,000 in labor income in all alternatives.

Payments to Counties

KNF management will not affect payments to counties if the Secure Rural Schools and Community Self-Determination Act is reauthorized into the future. However, if this act expires and no other act replaces it, payments would revert to 25 percent Payments (as under the National Forest Revenue Act of 1908). If this were the case, payments to counties would be greatly diminished from current levels. Alternatives providing the highest level of receipts would

provide the highest amount of payments to counties. Alternatives A and C would provide the highest while Alternatives B and D would provide the lowest levels of payments to counties and states. The 25 percent Payments for the five-county area are estimated to range from a high of $1,760,000 under Alternative C to a low of $1,550,000 under Alternative D. The current level of payments associated with the KNF for the five-county area is $7,860,000 under the Secure Rural Schools and Community Self-Determination Act. A return to 25 percent Payments would result in a large reduction in payments to counties. Affects would be greatest in those counties where federal payments are a larger portion of the county budget, such as Lincoln County.

Payments from payment in lieu of taxes may increase under reduced Forest Service payments to counties, depending on appropriations from Congress. The amount of increase is unknown, but would generally be insufficient to offset the reduction in Forest Service payments under the 25 percent Payments.

Economic Efficiency

The main criterion used in assessing economic efficiency is present net value, which is defined as the value of discounted benefits minus discounted costs. A present net value analysis includes all outputs, including timber, grazing, recreation, and minerals, to which monetary values are assigned. The monetary values include both market and nonmarket values. See appendix B for a description of these values and the economic analysis.

Table 103 shows estimated benefits, costs, and cumulative present net value by alternative. All monetary values are expressed in constant dollars with no allowance for inflation. A four percent discount rate was used over a 50-year period (2012 – 2061). The reduction in present net value in any alternative as compared to the most economically efficient solution is the economic trade-off, or opportunity cost, of implementing that alternative.

Table 103. Economic Efficiency by Alternative (in thousands of dollars)

	Alt. A	Alt. B	Alt. C	Alt. D
Present Net Value	$1,390,436	$1,383,177	$1,391,827	$1,384,311
Present Value of Benefits	$1,865,619	$1,858,359	$1,867,009	$1,859,493
Present Value of Costs	$475,182	$475,182	$475,182	$475,182

The Forest Service budget was held constant at current levels for all alternatives. The amount of benefits changed by alternative based on the amount and type of timber that was projected to be harvested over the next 50 years. The present net value is positive for all alternatives, indicating the alternatives are economically efficient. The alternative with the highest present net value is Alternative C and the alternative with the lowest present net value is Alternative B. However, as table 103 indicates, differences between alternatives for present net value are slight.

When evaluating trade-offs, the use of present net value and net public benefit is often misunderstood. In each alternative, present net value was maximized in an attempt to ensure that the alternative would be efficient in its use of tax dollars and land. The present net value coupled with indicators for Forest Plan goals (such as contributing to the social and economic well-being of local communities, moving vegetation toward desired conditions, and improving the capability of the Forest to provide high-quality recreation opportunities) can be used to estimate net public benefits, compare alternatives and assist in choosing a preferred alternative.

Cumulative Effects

There are many factors that influence and affect the local social and economic environment. National, state, and county policies affect population growth, demographics, and land uses. Following is a brief description of some items that are changing or may change in the future, adding to the effects on local communities from the alternatives.

Population Growth

The West has been the fastest growing region in the country, and this trend is expected to continue for the next 20 years (U.S. Census 2000 data and projections). With this increased growth rate comes an increased diversification of the population. More new residents are migrating in, while the adult children of families living in the region are moving out of the area to find employment. This change in population composition has added to the diversity of attitudes, lifestyles, and values of the population within the planning area. The social assessment for the KNF found there is a concern among some stakeholders that new residents are changing the nature of their communities. The new residents have different values about the use of natural resources in general and the harvesting of timber in particular (Russell and Downs 1995:311).

Development of Forestlands

There has also been increased housing density adjacent to and within national forest boundaries, and this trend is expected to continue over the next several decades. Moderate and high increases in residential development are projected around national forests located in Montana and Idaho (Stein et al. 2007). While local urban, county, and regional planners and the public are making progress in defining desirable development and recognizing the inherent costs and effects associated with subdivision sprawl, growth will continue in some form and overall density will increase. This development would likely add pressure on adjacent Forest Service lands. Pressure would include increased demand for potentially conflicting recreation opportunities, services such as road maintenance, demand for undeveloped and semi-primitive settings, and increased fire management problems.

Subdividing Corporate Timberlands

Montana, like many states across the West, is experiencing a massive divestiture of commercial timberlands for development and subdivisions (Montana DNRC 2010). Corporate timberland has become more valuable for recreational or residential real estate than for timber production. This development results in increased fragmentation of forested landscapes with increasing ex-urban migration and greater desire for recreational properties and other amenity values. Impacts of fragmentation include wildlife habitat degradation, public access issues, and increased challenges of providing public services and fire protection for new housing developments. This divestiture of corporate timberlands adds to the current trends for increased housing density within and adjacent to the national forest.

Future Mining or Wood Products Development

Diversification of wood product manufacturing has historically allowed Montana mills to be more resilient in changing markets (Montana DNRC 2010). The majority of timber harvested in Montana comes off private lands, with one-third from non-industrial private lands. The Montana Statewide Forest Resource Strategy (Montana DNRC 2010) recognizes the need to foster responsible management of private lands that integrates harvest of traditional and non-traditional forest products as a tool for good land stewardship. The amount of timber harvest on state and private lands and adjacent national forests will affect the local economy. Additional harvest from

these lands would help to stabilize local jobs and income. Any decrease in harvest would add to a decrease in associated jobs and income.

There is the potential for the development of two large-scale copper and silver mines on the KNF in the foreseeable future. If these mines are developed, there would be a positive impact on local jobs and income.

Other Required Disclosures

Environmental Justice

As required by Executive Order 12898, all federal actions must consider potentially disproportionate effects on minority or low-income communities. The Forest Plan is strategic and programmatic in nature, providing guidance and direction to future site-specific projects and activities. The Plan does not create, authorize, or execute any ground-disturbing activity, although it does provide for the consideration of certain types of activities. Site-specific activities will consider potential disproportionate effects on minority or low-income communities during project planning.

The social assessments for the KNF (Russell and Adams-Russell 2003, Russell and Downs 1995) and the assessment of social conditions and trends (Russell et al. 2006) did not identify any disproportionate impacts from forest management. In addition, collaboration on the Plan did not identify any concerns regarding disproportionate impacts to low-income or minority populations.

American Indian Religious Freedom Act

Agencies must make a good faith effort to understand how Indian religious practices may come into conflict with other forest uses and consider any adverse impacts on these practices in their decision-making practices. There are five federally-recognized American Indian nations with cultural affiliation on the KNF: the Kootenai Tribe of Idaho, the Kalispel Tribe, the Coeur d'Alene Tribe, the Spokane Tribe, and the Confederated Salish and Kootenai Tribes. The aboriginal territory of the Kalispel, Coeur d'Alene, and Spokane Tribes, overlap with the territory now along the Clark Fork Valley with the territory used by the Kootenai Tribe of Idaho and the Confederated Salish and Kootenai Tribes. The entire Forest is within aboriginal territory for the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho. No effects on American Indian social, economic, or subsistence rights are anticipated as a result of this Forest Plan revision effort. No matter which alternative is chosen for implementation, the Forest will be required to consult with tribes when management activities may impact treaty rights and/or cultural sites and cultural use, according to the Consultation Protocol. Desired conditions for American Indian Rights and Interests, for all action alternatives, would be for the KNF to; recognize and maintain culturally significant species and the habitat necessary to support healthy, sustainable, and harvestable plant and animal populations to ensure that rights reserved by Tribes in the Hellgate Treaty are not significantly impacted or diminished; recognize, ensure, and accommodate tribal member access to the Forest for the exercise of Treaty Rights and Cultural uses consistent with law, policy, and regulation; and recognize and protect traditional cultural areas as associated with the traditional beliefs of a Tribe about its cultural history.

Unavoidable Adverse Effects

Forest Plan revision and Forest Plans do not produce unavoidable adverse effects because they do not directly implement any management activities that would result in such effects. However, the Forest Plans do establish management emphasis and direction for implementation of activities that may occur on NFS lands in the planning period. If those activities occur, the application of forestwide, management area, and geographic area standards and guidelines (as described in the draft Forest Plan) would limit the extent and duration of any resulting environmental effects. Some unavoidable effects could still occur; however, these potential effects are described by resource area throughout chapter 3 of this document, primarily under "Environmental Consequences."

Relationship of Short-term uses and Long-term Productivity

Short-term uses are those expected to occur for the planning period (10 to 15 years), including recreation use, timber harvest, and prescribed burning. Although the Forest Plan does not directly implement these uses, the potential for these uses are described in the Forest Plan goals and objectives, both at the forestwide and MA levels (see draft Forest Plan).

Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the planning period. Minimum management requirements, established by regulation (31 CFR 219.27), provide for maintenance of long-term productivity of the land. Minimum management requirements are contained in forestwide and MA standards and guidelines, and would be met under any alternative. They ensure that the long-term productivity of the land is not impaired by short-term uses.

Monitoring and evaluation, as described in the draft Forest Plan, applies to all alternatives. A primary purpose of monitoring is to ensure that long-term productivity of the land is maintained or improved. If monitoring and evaluation show that Forest Plan standards and guidelines are inadequate to protect long-term productivity of the land, then the Plans will be adjusted (through amendment or revision) to provide for more protection or fewer impacts.

Although all alternatives are designed to maintain long-term productivity, there are differences among the alternatives in the long-term availability or condition of resources. There may also be differences among alternatives in long-term expenditures necessary to maintain or achieve desired conditions. The differences are discussed throughout the various sections in chapter 3 of this document.

Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitments of resources are defined in FSH 1909.15, Environmental Policy and Procedures.

Irreversible commitments of resources mean the consumption or destruction of nonrenewable resources, such as minerals or cultural resources, or the degradation of resources such as soil productivity, which can be renewed only over long periods of time.

Irretrievable commitments of resources are opportunities forgone; they represent tradeoffs in the use and management of forest resources. Irretrievable commitments of resources include expenditure of funds, loss of production, or restrictions on resource use. When one alternative produces less of a natural resource (such as timber volume) or offers fewer opportunities for use (such as nonmotorized recreation) than another alternative, the difference represents an irretrievable commitment of resources.

The decisions made in Forest Plan revisions do not represent actual irreversible and irretrievable commitments of resources. This is because forest planning identifies what kinds and levels of activities are appropriate in different parts of the forest; it does not make project decisions. The decision to irreversibly or irretrievably commit resources occurs at: (1) the time the Forest Service makes a project decision, such as approving new trail construction or a timber sale; (2) the time Congress acts on a recommendation to establish a new wilderness or to include a stream segment in the wild and scenic river system; or (3) the time the regional forester designates a research natural area.

Energy Requirements and Conservation Potential

Energy is consumed in the administration of natural resources from the national forests. The main activities that consume energy are timber harvest, restoration activities including; mechanical vegetation treatments and prescribed and use of wildland fire for multiple objectives, recreation use, road construction and reconstruction, range use, and administrative activities of the Forest Service and other regulatory agencies. Energy consumption is expected to vary only slightly by alternative. Those alternatives with higher potential for restoration activity, timber harvest and/or road construction, reconstruction and obliteration (Alternatives B, and D) are expected to have higher levels of energy use. Alternatives that have lower potential for these activities (C and A) are expected to have slightly lower levels of energy use.

Several opportunities exist under all alternatives to provide for energy conservation or conversion from less plentiful fuels to more plentiful fuels. For example, car-pooling and combining trips saves fuels and wear and tear on the Forest fleet. The use of electronic communication devices for sharing information, rather than scheduling meetings at one location, saves energy spent on travel. Improving energy efficiency of government buildings can conserve energy. More energy-efficient equipment for all activities like timber harvesting, road construction and reconstruction, or road maintenance can be required. More energy-efficient management methods can be explored and implemented as well.

Prime Farmland, Rangeland, and Forestland

No prime farmland, rangeland, or forestland has been identified in the planning area. Forest Plan revision or the Forest Plan would not directly affect such lands; although implementation of the Plan could have indirect effects. Regardless of the alternative selected for implementation, NFS lands would be managed with sensitivity to the values of any adjacent private or public lands.

Threatened and Endangered Species

Potential effects to species listed under the ESA can be found in chapter 3 of this document, as well as in the Wildlife Resource specialist report, the Aquatics/Soils/Riparian/Wetlands specialist report, and the Rare Plants specialist report (project file). The Biological Assessment and Biological Evaluation will be finalized for the final Forest Plan and final EIS. Management direction to protect the threatened, endangered, candidate, and sensitive species, or to provide for their habitats, can be found in the draft Forest Plan (forestwide, management area, and geographical area desired conditions, standards and guidelines).

Wetlands and Floodplains

Forest Plan revision and Forest Plans do not directly implement any management activities that would result in loss of wetland or floodplains. Revised forestwide management direction identifies the need to restore currently degraded wetlands and floodplains, and provides a broad spectrum of standards and guidelines designed to protect soil, water, riparian, and aquatic resources. The goals and intent of Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) would be met through compliance with this direction. Documentation for this conclusion can be found in this DEIS, chapter 3, “Watersheds, Soils, Riparian and Aquatic Habitat/Species,” and in the draft Forest Plan (desired condition, standards, and guidelines).

Conflicts with Other Agency or Government Goals or Objectives

Contact, review, and public involvement with other federal and state agencies indicate no major conflicts between the draft Forest Plan and the goals and objectives of other governmental entities.

Chapter 4. List of Preparers

The preparation of the draft environmental impact statement (DEIS) and the draft Forest Plan has been a major undertaking. This list of preparers is limited to those people who were members of the Interdisciplinary Team working on these documents. Their preparation could not have been completed without the support and assistance of employees of the KNF and our colleagues in the Regional Office. We also recognize the forest leadership team as providing guidance during this process.

Members of the Interdisciplinary Team:

Name	Unit	Position
Anderson, Jeremy	KNF	Wildlife Biologist
Clark, Linda	IPNF	Forest Planner and Team Leader IPNF
Cobb, Dave	IPNF	Vegetation and Fire Specialist
Dekome, Shanda	IPNF	Fisheries Biologist
Frament, Ellen	KNF	Analyst and Economist
Rodriguez, Kathy	KNF	Forest Planner and Team Leader KNF (until August 2011)
Scaife, Dan	IPNF	Hydrology/Fisheries Biologist
Sutton, Darcie	KNF	Writer Editor
Wellner, Kent	IPNF	Recreation Specialist
Zearfoss, Jack	KNF	Transportation Planner (Retired July 2011)

Support to the Interdisciplinary Team:

Name	Unit	Position
Allen, Lydia	IPNF	Wildlife Biologist
Carlson, John	KNF	Fish and Wildlife Program Manager
Gier, John	KNF	Soils
Grant, Mark	IPNF	Fire/Fuels
Kindel, Kenneth	KNF	Hydrologist
Kmonk, Nancy	KNF	GIS Support
Laws, Mary	KNF	Recreation
Matz, Steve	IPNF	Archeologist
Ratcliffe, Carol	IPNF	Transportation
Rone, Regina	IPNF	Soils
Rose, Dan	KNF	Fire/Fuels
Snook, Miranda	IPNF	Administrative Assistant
Timmons, Rebecca	KNF	Archeologist
Zack, Art	IPNF	Ecologist

Chapter 5. Agencies & Individuals Receiving EIS

Distribution of the Environmental Impact Statement

This EIS has been distributed to individuals who specifically requested a copy of the document. In addition, copies have been sent to the following Federal agencies, federally recognized tribes, State and local governments, and organizations.

Agency	Format		
	Hard Copy	CD	Web
Director, Planning and Review Advisory Council on Historic Preservation			X
Deputy Director USDA APHIS PPD/EAD			X
Rural Utilities Service (RUS)			X
Natural Resources Conservation Service National Environmental Coordinator			X
USDA, National Agricultural Library Head, Acquisitions & Serials Branch	X	X	X
National Marine Fisheries Service Habitat Conservationists Division Northwest Region			X
United States Army Engr. Northwestern Division			X
Chief of Naval Operations Energy and Environmental Division			X
Environmental Protection Agency Region 8 (Montana Office) EIS Review Coordinator	X		
Environmental Protection Agency Region 10 EIS Review Coordinator	X		
Director, Office of Environmental Policy and Compliance United States Department of the Interior	X		X
Northwest Power Planning Council			X
United States Coast Guard (USCG) Environmental Management CG-443			X
Northwest Mountain Region Regional Administrator Federal Aviation Administration			X
Division Administrator Federal Highway Administration			X
United States Department of Energy Director, Office of NEPA Policy and Compliance			X

Chapter 6. Glossary

Term	Definition
303(d) segments	A stream or other waterbody that is listed by the State as being "water quality impaired" by a pollutant in their current 303(d) list or 303(d)/305(b) Integrated Report, pursuant to the Clean Water Act.
Activity Area	A land area affected by a management activity to which soil quality standards are applied. Activity areas include harvest units within timber sale areas, prescribed burn areas, recreation areas, and grazing areas or pastures within range allotments
Allowable Sale Quantity (ASQ)	The quantity of timber that may be sold from the area of suitable land covered by the forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."
Alternative	A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis as expressed in goals and objectives. One of several policies, plans, or projects proposed for decision making. An alternative need not substitute for another in all respects.
Animal Unit Month (AUM)	The amount of forage required by a one thousand pound cow, or the equivalent, for one month.
Aquatic Ecosystem	Waters of the United States that serve as habitat for interrelated and interacting communities and populations of plants and animals. The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur therein.
Bear Year	The active bear year is from April 1 to November 15 Spring = April 1 to June 15; Summer = June 16 to September 15; Fall = September 16 to November 30; Winter = December 1 to March 30
Bears Outside of Recovery Zone	An area where one would reasonably expect to find grizzly bear use occurring during most years.
Bear Management Unit	Areas established for use in grizzly bear analysis. Bear management units generally: a) Approximate female home range size; and b) Include representations of all available habitat components.

Term	Definition
Beneficial Uses	Any of the various uses which may be made of the water, including, but not limited to, domestic water supplies, fisheries and other aquatic life, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.
Best Management Practices	Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.
Big Game	Those species of large mammals normally managed as a sport hunting resource. Generally includes elk, moose, white-tailed deer, mule deer, mountain goat, bighorn sheep, black bear and mountain lion.
Biodiversity	The variety and abundance of species, their genetic composition, their communities and the ecosystems and landscapes of which they are a part. As used in this document, biodiversity refers to native biological diversity; therefore increase in species diversity resulting from the introduction of non-native species would not constitute an increase in biodiversity.
Biophysical Setting	An aggregation of vegetation response units, grouped by broad, climatic modifiers including temperature and moisture gradients.
Candidate Species	Plant and animal species being considered for listing as endangered or threatened under the Endangered Species Act.
Carbon Sequestration	The process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions.
Cavity	The hollow excavated in a tree that is used by birds or mammals for roosting and/or reproduction.
Coarse Woody Debris	Provides living spaces for a host of organisms and serves as long-term storage sites for moisture, nutrients, and energy. Coarse woody debris consists of any woody material greater than (or equal to) three inches in diameter and is derived from tree limbs, boles, roots, and large (greater than 12 inches in diameter) wood fragments and fallen trees in various stages of decay.

Term	Definition
Community (Ecological)	A group of organisms living together; any group of interacting organisms.
Community Wildfire Protection Plan	A plan for an at-risk community that: Is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community; Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure; and Recommends measures to reduce structural ignitability throughout the at-risk community.
Composition	The component tree, shrub, grass and forb classes in a stand or community.
Connectivity	The arrangements of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of approved vegetation. The opposite of fragmentation.
Conservation Subwatersheds	Subwatersheds (6th level HUC) are considered to have excellent habitat, excellent water quality, and strong populations of native fish species. These areas are intended to protect stronghold populations of native salmonids and compliment restoration efforts. See also Priority Watersheds.
Corridors	Avenues along which wide ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas.
Critical Habitat	Specific areas within the geographic area occupied by the species on which are found those physical and biological features (1) essential to the conservation of the species, and (2) which may require special management considerations or protection.

Term	Definition
Cultural Resources	The physical remains of human activity (artifacts, ruins, burial mounds, petro glyphs, etc.) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, as a sacred area of native people, etc.) of an area of prehistoric or historic occupation.
Decommission	Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset.
Deferred Maintenance	Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Code compliance (e.g., life safety, ADA, OSHA, environmental, etc.), Forest Plan Direction, Best Management Practices, Biological Evaluations other regulatory or Executive Order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance.
Designated Route	A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to 36 CFR 212.51 on motor vehicle use maps.
Disturbance	A discrete event that changes existing plant community composition or structure, and interrupts, changes, or resets the ongoing succession sequence. Or: Human presence, noise, or other activity that causes wildlife to move away from the area or alter behavior.
Dominant Vegetation Type	Dominant vegetation is determined by the following: Single species – species that makes up at least 60 percent of the canopy cover or weighted basal area. Species mix – No single species determination can be made. Type of mix, either tolerant or intolerant, is determined by what species combination makes up 80 percent of the canopy cover or weighted basal area, with each species contributing more than 20 percent of the total. Mixed species were combined with vegetation response units to derive a single species label, based on predominant vegetation types within a vegetation response unit.
Down Wood	Accumulation of woody material scattered on the forest floor that consists of two categories: coarse woody debris and fine woody debris.

Term	Definition
Ecological Conditions	Components of the biological and physical environment that can affect diversity of plant and animal communities and the productive capacity of ecological systems. These components could include the abundance and distribution of aquatic and terrestrial habitats, roads and other structural developments, human uses, and invasive, exotic species.
Ecosystem	A spatially explicit, unit of the earth that includes all the organisms, along with all components of the abiotic environment within its boundaries.
Ecosystem Diversity	The variety and relative extent of ecosystem types, including their composition, structure, and processes within all or a part of an area of analysis.
Ecosystem Function	Includes energy flows of materials across and within the landscape and how one ecosystem influences another. Function also relates to energy processes such as fire, hydrological processes (including floods), and matter and energy exchange throughout the food chain.
Ecological Integrity	The capacity to support and maintain a balanced, integrated, and adaptive biological system having the full range of elements and processes expected in a region's natural habitat.
Endangered Species	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Environmental Impact Statement (EIS)	A detailed written statement as required by Sec. 102(2) C of NEPA
Fire-Adapted Ecosystem	An arrangement of populations that have made long-term genetic changes in response to the presence of fire in the environment.
Fire Regime	The fire pattern across the landscape, characterized by occurrence interval and relative intensity. Fire regimes result from a unique combination of climate and vegetation. Fire regimes exist on a continuum from short-interval, low-intensity (stand maintenance) fires to long-interval, high-intensity (stand replacement) fires.
Fire Suppression	The practice of controlling forest and rangeland fires in a safe, economical, and expedient fashion while meeting the natural resource objectives outlined in each forest's or grassland's land management plan.

Term	Definition
Forest Inventory Analysis (FIA)	A data source for forestwide vegetation. FIA inventories provide a statistical-based sample of forest resources that can be used for planning and analyses at local, state. Regional and national levels.
Fire Management Plan	A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.
Forest Health	The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, and vigor, presence of unusual levels of insects and disease and resilience to disturbance.
Forest Road or Trail	A road or trail wholly or partially within or adjacent to and serving the NFS that the Forest Service determines is necessary for the protection, administration, and utilization of the NFS and the use and development of its resources.
Fragmentation	A condition in which a continuous area is reduced and divided into smaller sections. Habitat can be fragmented by natural events or development activities.
Fuel Treatment	Any manipulation or removal of fuels to lessen potential damage and resistance to control (includes mechanical and prescribed fire treatments).
Goods and Services	The various outputs, including on-site uses, produced by forest and rangeland resources.
Grizzly Bear Core Habitat	An area of secure habitat within a bear management unit that contains no motorized travel routes or high use nonmotorized trails during the non-denning season and is more than 0.3 miles (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the bear management unit.

Term	Definition
Grizzly Bear Recovery Zone	The area in each grizzly bear ecosystem within which the population and habitat criteria for achievement of recovery will be measured. Cabinet/Yaak grizzly bear recovery zone: This zone is approximately 2,600 square miles (6,734 square kilometers). The recovery zone is located in northwestern Montana and northern Idaho and includes portions of the KNF, Lolo, and IPNF. Northern Continental Divide grizzly bear recovery zone: The Northern Continental Divide grizzly bear recovery zone is approximately 8,933 square miles (5,717,164 acres). The recovery zone is located in northwestern Montana and includes portions of six national forests, including the Kootenai, two Indian Reservations, Glacier National Park, State of Montana, and private lands. There are approximately 115,190 acres of the Northern Continental Divide Ecosystem on the KNF.
Habitat Guilds	A set of species that share a common habitat (such as riparian areas) that use the same resources (such as food), or that use resources in the same manner (such as mode of foraging).
Habitat Type	All land areas potentially capable of producing similar plant communities (associations) at climax.
Head Month	One month's use and occupancy of the range by one animal. For grazing fee purposes, it is a month's use and occupancy of range by one weaned or adult cow with or without calf, bull, steer, heifer, horse, burro, or mule, or five sheep or goats.
Hibernacula	Habitat niches where certain animals (e.g., bats) over-winter, such as caves, mines, tree hollows, or loose bark.
Historic Range of Variability (HRV)	The variation in spatial, structural, compositional, and temporal characteristics of ecosystem elements as affected by minor climatic fluctuations and disturbances within the current climatic period. This range is measured during a reference period prior to intensive resource use and management. The range of historic variability is used as a baseline for comparison with current conditions to assess the degree of past change.

Term	Definition
Hydrologic Unit (HU)	A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, non-contributing, and diversions to form a drainage area with single or multiple outlet points. Hydrologic units are only synonymous with classic watersheds when their boundaries include all the source area contributing surface water to a single defined outlet point.
Hydrologic Unit Code (HUC)	The numeric identifier of a specific hydrologic unit consisting of a 2-digit sequence for each specific level within the delineation hierarchy. 4th code refers to the 4th pair of an 8-digit code of a sub basin HUs that is generally 450,000 acres in size. 5th code refers to the 5th pair of a 10-digit code of a watershed HUs that generally ranges from 40,000 to 250,000 acres in size. 6th code refers to the 6th pair of a 10-digit code of a subwatershed HUs that generally ranges from 10,000 to 40,000 acres in size.
Inceptisol	A gray-brown soil consisting mainly of clay and silt loams that is not particularly fertile but can be productive when properly managed.
Incidental Take	Take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant.
Integrity	The capacity to support and maintain a balanced, integrated, and adaptive biological system having the full range of elements and processes expected in a region's natural habitat.
Intermediate Treatment	Any treatment or tending designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest.
Intermittent Stored Service	An existing road where future use is expected, but not known, and is currently closed to vehicle traffic. The road is in a condition that there is little resource risk if maintenance is not performed.

Term	Definition
Invasive Species	Invasive species are an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Alien species are any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (with respect to a particular ecosystem).
Invasive Weeds	See Noxious Weeds
Inventoried Roadless Area (IRAs)	For National Forest System lands outside of Idaho, inventoried roadless areas are those lands identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, and any subsequent update or revision of those maps through the land management planning process. For National Forest System lands in Idaho, inventoried roadless areas are those areas designated as Idaho Roadless Areas pursuant to 36 CFR §294.21 and 36 CFR §294.29. These areas are identified in a set of maps maintained at the national headquarters office of the Forest Service.
Keystone Species	A species whose impact on its community or ecosystem is large, and disproportionately large relative to its abundance.
Landbird Assemblage	A group of species having similar ecological resource requirements and foraging strategies, and therefore having similar roles in the community.
Lands Managed for Old Growth	Lands managed for old growth are stands that either currently meet the definition for old growth, or they are stands that have been identified as having some characteristics of old growth stands and they are being managed with the objective of eventually meeting the definition of old growth.
Landscape	An area composed of interacting, and interconnected patterns of habitats (ecosystems) that are repeated because of the geology, land form, soil, climate, biota, and human influences throughout, the areas. Landscape structure is formed by patches, connections, and the matrix. Landscape function is based on disturbance events, successional development of landscape structure, and flows of' energy and nutrients through the structure of the landscape. A landscape is composed of watersheds and smaller ecosystems. It is the building block of biotic provinces and regions.

Term	Definition
Landscape Pattern	Number, frequency, size and juxtaposition of landscape elements (stands and patches) that are important to the determination or interpretation of ecological processes.
Large Woody Debris	Large pieces of relatively stable woody material located within the bankfull channel and appearing to influence bankfull flows. There are categorized as singles, aggregates, or rootwads. **Single** – A single piece that has a length equal to or greater than three meters or two-thirds of the wetted stream width and 10 cm in diameter one-third of the way from the base. **Aggregate** – Two or more clumped pieces, each of which qualifies as a single piece. **Rootwad** – Rootmass or boles attached to a log less than three meters in length.
Long-term Sustained Yield Capacity	The highest uniform wood yield from lands being managed for timber production that may be sustained under specified management intensity consistent with multiple-use objectives.
Lynx Analysis Units (LAU)	An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 square miles. A project analysis unit upon which direct, indirect and cumulative effects analyses are performed.
Mechanized	Wheeled forms of transportation (including nonmotorized carts, wheelbarrows, bicycles and any other nonmotorized, wheeled vehicle).
Minerals (Locatable)	Those hard-rock minerals that are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.
Minerals (Leasable)	Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulfur, and geothermal resources.
Minerals- Materials (Salable)	A collective term to describe common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials that may be locatable.
Mitigation	Measures implemented to minimize, reduce, rectify, avoid, eliminate, and/or compensate the potential impacts to resources identified in the effects analysis.
Mixed Severity Fire	A fire severity classification where between 25 and 75 percent average top-kill of vegetation occurs within a typical fire perimeter.

Term	Definition
National Forest System Road	A Forest road other than a road that has been authorized by a legally documented right-of-way held by a State, county or other local public road authority.
National Register of Historic Places	The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of Interior.
Native Species	Animals or plants that have historically occupied a given aquatic or terrestrial area.
Natural Unplanned Fire	A wildland fire ignited by a natural event such as lightning.
Noxious Weeds (invasive weeds)	Plants designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.
Off-highway Vehicle	Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain. Over snow and over water vehicles are not included in this definition.

Term	Definition
Old Growth	Old growth stands are defined as those that meet the minimum criteria as described in Green et al. 1992 (errata corrected 10/2008). If that document is revised or replaced by the Northern Region, the updated version will be used. In general, old growth stands are in the late stages of stand development and are distinguished by old trees and related structural attributes. These old growth stands are typically distinguished from earlier developmental stages by combinations of characteristics such as tree age, tree size, number of large old trees per acre, and stand density (expressed as basal area). Specific values for these attributes vary by local ecological type and forest type. Other characteristics sometimes associated with old growth stands (canopy layers, snags, down wood, etc) are not part of the minimum criteria needed to meet the definition of an old growth stand because those other characteristics can vary greatly even in stands that are clearly old growth.
Open Motorized Route Density	Calculation made with the moving windows technique that includes open roads, other roads not meeting all restricted or obliterated criteria, and open motorized trails. The percent of the analysis area in relevant route density classes are calculated.
Openings	Meadows, clear-cuts, and other areas of vegetation that do not provide cover.
Outstandingly Remarkable Value	A river-related value that is a rare, unique, or exemplary feature that is significant at a comparative regional or national scale.
Over-Snow Vehicle	A motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow.
Pacific Decadal Oscillation (PDO)	A pattern of Pacific climate variability that shifts phases on at least inter-decadal time scale, usually about 20 to 30 years. The PDO is detected as warm or cool surface waters in the Pacific Ocean, north of 20 degrees N. During a “warm”, or “positive”, phase, the west Pacific becomes cool and part of the eastern ocean warms; during a “cool” or negative” phase, the opposite pattern occurs.
Plan Area	The National Forest System lands covered by a plan.

Term	Definition
Planned Ignition (Prescribed Fire)	The intentional initiation of a wildland fire by hand-held, mechanical or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), fire technique, and other factors which influence fire behavior and fire effects (see prescribed fire).
Prescribed Fire	A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition (see planned ignition).
Present Net Value	The difference between the discounted values (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.
Priority Watersheds	Subwatersheds (6th code HUC) as described in INFISH (USDA Forest Service 1995), are intended to provide a pattern of protection across the landscape, where habitat for inland native fish would receive special attention and treatment and would have the highest priority for restoration, monitoring and watershed analysis. Priority watersheds have been further refined by Conservation Subwatersheds and Restoration Subwatersheds for implementation of the revised Forest Plan.
Proposed Species	Any species that is proposed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to be listed as threatened or endangered under the Endangered Species Act.
Recreation Opportunity Spectrum (ROS)	A framework of land delineations that identifies a variety of recreation experience opportunities categorized into classes on a continuum. The Spectrum's continuum has been divided into six major classes for Forest Service use: Urban (U), Rural (R), Roaded Natural (RN), Semi-primitive Motorized (SPM), Semi-Primitive Nonmotorized (SPNM), and Primitive (P).
Recreation Sites	Specific places in the Forest other than roads and trails that are used for recreational activities. These sites include a wide range of recreational activities and associated development. These sites include highly developed facilities like ski areas, resorts, and campgrounds. It also includes dispersed recreation sites that have few or no improvements but show the affects of repeated recreation use.

Term	Definition
Regeneration Treatment	A cutting procedure by which a new age class is created; the major methods are clearcutting, seed tree, shelterwood, selection, and coppice.
Resilience	The amount of change a system can undergo (its capacity to absorb disturbance) and remain within the same regime-essentially retaining the same function, structure, and feedbacks.
Restoration	Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. It is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.
Restoration Subwatersheds	Subwatersheds (6th level HUC) are dentified as having relatively degraded habitat conditions, water quality limitations, depressed populations of native fish species, or a combination of the above, and a relatively higher potential for improvement through active or passive restoration efforts. See also Priority Watersheds.

Term	Definition
Riparian Conservation Areas (RCAs)	Portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific guidelines. The followings riparian conservation areas widths are based on the best available science and apply to all aquatic habitats, except where site-specific analysis supports modification: **Category 1 – Fish-bearing streams:** Riparian conservation areas consist of the stream and the area on either side of the stream extending from the edges of the active channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of the riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest. **Category 2 – Permanently flowing non-fish bearing streams:** Riparian conservation areas consist of the stream and the area on either side of the stream extending from the edges of the active channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of the riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest. **Category 3 – Ponds, lakes, reservoirs and wetlands greater than one acre:** Riparian conservation areas consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest. **Category 4 – Seasonally flowing or intermittent streams, wetlands less than one acre:** This category includes features with high variability in size and site-specific characteristics. At a minimum, the riparian conservation areas must include the area from the edges of the stream channel or wetland, to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.
Road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail.
Road Construction	Activity that results in the addition of Forest authorized or temporary road miles.

Term	Definition
Road Decommissioning	Activities that result in the stabilization and restoration of unneeded roads to a more natural state.
Road Maintenance	The ongoing upkeep of a road necessary to retain or restore the road in accordance with its road management objective. **Road Maintenance Level 1 – basic custodial care**. Assigned to intermittent service roads during the time they are closed to vehicular traffic **Road Maintenance Level 2 – high clearance vehicles.** Assigned to roads operated for use by high clearance vehicles. **Road Maintenance Level 3 – suitable for passenger cars.** Assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car. **Road Maintenance Level 4 – moderate degree of user comfort.** Assigned to roads that provide a moderate degree of user comfort at moderate travel speeds. **Road Maintenance Level 5 – high degree of user comfort.** Assigned to roads that provide a high degree of user comfort and convenience.
Road Reconstruction	Activity that results in improvement or realignment of an existing authorized road defined as follows: **Road improvement –** Activity that results in an increase of an existing road's traffic service level, expansion of its capacity, or a change in its original design function. **Road realignment –** Activity that results in a new location of an existing road or portions of an existing road, and treatment of the old roadway.
Roadless	See Inventoried Roadless Area

Term	Definition
Scenic Integrity Objective	The Scenic Integrity Objectives serve as the desired conditions for the scenic resources and represent the degree of intactness of positive landscape attributes. Scenic integrity objectives are categorized into 5 levels. The highest scenic integrity ratings are given to those landscapes where valued landscape attributes will appear complete with little or no visible deviations evident. Lowers SIOs are given to those landscapes where modifications to the landscape will be more evident. Each of the SIOs is defined as follows: **Very High –** Landscape is intact with changes resulting primarily through natural processes and disturbance regimes. **High –** Management activities are unnoticed and the landscape character appears unaltered. **Moderate –** Management activities are noticeable but are subordinate to the landscape character. The landscape appears slightly altered. **Low –** Management activities are evident and sometimes dominate the landscape but are designed to blend with surroundings by repeating line, form, color, and texture of valued landscape character attributes. The landscape appears altered. **Very Low** (not used in this draft Plan and EIS) – Human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at back-ground distances
Security	An area where wildlife (such as elk) retreat to for safety when disturbance in their usual range is intensified – such as by logging activities or during the hunting season. To qualify as a security area for elk there must be 250 contiguous acres that are more than one-half mile from open motorized routes.
Seral Stage	Any stage of development of an ecosystem from a disturbed, un-vegetated state to a climax plant community.
Silvicultural Prescription	A silvicultural prescription is a written document that describes in detail the management activities needed to implement a silvicultural treatment or treatment sequence. The prescription is based on an examination of the stand being proposed for management. The prescription documents the results of an analysis of present and anticipated future stand conditions and evaluates this in terms of management direction. It also describes the desired future vegetation conditions in measurable terms.
Silvicultural Systems	A planned series of treatments for tending, harvesting, and re-establishing a stand.

Term	Definition
Size Class	Size class is based on basal area weighted diameter of the plot/stand. Weighted diameter is calculated then classification is made as follows according to weighted diameter: Seedling/sapling: 0.0 – 4.9” DBH (if basal area weighted diameter is 0.0, must have 100 or more trees per acre) Small: 5.0 – 9.9” Medium: 10.0 – 14.9” Large: 15.0 +
Snag	A standing dead tree usually greater than five feet in height and six inches in diameter at breast height (DBH).
Soil Erosion	The detachment and movement of soil or rock by water, wind, ice, or gravity.
Soil Function	Any service, role, or task that soil performs, especially: Sustaining biological activity, diversity, and productivity; Regulating and partitioning water and solute flow (hydrologic function); Filtering, buffering, degrading, and detoxifying potential pollutants; Storing and cycling nutrients; and Providing support for buildings and other structures (trees) and to protect archaeological treasures (cultural features).
Soil Productivity	The inherent capacity of a soil to support the growth of specified plants, plant communities, and soil biota. It is often expressed by some measure of biomass accumulation.
Soil Quality	The capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation and ecosystem health. In short, the capacity of the soil to function. There are two aspects of the definition: inherent soil quality and dynamic soil quality: Inherent soil quality: That aspect of soil quality relating to a soils natural composition and properties as influenced by the factors and processes of soil formation, in the absence of human impacts. Dynamic soil quality: That aspect of soil quality relating to soil properties which change as a result of soil use and management or over the human time scale.
Special Use Authorization	A permit, term permit, lease, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

Term	Definition
Stand	A contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.
Stand Replacement Fire	A fire severity classification where at least 75 percent average top-kill of vegetation occurs within a typical fire perimeter.
Stronghold Population	Directly associated with strong populations. For native fish, strong populations have numbers that are stable or increasing, and all major life history forms that historically occurred within the watershed are present.
Structure	The horizontal and vertical physical elements of forests and grasslands and the spatial interrelationships of ecosystems.
Succession	The sequential process of long-term plant community change and development that occurs following a disturbance.
Suitable Habitat	Habitat that currently has both the fixed and variable stand attributes for a given species habitat requirements. Variable attributes change over time and may include seral stage, cover type and overstory canopy cover.
Suitability	The appropriateness of a particular area of land for applying certain resource management practices to a particular area of land, as determined by an analysis of the existing resource condition and the social, economic, and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.
Suppression	The work of extinguishing a fire or confining fire spread.
Sustainability	Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological, economic conditions or trends interacting at varying spatial and temporal scales embodying the principles of multiple-use and sustained yield.
Take	Regarding species listed under the Endangered Species Act: To harass, harm, pursue, hunt, shoot, kill, trap, capture, or collect or attempt to engage in any such conduct.
Temporary Road or Trail	A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or a forest trail and that is not included in a forest transportation atlas.

Term	Definition
Threatened Species	Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which the appropriate Secretary has designated as a threatened species.
Timber Harvest	The removal of trees for wood fiber utilization and other multiple-use purposes.
Timber Production	The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. In addition, managing land to provide commercial timber products on a regulated basis with planned, scheduled entries.
Total Motorized Route Density	Calculations made with the moving windows technique that includes open roads, restricted roads, roads not meeting all reclaimed criteria, and open motorized trails. The percent of the analysis area in relevant route density classes is calculated.
Traditional Cultural Areas	Those areas of the forest used by American Indians for traditional activities and often referred to as “religious use areas” or “sacred areas.” They may include areas traditionally used for gathering of special forest products.
Trail	A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail.
Travel Corridors	An area of vegetation that provides completely or partially suitable habitat for animals to travel from one location to another.
Ungulate	A hoofed mammal such as a deer or elk.
Use of Wildland Fire	Management of either wildfire or prescribed fire to meet resource objectives specified in Land/Resource Management Plans.
Utility Corridor	A parcel of land, without fixed limits or boundaries that is being used as the location for one or more transportation or utility rights-of-way.

Term	Definition
Vegetation Management	Activities designed primarily to promote the health of forest vegetation in order to achieve desired results. When vegetation is actively managed, it means that it is manipulated or changed on purpose by humans to produce desired results. Where active management of vegetation is required, techniques are based on the latest scientific research and mimic natural processes as closely as possible. Vegetation management is the practice of manipulating the species mix, age, fuel load, and/or distribution of wildland plant communities within a prescribed or designated management area in order to achieve desired results. It includes prescribed burning, grazing, chemical applications, biomass harvesting, and any other economically feasible methods of enhancing, retarding, modifying, transplanting, or removing the aboveground parts of plants.
Vegetation Response Unit	Units of land with vegetative communities that have broadly similar disturbance responses and succession pathways, and that produce similar landscape-scale vegetation patterns. Vegetation response units are typically groups of habitat types aggregated by landform and topographic characteristics that regulate disturbance regimes and succession response. Historically lands within a given vegetation response unit were subject to broadly similar disturbance regimes.
Water Quality Limited Segment	A stretch or area of surface water where technology-based controls are not sufficient to prevent violations of water-quality standards. In such cases, new permit limitations are based on ambient-water-quality considerations. See also, 303(d) segments.
Watershed	A geographic area of land, water, and biota within the confines of a drainage divide. The total area above a given point of a water body that contributes flow to that point.

Term	Definition
Watershed Condition Rating	The state of the watershed based on physical and biogeochemical characteristics and processes (such as, hydrologic, geomorphic, landscape, topographic, vegetative cover, and aquatic habitat), water flow characteristics and processes (such as volume and timing), and water quality characteristics and processes (such as chemical, physical, and biological). **Low:** Watersheds exhibit geomorphic, hydrologic, and biotic integrity, relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are predominately functional in terms of supporting beneficial uses. **Moderate:** Watersheds exhibit moderate geomorphic, hydrologic and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems may not support beneficial uses. **High:** Watersheds may have limited geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic conditions suggest that soil, riparian, and it is assumed that beneficial uses are not generally supported.
Wetlands	Those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.
Wildfire	Unplanned ignitions of a wildland fire (such as a fire caused by lightning, or unauthorized and accidental human-caused fires) and escaped prescribed fires.
Wildland Fire	A general term describing any non-structure fire that occurs in the wildland. Two distinct types of wildland fire have been defined and include planned ignitions (prescribed fire) and natural unplanned fire (wildfire). See also planned ignitions and natural unplanned fire.

Term	Definition
Wildland Urban Interface (WUI)	The term "wildland urban interface" means either: (A) An area within or adjacent to an at-risk community that is identified in recommendations to the Secretary in a community wildfire protection plan and/or under the "Healthy Forest Restoration Act"; or (B) In the case of any area for which a community wildfire protection plan is not in effect: (i) An area extending ½-mile from the boundary of an at-risk community; (ii) An area within 1½ miles of the boundary of an at-risk community, including any land that: (I) Has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (II) Has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (III) Is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; and (iii) An area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuel reduction to provide safer evacuation from the at-risk community.
Winter Range	The area available to and used by wildlife (big game) during the winter season (Dec 1 to April 30). Generally, lands below 4,000 feet in elevation, on south and west aspects, that provides forage and cover.

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