

SUMMARY

Final Environmental Impact Statement Forest Plan Revision Chippewa and Superior National Forests

Eastern Region
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Abstract: This is the summary for the final environmental impact statement (EIS) of seven alternatives developed for programmatic management of the land administered by the Chippewa and Superior National Forests. The Record of Decision identified the selected alternative.

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INTRODUCTION

This Summary provides an overview of the Final Environmental Impact Statement (EIS) for revision of the Chippewa and Superior National Forests' Land and Resource Management Plans (Forest Plans).

The Chippewa and Superior National Forests are located in northern Minnesota. Both Forests are within a day's drive from the Minneapolis-St. Paul metro area and both are the focus of demands for various forest benefits such as recreation, cultural, timber, and special forest products. A large portion of acreage on both Forests is in lakes, streams, and wetlands. The Chippewa National Forest includes 666,325 acres of National Forest System land in Beltrami, Itasca, and Cass counties. The Superior National Forest contains over 2.1 million acres of National Forest System lands located in Cook, Lake, Koochiching, and St. Louis Counties. The Boundary Waters Canoe Area Wilderness (BWCAW) makes up approximately one-third of the Superior National Forest. Management direction for the BWCAW will not be changed as part of this Forest Plan revision.

Two major sources of direction for this effort are the National Forest Management Act and the National Environmental Policy Act. Both provide guidance on the process of revision and the content for analysis. The National Forest Management Act requires an interdisciplinary approach to assure coordination of multiple-uses including outdoor recreation, range, timber, watershed, wildlife and fish, wilderness, sustained yield of products and services. The National Environmental Policy Act requires a systematic decision-making process with public involvement, issue identification, development of alternatives to address issues, and analysis of environmental impacts of alternatives.

The Chippewa and Superior NF Forest Plans are being revised under the existing planning rule that was

adopted in 1982. Generally, Forest Plans are to be revised every 10 to 15 years to address changed conditions and new information. The current Forest Plans on the Chippewa and Superior National Forests were implemented in 1986. Since that time, there have been considerable changes in conditions on the two Forests, shifts in public demands, technological advances, and a better understanding of forest ecosystems. These changes are reflected in the issues addressed by this revision. One of the most notable changes is the role of landscape ecosystems as a key component in the analysis of the alternatives in the Final EIS and the definition of desired conditions in the revised Forest Plans.

Following the direction of the National Environmental Policy Act, the Forest Service is conducting environmental analyses for Forest Plan revision. The Notice of Intent (NOI) published in August of 1997 officially announced the proposal to revise the two Forest Plans. The Draft EIS was published in April 2003. The Final EIS states the purpose and need for Plan Revision, discloses a description of the issues to be addressed, the alternatives being considered to respond to the issues, and an analysis of potential environmental effects of each alternative. The Record of Decision also identifies the alternative that the Regional Forester has chosen for implementation.

Based on the Selected Alternative, the revised Forest Plans describe desired conditions, assign measurable objectives with timelines, provide specific standards and guidelines as to how to achieve the desired conditions, and then outline a program for monitoring and evaluating results of implementation. Implementation of the Forest Plans is dependent on funding. The Forests have not typically been fully funded, receiving 55 percent of the necessary budget to fully implement the 1986 Forest Plans.

CHAPTER 1 PURPOSE AND NEED

1.1 Proposed Action

The Forest Service proposes to revise the Forest Plans (Land and Resource Management Plans) of the Chippewa and Superior National Forests (NF) that were approved in 1986. In conjunction with Forest Service Manuals and Handbooks, revised Forest Plans would establish direction for managing natural resources for the next 10 to 15 years on National Forest System (NFS) land. Direction in these manuals, handbooks, or other Forest Service directives is applied to Forest Plan implementation but is generally not repeated in the Final EIS or the revised Forest Plans.

On the Superior NF, management direction for the Boundary Waters Canoe Area Wilderness (BWCAW) would not change as part of this Forest Plan revision. In 1993, this management direction was analyzed and disclosed in the Final EIS and Record of Decision for the BWCA Wilderness Management Plan and Implementation Schedule (Amendment 3 to the 1986 Forest Plan).

1.2 Decisions to be Made

Six Key Decisions

Forest plans make six key decisions (36 CFR 219, 1982 regulations):

1. Forest-wide multiple use goals and objectives
2. Forest-wide management requirements for protecting resources
3. Management area direction
4. Land suited and not suited for timber management (including the allowable sale quantity of timber)
5. Monitoring and evaluating requirements
6. Recommendations to Congress, such as wilderness study area designations

Management Direction Established in Forest Plans

There is a hierarchy to the management direction provided in a Forest Plan. Forest-wide direction is applied across all areas of the Forest. Each subsequent level of management direction below the Forest-wide direction provides increasingly specific guidance used in planning, analysis and implementation of project level decisions.

Figure 1.1 on the next page illustrates the relationship of different management direction in the Forest Plan.

Responsible Official

The Regional Forester is the responsible official for the analysis and decisions for Forest Plan Revision. Based on analysis in the Draft EIS, public comments, and analysis in the Final EIS, the Regional Forester will select an alternative to be implemented in the revised Forest Plans. The Regional Forester will document his rationale for the selection in two Records of Decision (one for each Forest) accompanying the Final EIS.

The Chippewa and Superior NFs conducted the analysis, developed alternatives, and prepared the Final EIS.

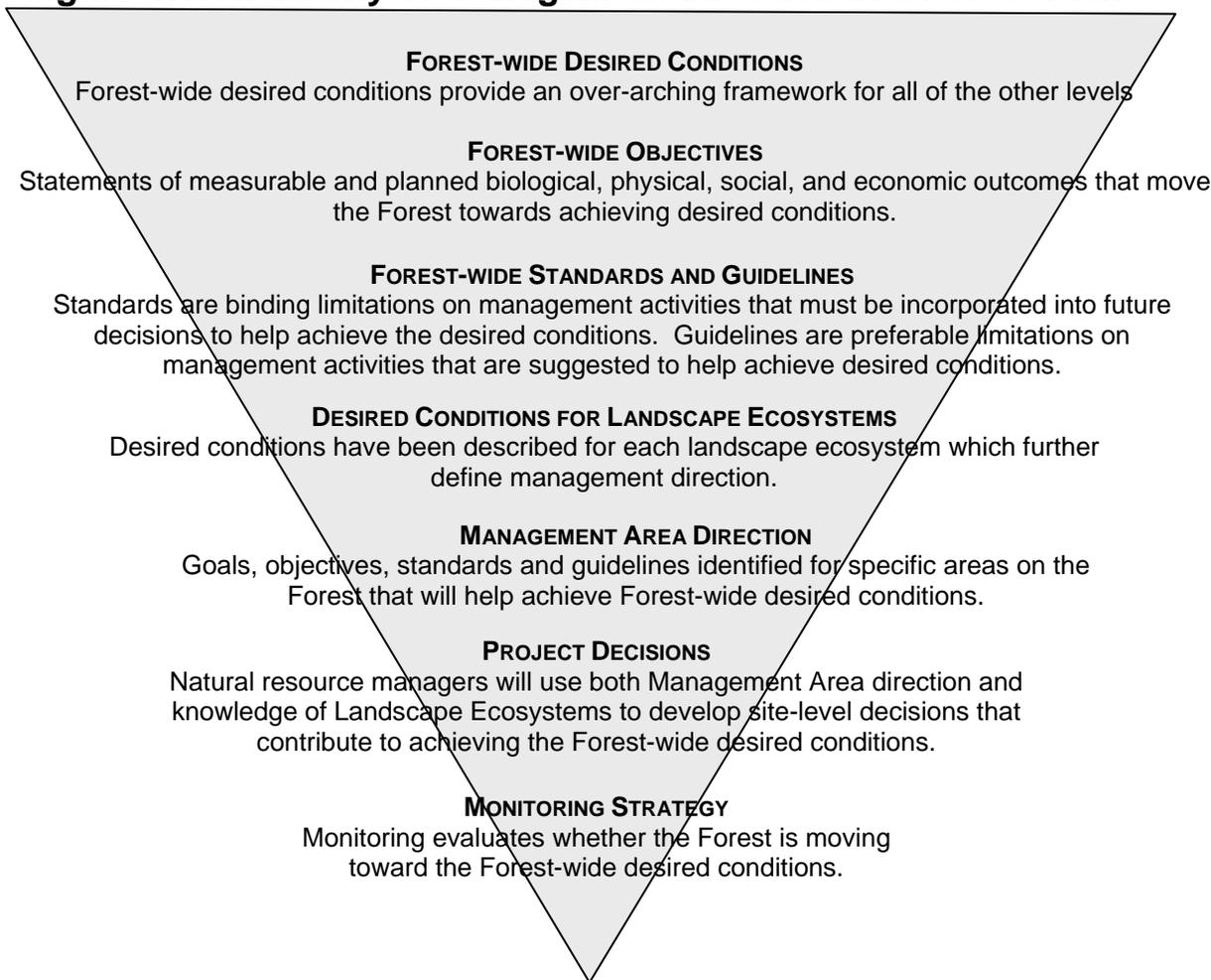
1.3 Purpose and Need for Change

The current Forest Plans were approved in June 1986 and have since been amended. In the past 16 years, the Chippewa and Superior NFs have successfully implemented site-specific projects with the management direction in the 1986 Forest Plans, and resources are in good condition. However, there is concern that continuing to follow the management

direction in the 1986 Forest Plans may not allow the two Forests to reach their desired conditions and could potentially result in adverse impacts in the long run. Changes in Forest resource conditions, changed public demands, new ecosystem

information, new management approaches, and shifts in national Forest Service policy also result in the need to revise current Forest Plans.

Figure 1.1. Hierarchy of Management Direction in a Forest Plan



Purpose

The purpose of the proposed action is to have revised Forest Plans that guide all natural resource management activities on the Chippewa and Superior National Forests and that:

- Meet the objectives of federal law and regulations
- Respond to the public's needs and desires
- Manage ecosystems to provide for long-term sustainability

Federal Planning Regulations

The Forest Plans were approved in June 1986 and have since been amended. As of March 2003, there are 31 amendments to the Chippewa Forest Plan and 10 amendments to the Superior Forest Plan. The National Forest Management Act requires the Forest Service to revise forest plans every 15 years.

Changed Conditions and New Information

The public's interest in how national forests are managed has increased. Public demands for forest products and services have changed since 1986. The amount and kind of demand has changed for forest commodities, such as pulpwood, and for non-consumptive services, such as recreation.

Forest conditions have changed substantially since 1986. Insect infestation (such as spruce budworm), fuels build up, drought, blowdown, and flooding have changed conditions on the Forests in ways not anticipated in the 1986 Forest Plans.

There is new information about the Chippewa and Superior NFs and new forest management approaches. New scientific information has been published since 1986, including research, assessments, and inventories issued by the Forest Service, the Minnesota Department of Natural Resources (DNR), universities, and other research organizations.

The Minnesota Forest Resources Council, in partnership with the Chippewa and Superior NFs,

University of Minnesota, and other organizations, has also developed management approaches for landscape planning that include the use of landscape ecosystem information in forest planning. In addition this cooperative effort has resulted in voluntary state-wide forest management guidelines for vegetation, soil, wildlife, riparian, visual quality, and cultural resources.

The landscape ecosystem classification from the Terrestrial Ecological Unit Inventory (a national inventory) is new information and the concept of the range of natural variability (RNV) has been recently advanced as a means of analyzing landscape conditions and their ability to maintain long-term ecological sustainability. Information about the condition of ecosystems on a broad-scale was recently developed by the Great Lakes Ecological Assessment. The Forest Plan revision process used these new sources of information.

Since 1986, agency direction has shifted the course of agency plans and programs from output-centered management, concentrating on products, to outcome-centered management, concentrating on the long-term condition of landscapes. The *Forest Service Strategic Plan for Fiscal Years 2004-2008* provides purpose and context for managing national forests. The Forest Service adopted ecosystem management as an operating philosophy for national forests and grasslands in 1992. This shift affects the programs on the Chippewa and Superior NFs.

Over the past two years, administrative procedures and processes governing preparation of projects to reduce hazardous fuel and restore healthy ecological conditions on federal land have undergone many changes. These changes have resulted in the Healthy Forest Initiative, launched in 2002 to reduce administrative process delays to implementation of such projects, and the Healthy Forest Restoration Act (HFRA), passed in December 2003. HFRA provides improved statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System land and also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on all ownerships.

Need for Change in Management Direction

There is a need to revise the 1986 Forest Plans to address changes that have occurred since the 1986 Forest Plans were implemented. An interdisciplinary team of Forest Service resource specialists and planners worked with representatives from tribes, other agencies, and members of the public to identify key areas that need to be changed in the 1986 Forest Plans.

Need for Change Topics

Biodiversity

Along with new information, management direction needs to incorporate ecosystem processes, such as the role of prescribed fire and timber harvest in emulating natural disturbances. There is a need to modify management direction to address biodiversity at both the site and landscape levels rather than using a species-by-species or community-by-community management approach and to integrate current lists of rare natural resources.

Wildlife and Fish Resources

There is a need to develop management direction for managing whole ecosystems for a variety of wildlife habitats at large landscape scales and to revise the list of management indicator species.

Vegetation Management Practices

There is a need to emphasize both even-aged and uneven-aged management, emphasize site suitability, and better integrate fire management into direction for vegetation management practices.

Water Resources

There is a need to revise management direction to integrate composition and structure with hydrologic function, to develop management direction for both entire watersheds and site-level projects, and to develop management direction for maintaining and restoring riparian functions.

Timber Resources

There is a need to recalculate suitable acres for timber production, review standards and guidelines, recalculate timber yields per acre to better reflect actual removals, and arrive at an allowable sale quantity (ASQ) that incorporates all of these factors.

Allowable Sale Quantity (ASQ) is a maximum limit on volume that the National Forests can sell within a decade while meeting the requirements for multiple-uses and resource protection. ASQ is not a goal for production.

Recreation Resources

There is a need to determine the mix of forest settings and associated recreational opportunities, scenic integrity level, the use and restrictions on recreational motor vehicles, and the level of water access development that the two National Forests will emphasize.

Socio-economic Considerations

There is a need to address current economic needs, social conditions, expectations, and values of individuals, tribes, government agencies, surrounding communities, and organizations.

Other Considerations

During Forest Plan revision, management direction for additional topics may also be changed. For some of these topics, Forest Plan revision will not make major changes to the current management direction, however some changes are likely. For other topics that currently do not have management direction, desired conditions, objectives, standards, and guidelines may be developed.

Greater cooperative stewardship with other land managers is key to meeting these needs because of intermixed ownership on the Chippewa and Superior National Forests.

1.4 Public Involvement and Cooperative Planning

Throughout the revision process the Forest Service has consulted with federal, state, tribal, municipal, and county government agencies as well as with private organizations and individuals. A special effort has been made to consult and involve the bands of the Minnesota Chippewa Tribe that reside within and around the Forests' boundaries. The Forests also consulted with personnel from universities and from the research and the state and private forestry divisions of the Forest Service.

The public has been informed of the revision process through regular newsletters, news releases, open houses, workshops, public meetings, and documents posted on the Internet. Public input has come in the form of letters, participation in workshops, and at meetings during several stages of the revision process, including:

- Identifying needed change
- Responding to the Notice of Intent
- Identifying issues
- Developing preliminary alternatives
- Reviewing preliminary alternatives

The public also reviewed and commented on the Draft EIS and the Proposed Revised Forest Plans.

1.5 Issues

Introduction

Issues stem from the need for change topics previously summarized in the "Need for Change in Management Direction" section. Public involvement, internal discussion, and analysis were also used to identify issues in Forest Plan revision.

An **issue** is a potential conflict from an effect on physical, biological, social, or economic resources. In terms of a Forest Plan, an issue may involve differing opinions about how to manage forest resources.

An **issue indicator** is a measurable outcome associated with a particular resource issue that could result from proposed management.

Forest Vegetation

This issue encompasses various aspects and outcomes of vegetation management, including composition, age, and spatial patterns.

Forest Age and Composition

There are differing opinions about what forest ages and forest tree species will provide adequate forest structure and biodiversity while providing the social and economic needs of people over the long term.

Forest Plan revision will determine the long-term goals for young, mature, old, and old-growth forests and for the species composition of forest communities, types of forest vegetation communities, and distribution of the communities. Revision will also determine if old growth will be actively managed, and if so, how it would be managed. Another decision to be made is if old growth will be permanently allocated to a location or be transient on the landscape.

Forest Composition refers to all the plant species found in a stand or in a landscape, including trees, shrubs, forbs, and grasses. Generally, the complexity of a forest stand reflects the robustness of the stand to deal with disturbances and maintain ecological functions.

Forest Spatial Patterns

There are differing opinions about what forest spatial patterns would provide for ecosystem integrity as well as the social and economic needs of people. Forest Plan revision will establish long-term goals for the size, shape, and distribution of forest patches.

Forest spatial patterns refer to the size, shape, and arrangement across the landscape of: forest types, habitats, and vegetation communities and disturbances, both natural and forest management.

Wildlife Habitat

There are differing opinions about how the Forests should be managed for the full array of wildlife species and habitats, whether rare or common, and what habitats and species should be emphasized. Forest Plan revision will establish direction for the types, amounts, distribution, spatial pattern, and function of wildlife habitats. This will include how, where, and to what extent rare species and their habitats will be protected, enhanced, or restored.

Federal regulations require the Forest Service to maintain or improve biological diversity at the genetic, species, and ecosystem levels and to maintain viable populations of existing native and desired non-native species. Specifically the Forest Service must provide habitat to sustain viable populations of all native and desired non-native species.

Timber

There are three aspects of timber management at issue, including uneven-aged versus even-aged management, timber supply, and mix of forest products.

Uneven-aged management is a planned sequence of treatments designed to maintain and regenerate a stand of trees with three or more age classes. An example is selection harvest that creates or maintains multiple age classes.

Even-aged management results in stands in which the trees are essentially the same age. Examples of even-aged management are clearcutting and shelterwood harvests.

Uneven-aged vs. Even-aged Management

There is debate about how much even-aged management can be used while providing for ecological integrity as well as the economic and social needs of people in the long term. Forest Plan revision will establish how much even-aged management (especially clearcutting) may be used and in what forest types and landscape ecosystems it may be used over time.

Timber Supply

There are divergent opinions on how much timber the Chippewa and Superior National Forests can supply to

meet social and economic needs of people without adversely affecting ecosystem integrity. Forest Plan revision will determine a sustainable level of timber harvest that the Chippewa and Superior National Forests may supply over time. Revision will also establish the acreage and location of land that is suitable for timber production.

Mix of Forest Products

There are different views on what mix of forest products will adequately provide for local mills over the long term. Forest Plan revision will determine the mix of sawtimber and pulpwood that the Chippewa and Superior National Forests may supply.

The Role of Fire

There are differing opinions about the use of prescribed fire on the Chippewa and Superior National Forests. Forest Plan revision will determine how, where, and to what extent prescribed fire may be used to mimic natural processes and to restore natural processes and functions to ecosystems, and to reduce fuels.

Prescribed fires are intentionally set by forest managers under controlled conditions to meet specific natural resource objectives. These are also referred to as management ignited fires.

Fuels are anything that will burn such as trees, branches, grass, and pine needles.

Watershed Health

The issue of watershed health encompasses watershed management and management of riparian areas and fish habitat.

Watershed Management

There are divergent opinions about how much emphasis to give watershed health in forest management. Forest Plan revision will determine the approach taken for management activities in watersheds. Measures to protect and enhance watersheds could remain either as they are in the 1986 Forest Plans or provide direction for enhancing and restoring watersheds.

Riparian and Fish Management

There is debate about how much emphasis should be placed on riparian areas and fish habitat in forest management. Forest Plan revision will determine if the approach to management in riparian areas will stay as it is in the 1986 Plans or if the approach will change to provide direction to enhance and restore riparian functions. Revision may change the management direction for riparian areas, including the size and location of riparian management zones. Forest Plan revision will also develop direction for the role of Forest Service managers in managing fish habitat with other agencies and American Indian tribes. This direction may include objectives for maintaining, restoring, and enhancing habitat for fish, including rare species.

Special Designations

During planning, the Forest Service must evaluate areas of the Forests for special designation including potential wilderness or potential research natural areas.

Potential Wilderness Study Areas

Public opinions differ on whether or not to add potential wilderness (for ecosystem, social, and other wilderness values) on the Chippewa and Superior NFs. Forest Plan revision will determine which, if any, areas will be recommended for wilderness study area designation. (The Forest Plan revision process did not address the current management direction for the BWCAW.)

Forest Plan revision may result in recommended areas for wilderness study designation on the Forests but only Congress can designate wilderness. The Forest Plan revision process will not change current management direction for the BWCAW.

Potential Research Natural Areas

There is debate about how many Research Natural Areas on the Chippewa and Superior National Forests are needed to provide for biodiversity and research opportunities. Forest Plan revision will determine which, if any, additional Research Natural Areas will be recommended for establishment.

Recreation

Recreational Opportunities and Forest Settings

There are differing opinions about which recreational opportunities and forest settings should be emphasized on the Chippewa and Superior National Forests. Forest Plan revision will establish objectives for recreational opportunities and associated forest settings, specifically the quantity and location of each forest setting.

Scenic Quality

There are many ideas of what a 'natural' appearing forest looks like and how much emphasis there should be on scenic integrity in forest management. Forest Plan revision will determine management direction for maintaining, enhancing, restoring, and monitoring scenic integrity. Revision will also establish Scenic Integrity Objectives across the Forests, which guide the amount, degree, intensity, and distribution of management activities needed to achieve desired scenic conditions.

Recreational Motor Vehicles (RMV)

There is debate about the level of RMV use that would provide an adequate range of recreational opportunities while not adversely affecting the environment. Forest Plan revision will determine the management direction for RMV use on roads and trails as well as in cross-country travel.

Recreational motor vehicles (RMVs) include off-highway motorcycles, off road vehicles, all-terrain vehicles, and snowmobiles.

Water Access

There are different public opinions concerning the amount and intensity of water access development that should be provided on the Chippewa and Superior National Forests. Forest Plan revision, taking ecological, social, and economic criteria into consideration, will establish management direction for the quantity and types of access to bodies of water.

Economic and Social Sustainability

Key components of this issue that are being analyzed include interdependent ecological, social, and economic factors that work together to allow goods and services to be produced without impairment to the long-term productivity of the land.

Economic Sustainability of Local Communities

Forest Plan decisions contribute to economic sustainability by providing for a range of uses, values, products, and services. At the same time, the Forest Plans must be ecologically sustainable. Forest Plan revision will determine the mix of uses, values, products, and services that the Chippewa and Superior NFs could provide over time.

Social Sustainability

Forest Plan decisions can affect the social conditions, expectations, and values of individuals, tribes, government agencies, surrounding communities, and organizations. Forest Plan revision may change management direction that could affect land allocations, management actions, uses, values, products, and services provided by the Chippewa and Superior National Forests. Changes to management direction may also affect heritage resources.

1.6 Issues Not Addressed in Detail

Although raised by the public, employees, or other agencies, some issues are not addressed in the Final EIS for a variety of reasons. These included: Managing the BWCAW, Planned Ignition for Prescribed Fire in the BWCAW, Wild and Scenic River Recommendations, Special Uses, and Minerals Management. Generally, the management direction for these resources will be carried forward from the amended 1986 Forest Plans to the revised Forest Plans.

1.7 Changes Between Draft and Final EIS

Based on analysis in the Draft and Final EISs and on comments from Tribal governments, public, and other governmental agencies (including consultation with the US Fish and Wildlife Service), the Regional Forester has modified Alternative E. Modified Alternative E serves as the basis for the revised Forest Plans. The changes ranged from minor editing for improved clarity to changes in management area allocations, desired conditions, objectives and standards and guidelines. Some changes were also based on data corrections or further vegetation modeling efforts. These modifications are reflected in management direction in the revised Plans and the analysis of effects in the Final EIS. The modifications do not change the overall theme of the original Alternative E.

The summary below describes the most substantial changes made between the Draft and Final EIS:

Vegetation data bases were updated for modified Alternative E. This update resulted in changes in forest type and age and in timber suitability, from the figures reported for Alternative E in the Draft EIS. The timber harvest model was expanded to include a spatial component and a series of model runs were completed that displayed an array of implementation options for implementing Modified Alternative E. The yield tables were re-examined and in some cases were adjusted to better reflect expected outputs. The combination of these modifications resulted in some changes to acres treated, changes in the amount of even-aged and uneven-aged harvest and changes to maximum Allowable Sale Quantities. The Allowable Sale Quantity for the first decade for the Chippewa NF increased from 500 million board feet (MMBF) to 580 MMBF and on the Superior NF the allowable sale quantity increased from 820 to 1,020 MMBF.

The economic effects of all alternatives were recalculated based on the updated allowable sale quantity figures and new visitor use estimates from the National Visitor Use Monitoring report.

Management Area allocations changed based on data corrections and adjustments that responded to public

comment (expansion on the non-motorized semi-primitive areas on the Chippewa NF, for instance).

Stand replacement fire (prescribed fire that is used to kill an entire stand of trees) will generally not be used as a management tool within parts of the Forests classified as suitable for timber production. Timber harvest, often followed by prescribed fire, will be the primary tool used to meet vegetation age class objectives. Prescribed fire will continue to be used to

restore ecosystem function, treat hazardous fuels and for site preparation.

The Forests worked closely with the US Fish and Wildlife Service to provide management direction that would contribute to the recovery of the bald eagle, gray wolf, and Canada Lynx. A guideline was added to protect wolf dens. Standards and guidelines to address concerns related to lynx were added or refined.

CHAPTER 2 ALTERNATIVES

2.1 Introduction

This chapter describes and compares the alternatives considered for the revised Forest Plans. Alternatives provide a framework for analyzing different ways of meeting the purpose and need and addressing the issues discussed in Chapter 1. In Forest Plan revision, each alternative has a different approach to managing natural resources on the two National Forests. The revised Forest Plans are based on the selected alternative.

2.2 Developing Alternatives

The Chippewa and Superior National Forests considered a broad range of reasonable alternative management approaches based on the following criteria:

- Alternatives are distributed between minimum and maximum benchmarks.
- Alternatives respond to the issues raised during the planning process.
- Alternatives respond to regional management direction.
- A range of outcomes and outputs would result from the alternatives.

Process

In 1997, the Forest Service issued a Notice of Intent (NOI) to revise the current Forest Plans. The NOI informed the public about the formal revision process. An initial proposal of how to change the current Forest Plans was made in the NOI. The Forests solicited comments or suggestions from the public on the proposal for revising the Forest Plans and possible alternatives for addressing the issues associated with the proposal. These public comments helped frame the alternatives and analysis in the Draft EIS. Figure 2-1 on the next page illustrates the alternative development process.

The Draft EIS and proposed Forest Plans were available for 120-day public comment period. Thousands of comments were received. The FS read and considered these comments and used them to better address the public's concerns and improve the Final EIS and revised Forest Plans.

Alternatives Eliminated from Detailed Study

Twenty-one alternatives were considered during the initial analysis process. Some of the alternatives considered were developed internally and some were proposed by outside groups. Some of these alternatives had similar themes, so they were combined. Other alternatives were eliminated from detailed study, including some alternatives that involved harvesting more timber than could be sustained over time, allowed for no harvest, or mandated a watershed-based management approach.

Figure 2.1 General Strategy for Identifying Management Approach for Revised Forest Plan

Developing Alternatives	
<p>Step #1: What did people say? About 460 people commented on the Notice of Intent to analyze Revision of the Forest Plans.</p>	Public Comments
<p>Step #2: What are the issues? Issues were identified from public comments, concerns of other agencies, and internal considerations.</p>	Issues
<p>Step #3: How do we address the issues? Public workshops were held to develop preliminary alternatives. Alternatives are different ways of dealing with issues.</p>	Preliminary Alternatives
<p>Step #4: What are the ecological objectives of the alternatives? Objectives were developed using information such as the minimum requirements for plant and wildlife species viability.</p>	Ecosystem Objectives
<p>Step #5: What management activities should be used? Direction was developed for Management Areas to emphasize different resources and uses. Each alternative has a different mix of Management Areas.</p>	Management Areas
<p>Step #6: What management approaches are considered? Seven alternatives were developed. The environmental effects of each alternative are analyzed.</p>	ALTERNATIVES
<p>Step #7: How do the alternatives relate to the Proposed Forest Plans? The preferred alternative was used to develop the Proposed Forest Plans. (After the Final EIS is issued, the Records of Decision will select an alternative to implement. The final Revised Forest Plans will be based on the selected alternative.)</p>	Proposed Forest Plans

2.3 Elements Common to All Alternatives

Seven alternatives were studied in detail. They have a number of elements in common.

Laws, Regulations, and Policies

To be considered, alternatives must:

- Meet the minimum management requirements of 36 (Code of Federal Regulations) CFR 219.27 for development, analysis, approval, implementation, monitoring, and evaluation of forest plans
- Recognize the unique status of American Indians and their rights retained by trust and treaty with the United States, including consultation requirements
- Meet, as a minimum, the Minnesota Forest Resource Council site-specific guidelines for forest management
- Continue current management of the Boundary Waters Canoe Area Wilderness on the Superior National Forest in accordance with wilderness legislation and the Boundary Waters Canoe Area Wilderness Management Plan
- Meet minimum health and safety standards

Fire management plans for each Forest will continue to be developed and updated on a yearly basis.

Wild and Scenic Rivers

All alternatives would manage the seven rivers determined eligible in a manner that would protect their free flow, outstanding remarkable values, and classification.

Landscape Ecosystems

A new component to national forest management in this Forest Plan revision process is the Landscape Ecosystem classification. All alternatives use the concept of Landscape Ecosystems (LE), except

Alternative A. The following ecosystem objectives have been developed for each LE for each alternative:

- Age classes – Percent of an LE dominated by an age class
- Species diversity – Percent of an LE dominated by a species
- Stand diversity – Percent of an LE dominated by a forest type
- Management indicator habitats – Direction of change in percent of habitats

Every alternative also has a goal of providing for a minimum of 10 percent representation of vegetation conditions that are referred to as Range of Natural Variability.

Range of Natural Variability is the variation of physical and biological conditions within an area due to natural processes with all of the elements present and functioning.

Management Areas

Management Areas (management direction for a specific location) are the social information used in planning, such as what human uses are emphasized.

Management areas (MAs) provide direction in terms of the types of human uses allowed in specific areas of the Forests. Different MAs emphasize different kinds of uses. The mix of MAs changes between alternatives depending on the theme of the alternative.

Some of the MAs in the revised Forest Plans have not changed from the MAs in the 1986 Plans. Others have been carried forward from the 1986 to revised Forest Plans, but have changed in total acres or location on the landscape.

The management direction for the following MAs generally has not changed from the 1986 Plans and Plan amendments:

- Pristine Wilderness
- Primitive Wilderness
- Semi-primitive Non-motorized Wilderness
- Semi-primitive Motorized Wilderness
- Eligible Wild, Scenic, and Recreational Rivers
- Experimental Forest
- Research Natural Areas
- Unique Areas

The following is a brief description of each MA. Each MA has a different mix of resource uses. The descriptions here only highlight the predominant use in the MA and list the multiple uses of each MA. The emphasis in each area is not an exclusive use.

General Forest Emphasis

There are two management areas with a general forest emphasis: General Forest MA and General Forest - Longer Rotation MA. The amount of land in the general forest areas is plentiful in most alternatives because it includes the broadest variety of uses. These areas are managed to maintain ecosystem integrity while providing a variety of sustainable economic and social uses and values. Management emphasizes maintaining a variety of vegetative communities, age classes, and habitats that are appropriate within landscape ecosystems. These areas are also managed for forest products, and occasionally there is a moderate to high level of human interaction on the landscape.

Timber management is one of the primary activities in these MAs. When trees are harvested, they provide commercial pulpwood, sawtimber, and fiber at sustainable levels. Other forest products are also available, such as firewood and boughs. Items that are traditionally gathered, including birch bark and pinecones, are available within these MAs.

Other activities, such as recreation, are also featured in these two MAs. A wide variety of recreation opportunities is provided. Examples include hunting, recreation motor vehicle use, hiking, camping, and water-based recreation. Roads and developed recreation facilities are present, such as campgrounds and trails. Higher maintenance level roads that are developed for forest management activities would likely stay open for public use.

Recreational activities occur in natural-appearing forest surroundings that are modified by forest management activities. The visual effects of timber management are often noticeable and may sometimes dominate the landscape. The landscape is diverse with a combination of continuous canopy, open canopy, and areas of young regenerating forest. Openings are shaped to follow natural landforms or features, with sizes typically ranging from 10 to 100 acres and occasionally up to 1,000 acres.

General Forest MA

The range of rotation ages for each forest type is determined by specific objectives for landscape ecosystems that are outlined in Chapter 3 of the revised Forest Plans. In the General Forest MA, timber harvest occurs at all rotation ages within the range set by the landscape ecosystem objectives.

Forest vegetation communities are managed with practices that mimic ecosystem processes, mainly mimicking stand replacement disturbance. A full range of silvicultural practices is used. However, compared to the General Forest - Longer Rotation MA, there is more clearcutting.

Management activities generally create young, even-aged forests. A mosaic of young to mature (1 to 150 years) trees dominates these areas. Compared to other MAs, this MA would have the most young forest and the largest sized timber harvest units.

Management-ignited fire is used primarily to prepare sites for regenerating new forests and to reduce fuel that could cause wildfires.

General Forest - Longer Rotation MA

In the General Forest – Longer Rotation MA, final harvest occurs more often at extended rotation ages than at minimum rotation ages for some forest types. The range of rotation ages for each forest type is determined by the management objectives for each landscape ecosystem.

Forest vegetation communities are managed with practices that mimic both stand replacement disturbance and less severe stand maintenance disturbance. A full range of silvicultural practices is employed. However, compared to the General Forest MA, there is more partial cutting. When

clearcutting is used in the General Forest – Longer Rotation MA, it would generally be at an extended rotation age.

Management activities leave both young, even-aged and older, multi-aged forests on the landscape. A mosaic of young to old (1 to 250 years) trees dominates these areas.

Management-ignited fire is used to mimic natural disturbances on the landscape to maintain vegetation communities. Fire is also used as a tool to prepare sites for regenerating new forests and to reduce fuel that could cause wildfires.

Compared to the General Forest MA, forest management activities in the General Forest - Longer Rotation MA would generally be less noticeable to visitors.

Recreation and Scenic Emphasis

Two management areas emphasize recreation and scenic resources:

- Recreation Use in a Scenic Landscape MA
- Eligible Scenic River (Chippewa NF) and Eligible Wild, Scenic, and Recreational River (Superior NF) MAs

Ecosystems are managed to provide a predominantly natural-appearing landscape that may be slightly modified by forest management activities. These areas emphasize a large tree and old forest character. Management activities enhance recreation and aesthetic objectives, such as vistas, and may be noticeable to visitors. Timber harvest, management-ignited fire, tree planting, and other management techniques may be used to meet recreation and scenic resource objectives.

Recreation Use in a Scenic Landscape MA

Concentrated recreation use is primarily emphasized in these areas. Facilities and access may be highly developed, resulting in a high degree of user interaction. There may be paved roads and buildings. These areas provide many recreational facilities, including day use areas, resorts, visitor centers, trails, and camping at developed campgrounds.

Low- to high-density recreation occurs in these large geographic areas. Viewsheds are managed for scenic beauty and big-tree character. Generally, these areas offer a natural-appearing forest setting with some facility and trail development and roads for recreation. These areas also provide wildlife habitat to enhance opportunities for watching wildlife.

Eligible Scenic River MA (CNF) and Eligible Wild, Scenic, and Recreational River MA (SNF)

These areas provide for the interim protection of river corridors identified as Wild, Scenic, or Recreational rivers. Under the interim protection, management works toward maintaining the outstanding values of the river corridors. Areas are managed as a range of settings from primitive to developed recreation areas, depending on the potential river designation.

Semi-primitive Recreation Emphasis

Three management areas emphasize semi-primitive recreation:

- Semi-primitive Non-motorized Recreation MA
- Semi-primitive Motorized Recreation MA
- Semi-primitive Motorized and Non-motorized Recreation MA

These areas provide opportunities for low-density, undeveloped recreation. Examples include: walking, hiking, cross-country skiing, snowshoeing, trail running, canoeing, fishing, and horseback riding. The motorized areas also provide trail-riding opportunities for recreation motor vehicle (RMV) use.

Recreational activities occur in natural-appearing environments that may be slightly modified by forest management activities. Interaction among recreational users is low, but there is some evidence of other users.

Management activities in these areas enhance recreation and scenic objectives and may be occasionally noticeable to visitors. These management activities may include developing primitive campsites, harvesting timber, using management-ignited fire, and planting trees.

Ecosystems are managed to provide a predominantly natural-appearing landscape, generally emphasizing large trees and older forest with a continuous forest canopy.

Semi-primitive Motorized Recreation MA

This MA emphasizes land and resource conditions that provide recreational opportunities in nearly primitive surroundings where motorized use is allowed. Most recreation use occurs on lakes, trails, portages, and low standard roads.

Semi-primitive Non-motorized Recreation MA

This MA emphasizes land and resource conditions that provide recreational opportunities in nearly primitive surroundings where motorized use is not allowed. Most of the non-motorized recreation use occurs on lakes, trails, portages, and low standard roads.

Semi-primitive Motorized and Non-motorized Recreation MA

This MA would occur on the Chippewa National Forest in Alternative D. These areas provide recreational opportunities for either motorized or non-motorized travel. Timber harvest is used to return and maintain areas to their native cover. Roads are low standard and some are available for RMV use.

Conservation and Special Features Emphasis

Four management areas emphasize conservation and special features:

- Unique Biological MA and Unique Biological, Geological, or Historical Areas MA
- Special Management Complexes MA
- Minimum Management Natural Areas MA
- Riparian Emphasis Areas MA

Management in these areas focuses on conserving special social or ecological features of the Forests. Management is generally limited but sometimes evident. Timber harvest and other activities may be allowed if needed to achieve the objectives of the

area. Recreation and access opportunities, values, and benefits are different in each MA. Recreation activities occur in a range of surroundings from a natural-appearing forest setting with minimal development and human modification to highly developed recreation settings.

Unique Biological MA (SNF) and Unique Biological, Aquatic, Geological, or Historical Areas (CNF)

Unique biological, aquatic, geological, or historical areas are preserved, including a National Natural Landmark on the Superior National Forest. In some areas, the focus is on interpreting features. Recreation facilities are provided only when needed to interpret or protect the resource. Dispersed recreation occurs but may be discouraged.

Special Management Complexes MA

These areas provide for large areas of contiguous, older forests. Terrestrial and riparian ecosystems are shaped by naturally occurring ecological processes or management actions that mimic those processes. Management activities, such as tree planting and timber harvesting, may be used to maintain, enhance, or restore species composition and forest structure. Dispersed recreation activities generally occur in semi-primitive settings. Some areas may have existing developed campgrounds and trails.

Minimum Management Natural Areas MA

Natural processes shape terrestrial and riparian ecosystems, and fire is the main management tool. Road networks are substantially reduced compared to the current road density. Recreation activities occur in primarily semi-primitive, non-motorized settings. This MA only applies to Alternative D.

Riparian Emphasis Areas MA

This MA emphasizes riparian values and functions. Riparian resources are restored, protected, and enhanced in areas where ecosystem processes are sensitive to degradation. Dispersed recreation activities occur in semi-primitive settings. There may also be highly developed campgrounds and trails in natural-appearing surroundings that are somewhat modified by forest management activities.

Research Emphasis

Three management areas emphasize research:

- Experimental Forests MA
- Research Natural Areas MA (existing)
- Potential Research Natural Areas MA.

Experimental Forests MA

These areas are formally designated as Experimental Forests. The focus is on researching vegetation management techniques. Timber products are incidental to the primary objective. Generally, no developed recreation facilities will be provided. Dispersed recreation use occurs but is generally discouraged.

Research Natural Areas MA

These areas are the existing formally designated Research Natural Areas (RNA). The focus is on preserving and maintaining areas for ecological research, observation, genetic conservation, monitoring, and educational activities. RNAs are not managed for timber products, and harvesting is not allowed. No recreation facilities are provided. Dispersed recreation use occurs but is generally discouraged.

Potential Research Natural Areas MA

These areas are recommended to be Research Natural Areas. They will be managed similarly to Research Natural Areas until they are formally designated as Research Natural Areas.

Wilderness Emphasis

Five management areas emphasize wilderness:

- Pristine Wilderness MA
- Primitive Wilderness MA
- Semi-primitive Non-motorized Wilderness MA
- Semi-primitive Motorized Wilderness MA
- Wilderness Study Areas MA

Wilderness MAs are federally designated wilderness or areas that may be recommended for wilderness study designations.

Ecosystems are managed to allow ecological processes such as fire, insects, and disease to operate relatively free from human influence. Diverse landscapes result from naturally occurring succession and natural disturbance. Vegetation is managed only to protect wilderness values or to protect adjacent property from fire or pests.

Pristine Wilderness MA

These areas are non-motorized where activities of contemporary humans are not noticeable. Trails, portages, and campsites are not constructed or maintained. Visitors rarely encounter each other.

Primitive Wilderness MA

These areas are non-motorized and away from main travel routes, but activities of contemporary humans are somewhat noticeable. Campsites have latrines and fire grates. Portages and trails are maintained. Visitors infrequently encounter each other.

Semi-primitive Non-motorized Wilderness MA

These are non-motorized areas near main travel routes. Campsites have latrines and fire grates. Portages and trails are constructed and maintained but are on main travel routes. Visitors encounter each other with moderate frequency.

Semi-primitive Motorized Wilderness MA

Based on the BWCA Act, these are the only places where motorized watercraft are permitted in wilderness. Campsites have latrines and fire grates. Portages and trails are constructed and maintained and are along main travel routes. The frequency of encounters with others is moderate to high.

Wilderness Study Areas MA

These areas are recommended for study as additions to the National Wilderness Preservation System. Wilderness Study Areas would be managed in a way that would allow them to retain their eligibility as wilderness. They would be semi-primitive non-motorized areas, so there would be minimal encounters with others, minimal evidence of human activities, and minimal facilities provided for visitors.

Minimum Investment Emphasis

There is one management area that emphasizes minimum investment, the Minimum Investment Emphasis MA. These are areas where NFS land is sparse and where Forest Service management and investment are minimal. These areas may be a priority for a land exchange for other ownership. Ecosystems are managed for protecting and maintaining environmental values and protecting public health and safety. This MA only applies to Alternative A on the Superior NF.

2.4 Alternatives Considered in Detail

The following narrative and Tables 2-1 and 2-2 provide brief descriptions of the alternatives that were considered in the analysis. The way management areas are layered on top of landscape ecosystems varies by alternative. Management areas were distributed in each alternative to reflect the theme of the alternative. Therefore, the land area of the Forests is allocated to management areas differently in each alternative as evidenced by the acreage allocations in the tables on the following pages.

The seven alternatives considered in detail provide for a range of outcomes, outputs and environmental effects. They were developed in order to demonstrate differing ways of responding to issues and resource emphases. The social, economic and ecological effects also vary by alternative. Most, but not all of the effects analyzed have been mitigated through the use of standards or guidelines. The effects of the alternatives described in the Environmental Consequences section of the Final EIS could be further reduced during project implementation by the use of site-specific mitigations. However, for the purpose of demonstrating differences between alternatives considered in detail, the analysis in the Final EIS does not include all of these mitigations. Doing so would tend to make alternatives appear much more alike and alter the overall themes the alternatives were originally designed to accomplish.

Management in the Boundary Waters Canoe Area Wilderness will not change under any of the alternatives. Natural resource managers will use both management area direction and knowledge of landscape ecosystems to develop site-level prescriptions that move the Forests toward the desired conditions.

Alternative A

Alternative A is the ‘no action’ alternative. In Forest Plan revision, ‘no action’ means that guidance for the next ten years would generally be the same as the management direction in the amended current Forest Plans. Implementation would also use current science. Alternative A emphasizes managing the forests to provide timber as well as deer and moose habitat, and developed and undeveloped recreational opportunities in motorized and non-motorized settings. This alternative would maintain the existing higher standard roads while decommissioning some of the existing low standard roads. New low standard roads would also be constructed.

Alternative B

Alternative B emphasizes restoring older, mixed forests and coniferous species. Protecting unique resources is emphasized more in this alternative than in other alternatives. Timber management and other commercial resource management would be secondary to increasing the amount of older forest. This alternative would maintain the existing higher standard roads while decommissioning some of the existing low standard roads. Some new low standard roads would also be constructed. Developed and undeveloped recreational opportunities in a scenic landscape would be emphasized.

Alternative C

Alternative C emphasizes producing timber and replicating large-scale natural disturbances, such as large fires or large blowdowns. Timber harvest would be the main tool used to create large-scale disturbance. To provide for older trees and wildlife

habitat, extended rotations would be used in some situations. Under Alternative C, there would be more large patches of young forest than in Alternative A. This alternative would maintain the existing higher standard roads while decommissioning some of the existing low standard roads. New low standard roads would also be constructed. Developed and undeveloped recreational opportunities in motorized and non-motorized settings would be provided.

Alternative D

Alternative D emphasizes semi-primitive, non-motorized recreation, and restoring conifers to create an 'old-tree' character. The highest priority for vegetative restoration would be establishing white pine. Vegetation management would transition away from timber production toward ecological succession and some restoration. However, timber harvesting would be used in the first two decades as a tool to restore some cover types. After this 20-year period, a very low level of timber harvest would be used to maintain a representation of all forest types and ages. The clearcutting harvest method would generally not be used in this alternative. This alternative would maintain most, but not all of the existing higher standard roads while decommissioning many of the existing low standard roads. Very few to no new low standard roads would be constructed. Developed and undeveloped recreational opportunities in a scenic landscape would be emphasized.

Modified Alternative E

Alternative E was modified between the Draft and Final EIS. Changes were made in response to public comments and because of data corrections. However, the theme of Alternative E has not changed.

Modified Alternative E emphasizes diverse economic opportunities for local communities. Compared to the other alternatives, the Forests would be managed in a way that provides a variety of economic opportunities. This alternative focuses more on tourism and its associated revenues by emphasizing resources such as recreational

opportunities, scenic landscapes, and diverse wildlife habitats. Modified Alternative E would provide a broad range of recreation opportunities in motorized and non-motorized settings. Timber and other commodity products would also be emphasized.

There would be a focus on protecting, enhancing, and restoring riparian areas because they are important to recreation and tourism. Modified Alternative E emphasizes timber harvesting less than Alternatives C and A, but more than the other alternatives. Existing higher standard roads would be maintained. Some existing low standard roads would be decommissioned. New low standard roads would also be constructed.

Alternative F

Alternative F emphasizes managing for a vegetative condition within the range of natural variability on National Forest System land. Timber harvest and prescribed fire would be used to mimic natural disturbances. Ecological processes would be maintained or restored by using a variety of timber harvest methods, management-ignited fire, and allowing natural processes to operate. Conifer and northern hardwood forest types would be restored. Areas that historically experienced high-intensity, stand-replacing events, such as wildfires and large-scale blowdowns, would be intensively managed. Areas that experienced low-intensity, stand maintenance events, such as surface fires and minor wind throw, would be less intensively managed. The existing higher standard roads would be maintained. Some existing low standard roads would be decommissioned. New low standard roads would also be constructed. Developed and undeveloped recreational opportunities in motorized and non-motorized settings would be provided.

Alternative G

Alternative G emphasizes managing vegetation communities in a way that distributes young forest, older forest, and old growth across the Forests. Under Alternative G, the Forests would be delineated as young, mature, or old-growth forests. Timber harvest and prescribed fire would be used to

mimic natural disturbances. Ecological processes would be maintained or restored by using a variety of timber harvest methods, management-ignited fire, and allowing natural processes to operate. Conifer and northern hardwood forest types would be restored. The existing higher standard roads would be maintained. Some existing low standard roads would be decommissioned. New low standard roads

undeveloped recreational opportunities in motorized and non-motorized settings would be provided.

Management Area	A	B	C	D	Mod E	F	G
General Forest Emphasis							
General Forest	621,899	0	569,275	0	347,319	11,995	153,978
General Forest - Longer Rotation	0	401,236	39,548	0	191,829	553,236	326,159
Recreation and Scenic Emphasis							
Recreation Use in a Scenic Landscape	3025	4,646	1,800	11,351	12,469	1,800	1,802
Eligible Scenic Rivers	1,537	1,537	1,537	1,537	1,537	1,537	1,537
Semi-primitive Recreation Emphasis							
Semi-primitive Motorized Recreation	0	0	0	0	0	0	5,140
Semi-primitive Non-motorized Recreation	12,365	14,662	12,364	70,536	21,937	11,816	18,100
Semi-primitive Non-motorized & Motorized Recreation	0	0	0	221,140	0	0	0
Conservation and Rare Features Emphasis							
Unique Biological, Aquatic Geological, or Historical Areas	8,105	8,105	8,105	8,105	18,026	36,408	8,105
Special Management Complexes	0	169,098	0	0	0		85,621
Minimum Management Natural Areas	0	0	0	323,257	0	0	0
Riparian Emphasis Areas	0	36,108	14,287	0	52,883	21,629	35,498
Research Emphasis							
Experimental Forest	8,184	8,184	8,184	8,184	8,184	8,184	8,184
Research Natural Areas (existing)	2,140	2,140	2,140	2,140	2,140	2,140	2,140
Potential Research Natural Areas	769	6,077	769	5,542	1,699	9,261	9,015
Wilderness Emphasis							
Wilderness Study Areas	0	6,213	0	6,213	0	0	2,727
Total*	658,024	658,006	658,009	658,005	658,023	658,006	658,006

* Totals do not exactly match among alternatives due to rounding.

would also be constructed. Developed and

Management Area	A	B	C	D	Mod E	F	G
General Forest Emphasis							
General Forest	1,160,990	0	1,155,938	0	640,443	318,983	419,516
General Forest - Longer Rotation	0	618,997	52,173	0	415,478	856,220	609,973
Recreation and Scenic Emphasis							
Recreation Use in a Scenic Landscape	11,331	74,637	113,877	569,770	155,415	110,500	87,406
Eligible Wild, Scenic, and Recreational River†	28,457	18,888	2,458	18,278	31,834	27,371	21,650
Semi-primitive Recreation Emphasis							
Semi-primitive Motorized Recreation	39,072	0	39,071	0	69,018	32,842	29,670
Semi-primitive Non-motorized Recreation	0	262,863	0	86,957	4,559	0	1,647
Conservation and Rare Features Emphasis							
Unique Biological Areas	514	514	514	514	2,578	514	514
Special Management Complexes	0	354,751	0	0	0	0	183,302
Minimum Management Natural Areas	0	0	0	615,762	0	0	0
Riparian Emphasis Areas	0	0	0	0	17,444	0	0
Research Emphasis							
Experimental Forest	0	0	0	0	0	0	0
Research Natural Areas (existing)	3,172	3,172	3,172	3,172	3,184	3,172	3,172
Potential Research Natural Areas	800	44,000	800	39,000	19,448	44,000	34,000
Wilderness Emphasis							
Pristine Wilderness	113,700	113,700	113,700	113,700	113,700	113,700	113,700
Primitive Wilderness	299,760	299,760	299,760	299,760	299,760	299,760	299,760
Semi-primitive Non-motorized Wilderness	345,233	345,233	345,233	345,233	345,233	345,233	345,233
Semi-primitive Motorized Wilderness	51,916	51,916	51,916	51,916	51,916	51,916	51,916
Wilderness Study Areas	0	17,481	0	60,534	0	0	3,672
Minimum Investment Emphasis							
Minimum Investment	47,420	0	0	0	0	0	0
Total*	2,102,365	2,205,912	2,178,612	2,165,596	2,170,010	2,204,211	2,205,131

† On the Superior National Forest, acres of Eligible Wild, Scenic, and Recreational River corridors protected is the same in every alternative (31,834 acres). However, some corridors were assigned to management areas that are more protective than the Eligible Wild, Scenic and Recreational Rivers MA, such as Wilderness Study Areas or potential RNA MA.

* Totals do not exactly match among alternatives due to rounding.

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

Chapter 3 discloses the analysis of environmental effects that are expected to occur as an outcome of implementing each alternative described in Chapter 2. Environmental effects are measured in terms of “indicators” relative to issues described in Chapter 1. The following discussion is a summary of effects described in the Final EIS. It is important to understand that “existing condition” refers to current status while “current Forest Plan” refers to the management direction in the 1986 Forest Plans as represented by Alternative A.

3.2 Forest Vegetation

Two key pieces of information used for the Forest Plan revision effects analysis of proposed management direction involve the application of landscape ecosystems as a geographic unit and the concept of Range of Natural Variability to compare outcomes under the alternatives. Range of natural variability (RNV) refers to the expected variation in physical and biological conditions caused by natural variations in climate and disturbances, such as wildfire and windstorms

Forest Composition and Structure

All of the proposed alternatives include some amount of tree harvesting, including stand regeneration harvesting. Harvest levels vary from relatively small amounts of harvesting in Alternative D to relatively large amounts of harvesting in Alternative C. Tree harvesting has implications for all measurements used to analyze the alternatives for effects to forest vegetation. These effects vary by the type and amount of tree harvesting method. The types and amounts of

these methods vary by alternative according to the theme of each alternative.

Forest succession (the sequential change in forest composition and structure of a particular stand as it ages or as it is subjected to local natural disturbances) is also common to all alternatives. How this process plays out across the landscape at a national forest level is dependent on vegetation objectives, the proposed and probable harvest cutting methods used, the amount and types of prescribed fire used, and natural disturbances. The vegetation objectives, amounts and types of tree harvesting methods, and amount of prescribed fire to be used varies according to the management direction for the alternatives.

Amounts of Forest Types Compared to the Range of Natural Variability Values

When compared to historic vegetation conditions that occurred within the range of natural variability (RNV), the current amount of aspen forest type on National Forest land is two to three times more than would have occurred under RNV. Conversely, when compared to RNV, the current amounts of jack pine, white pine, spruce-fir, and northern hardwood (Chippewa NF only) are under-represented.

Alternatives A, and C generally tend to maintain current amounts of forest types, while Alternatives B, Modified E, F, and G generally move closer to RNV value amounts over the long term, but in different amounts and at different rates. Alternative D moves vegetation considerably away from the existing amounts, beyond RNV, and tends to over-represent the long-lived forest types (red pine, white pine, spruce-fir, and northern hardwoods).

Amounts of Forest by Age Class Compared to the Range of Natural Variability Values

When compared to the amounts that occurred within RNV, the current amount on National Forest land in the 0 to 9 and 50 to 99 year age classes are

considerably over-represented. Conversely, when compared to RNV, the current amounts in the 100 to 149 and 150 plus year age classes are considerably under-represented.

Alternatives A and C generally tend to maintain the current amounts in the various age classes, while Alternatives B, Modified E, F, and G generally move closer to the RNV value amounts over the long term. Again, Alternative D moves considerably away from the existing amounts, beyond RNV conditions, and tends to over-represent the older age classes.

Resulting Within-stand Complexity on Treated Stands

Plant species diversity and structural complexity are affected by management treatments. Tree harvest cutting methods such as clearcutting and similar even-aged harvest methods can tend to simplify within-stand complexity while those such as partial harvests, retain a majority of the overstory trees, and multi-aged/selection harvests tend to increase within-stand complexity. Prescribed fire, when used in fire-dependent landscape ecosystems, also tends to increase within-stand complexity.

On the Chippewa, Alternatives A and C tend to rely heavily on even-aged harvest cutting methods, especially clearcutting; while Alternatives B, Modified E, F and G rely more on partial harvests and uneven-aged harvest methods. On the Superior, Alternatives A, C, Modified E and F tend to rely heavily on even-aged harvest cutting methods, especially clearcutting; while Alternatives B and G rely more on partial harvests and uneven-aged harvest methods. Alternative D relies completely on partial harvest cutting methods, however it actively treat a relatively small amount of the total forest. On both Forests, Alternatives A, C, Modified E, F and G would use less prescribed fire for ecological restoration than Alternatives B and D.

On the Chippewa, Alternatives B, D, Modified E, F and G would tend to have more within stand complexity compared to the other alternatives. While on the Superior, Alternatives B, D and F would tend to have more within stand complexity compared to the other alternatives.

Projected Amounts of Old-growth Forest Conditions

Old-growth forest conditions can be provided in a variety of ways. Each alternative provides for these conditions differently. Over the long term, Alternatives A, C and Modified E, respectively, tend to provide fewer acres in the later vegetation growth stages that are expected to provide old-growth forest characteristics. They also tend to have fewer acres in special designations that may provide some or all of the appropriate old-growth characteristics over time, and these designations are not necessarily managed for old-growth forest conditions. Alternatives D, B, G, and F, respectively, would provide more acres in the later vegetation growth stages. They also tend to have more acres in special designations, especially those such as potential Research Natural Areas, Special Management Complexes, and Minimum Management Natural Areas, where old-growth forest conditions are expected to occur over the long term.

Forest Spatial Patterns

The Chippewa and Superior National Forests are capable of providing for a variety of habitat conditions in the context of vegetative spatial patterns. These spatial patterns refer to the size, shape, and arrangement of forest types, habitats, and vegetation communities resulting from natural disturbances and forest management activities.

At issue is the size and age of forest patches, and quantity of interior habitat. The analysis of spatial patterns focused on broad level descriptors that included the size and amount of large mature and older forest patches; size and amount of large young forest patches; and the amount of forest interior and management induced edge density. A coarse filter approach was used in the analysis for meeting broad ecosystem conditions that can be described in terms of forest age, composition, and spatial patterns.

Inherent features of each Forest, such as land ownership patterns or the size of harvested areas, and the estimation of natural decadal disturbances in the Boundary Waters Canoe Area Wilderness, are understood as constant contributing factors within the Final EIS analysis.

The cumulative effects in the Final EIS includes a summary of each alternative's influence on forest spatial patterns. Ownership patterns; current and predicted disturbance rates on forested lands and the relationship to the range of natural variability; recent forest management trends; and the desired conditions of landscapes help to place into context foreseeable effects to landscape patterns.

In comparison to the existing condition, Alternatives B, D F, G and Modified E (on the Chippewa only) would create forest spatial patterns that provide a greater representation of Section-wide (an ecosystem hierarchical area that lays over much of northcentral and eastern Minnesota) ecosystem structure, processes, and functions that were once more common within the Chippewa and Superior National Forests. Alternatives A and C would create forest spatial patterns that provide less representation of Section-wide ecosystem structure, process, and functions that were once more common. On the Superior NF Modified Alternative E would create patterns less than the existing condition but more than Alternatives A and C.

Insects and Disease

Since about 1912 in northern Minnesota, eastern spruce budworm has been a concern as a threat to mature spruce/fir forest stands, while shoot blights on two-storied red and jack pine stands have been known to be present since the 1960's. Outbreaks of spruce budworm, shoot blights, and under some conditions forest tent caterpillar, kill trees, and in most cases result in the loss of merchantable timber. As trees decompose and fall, fuels accumulate. As a result, and depending on the area affected, the hazard of wildfire increases. The larger the area affected, the greater the risk of a catastrophic (larger and hotter) wildfire increases. Budworm, shoot blight and forest tent caterpillar epidemics may also alter wildlife habitat, lessen the recreational experience of the general forest user, and reduce the scenic integrity of the forested landscape.

Under all alternatives, the long-term trend in vegetation on both Forests results in an increase in the acres of mature spruce/fir and two-storied red and jack pine stands. Projected acreages of spruce/fir are well above those capable of sustaining spruce budworm

outbreaks of epidemic proportions, but it is unknown how many acres of two-storied red and jack pine acres are needed to support an epidemic of shoot blight.

Although all alternatives would increase the number of mature spruce/fir acres, Alternatives A and C, which emphasize early successional and young forests, would result in the least acreage increase. Modified Alternative E and G, which both emphasize a mix of young and old forests, would result in the next fewest acres. Alternative D, emphasizing old forests, and Alternative F, which has all the proposed RNA's and emphasizes RNV, would result in still more acres. Alternative B, which includes all the proposed SMCs and emphasizes older and conifer forests, would have the largest increase in acres of susceptible forest stands.

Alternative A, which does not emphasize two-storied stands, and Alternative D, which does the least amount of harvesting, would result in the least acres of two-storied stands on both Forests. Alternative G, which utilizes harvest methods that emphasize the establishment and maintenance of two-aged and multi aged stands, produces the most acres of two-storied stands on both forests. The other four alternatives fall in between, mainly because of the difference in the amount of acres harvested on each forest and the harvest methods applied.

Forest patterns that shorten the duration between forest tent caterpillar outbreaks would be greatest in Alternatives A and C. These alternatives produce the greatest amounts of management induced forest edge. Alternatives B, D, F, and G (Chippewa) would have similar conditions for forest tent caterpillars and would likely result in the longest duration between caterpillar outbreaks. Modified Alternative E and Alternative G (Superior) result in reductions in forest edge from existing conditions. The duration between forest tent caterpillar outbreaks under these alternatives would likely be greater than existing conditions, resulting in fewer outbreaks over time than existing conditions.

3.3 Wildlife

The Chippewa and Superior National Forest's wildlife habitat provides an environment for a host of terrestrial and aquatic animals, plants, fungi and other organisms.

At issue are the differing opinions about how the National Forests should be managed for the full array of rare to common wildlife species and their habitats. The Final EIS analysis of wildlife species and their habitats focused on impacts to a suite of management indicator habitats and species of management concern. Management indicator habitats were selected to represent the wide array of major environmental communities on the National Forests. Species of management concern were selected because they could serve to indicate management effects on other species or because they were of high public concern for ecological, social or economic reasons. These include:

- Forest type and age management indicator habitats
- Forest spatial pattern habitats age management indicator habitats
- Lake and stream management indicator habitats
- Threatened and endangered species
- Regional Forester sensitive species
- Management indicator species and species of management concern
- Non-native invasive species.

Analysis of potential effects on wildlife was applied at two different scales. The "coarse filter" scale evaluates effects of management of the alternatives to broad general habitat conditions that represent requirements for a large number of wildlife species, management indicator habitats. The "fine filter", or species-specific, analysis was used where impacts to wildlife were found to not be adequately addressed by the coarse filter. The analysis projected future conditions likely under the alternatives and compared these to the current and historical conditions under the estimated range of natural variability to assess whether future conditions would be likely to maintain the viability of all native and desired non-native species. Trade-offs to groups of species within management indicator habitats and effects on representative species were also considered.

Forest Type and Age Management Indicator Habitats

Representative wildlife species of management concern associated with each Management Indicator Habitat are shown in Table 3-1 below.

Management Indicator Habitat	Species
Upland Young Forest	Deer, ruffed grouse, chestnut-sided warbler, American woodcock
Upland Mature/Old Forest	Boreal owl (SNF), barred owl, northern goshawk, red-shouldered hawk (CNF) black-throated blue warbler, pileated woodpecker, least flycatcher, blue-spotted salamander, goblin fern
Young Aspen/Birch Forest	American woodcock, chestnut sided warbler, golden winged warbler (CNF), mourning warbler, deer, ruffed grouse, moose
Mature/Old Aspen/Birch Forest	Northern goshawk, boreal owl (SNF), pileated woodpecker, yellow-bellied sapsucker, Canada warbler, scarlet tanager
Young Upland Conifer Forest	Lynx, snowshoe hare
Mature/Old Upland Conifer	Lynx, bay-breasted warbler, moose, deer, black-backed woodpecker, spruce grouse, boreal chickadee, Blackburnian warbler, pine warbler,
Mature/old Lowland Black spruce-tamarack	Boreal owl, Connecticut warbler, great gray owl, boreal chickadee, yellow-bellied flycatcher, golden-crowned kinglet, gray jay, northern bog lemming (CNF), spruce grouse, taiga alpine butterfly (SNF), small shinleaf (SNF), white adder's mouth (CNF)

The Final EIS analyzed the effects of the alternatives by using management indicator habitat (MIH) as a surrogate measurement for the impacts on the above species of management concern and other wildlife and wildlife habitats. MIHs were selected because they reflect the broad spectrum of major biological

communities and wildlife management issues better than individual species. As surrogates, forest type and age have limitations for encompassing the many environmental features that comprise wildlife habitat, but they provide a practical and efficient approach to addressing the thousands of species that are found on the National Forests. They represent measurable characteristics of preferred habitat conditions or features at landscape and site level.

Alternatives were analyzed over 100 years, providing information on the short and long-term implications of forest management. Tables 3-2 and 3-3 display selected management indicator habitats in acres by each alternative on both Forests in decades two and ten. These MIHs include: young and old upland forest; aspen/birch-dominated forest; upland conifer-dominated forest; and lowland black spruce/tamarack forest. For purposes of comparing alternatives the assumption used is that there is a direction correlation between amounts of MIHs and potential changes to species' habitat and populations.

Spatial Patterns Management Indicator Habitats

The analysis of forest spatial management is interpreted primarily in terms of species associated with the key indicators. Key indicators evaluated along with sampling of some associated species of concern are: edge density (deer, American robin and cowbird); and size and amount of large forest patches (goshawk, black-throated blue warbler, and four species of lichen).

Spatial diversity, as a result of spatial management, is a summary measure of the desired condition of each Forest. Spatial diversity results in greater representation of ecosystem structure, processes, and functions that were once more common within the landscape and inherently benefits associated wildlife species. Reduction in disturbance rates would begin to change recent effects on forest spatial patterns more quickly than others.

On the Chippewa NF, Alternatives B, D, and F make the greatest short-term and long-term changes in the spatial diversity within the forest to a greater degree than the other alternatives. Alternatives G and Modified E continue to make long-term increases in

the spatial diversity although temporally and quantitatively slower than the above alternatives. Alternatives A and C continue recent downward trends in changes to forest spatial patterns and decreasing spatial diversity.

Alternatives B, D, F, and G on the Superior NF make the greatest long-term changes in the spatial diversity with the forest and work towards the desired conditions of spatial diversity with inherent wildlife species. The rates of disturbance in Modified Alternative E, combined with the landscape trends may limit change in spatial diversity. Alternatives A and C continue recent downward trends in changes to forest spatial patterns. Rates of disturbance predicted combined with landscape trends would limit these alternatives to maintain species that require interior forest or large mature upland forest patches.

Lake and Stream Health Management Indicator Habitats

The Chippewa and Superior NF include a wide variety of aquatic habitats from large lakes to slow or fast flowing streams to seasonal ponds and intermittent streams. Each provides habitat for diverse assemblages of both aquatic and terrestrial species.

All alternatives provide direction for maintaining or improving watershed conditions, for maintaining quality habitat sufficient to maintain viable populations of all species, and for promoting productive fish populations to support sustainable recreational and subsistence fisheries.

On both Forests, water quality, as measured by its chemical attributes, of most lakes and streams is generally good to excellent. No landscape scale assessment exists to date to measure water ecosystems quality in terms of functional attributes such as channel stability, stream flow, riparian conditions, water temperature, habitat connectivity, sedimentation, and others. The overall health of lakes and streams may be affected by management activities and land use such as vegetation management, road, trail, and recreational development, and landowners and managers as they implement land use and management activities. These impacts vary by alternative.

Table 3-2. Chippewa National Forest. Forest Type and Age Management Indicator Habitats Number and percent acres at Existing, Decades 2 and 10. Acres are in thousands. Percents represent % of total upland forest (455,881 ac) and % of total lowland forest on NFS land (62,195) in Dualplan .															
		A		B		C		D		MOD E		F		G	
MIH	Existing	2	10	2	10	2	10	2	10	2	10	2	10	2	10
Upland Forest 455,881 acres															
Young	55.5	59.9	71.6	17.2	18.2	65.8	66.8	16.9	9.9	38.2	33.5	21.5	25.5	29.9	33.6
Percent	12.2	13.1	15.7	3.8	4.0	14.4	14.7	3.7	2.2	8.4	7.3	4.7	5.6	6.6	7.4
Mature+	226.5	143.3	128.6	238.6	350.3	128.2	162.2	233.3	395.4	204.6	266.1	231.1	325.2	214.8	291.6
Percent	66.6	4.0	28.2	52.3	76.9	28.1	35.6	51.2	86.7	44.9	58.4	50.7	71.3	47.1	64.0
Aspen / Birch Forest Total upland forest: 455,881 acres															
Young	44.7	38.1	48.8	8.4	10.7	41.4	39.5	8.7	5.6	27.0	19.7	7.5	11.2	13.8	17.2
Percent	9.8	8.4	10.7	1.8	2.3	9.1	8.7	1.9	1.2	5.9	4.3	1.7	2.5	3.0	3.8
Mature+	100.0	19.9	2.1	65.9	19.9	19.0	4.4	69.5	18.0	46.5	41.1	60.0	7.1	58.7	29.2
Percent	21.9	4.4	0.5	14.5	4.4	4.2	1.0	15.3	3.9	10.2	9.0	13.2	1.6	12.9	6.4
All Upland Conifer Forest Total upland forest 455,881 acres															
Young acres	44.7	38.1	48.8	8.4	10.7	41.4	39.5	8.7	5.6	27.0	19.7	7.5	11.2	13.8	17.2
Percent	9.8	8.4	10.7	1.8	2.3	9.1	8.7	1.9	1.2	5.9	4.3	1.7	2.5	3.0	3.8
Mature+	100.0	19.9	2.1	65.9	19.9	19.0	4.4	69.5	18.0	46.5	41.1	60.0	7.1	58.7	29.2
Percent	21.9	4.4	0.5	14.5	4.4	4.2	1.0	15.3	3.9	10.2	9.0	13.2	1.6	12.9	6.4
Lowland B. Spruce / Fir Forest 62,195 acres															
Young	2.6	15.8	1.9	5.2	4.5	17.7	8.9	0	0	6.4	3.5	7.6	5.4	6.6	3.7
Percent	4.1	25.4	3.1	8.4	7.3	28.5	14.3	0	0	10.3	5.6	12.2	8.6	10.6	5.9
Mature+	54.6	42.1	54.3	52.6	49.8	40.2	49.5	57.9	62.2	51.5	53.4	50.3	51.4	51.3	50.5
Percent	87.8	67.7	87.3	84.6	80.1	64.6	79.5	93.1	100.0	82.9	85.8	80.9	82.7	82.4	81.2

Table 3-3. Superior National Forest. Forest Type and Age Management Indicator Habitats															
Number and percent acres at Decades 2, 10. Acres are in thousands. Percents represent % of total upland forest and % of total lowland forest on NFS land in Dualplan. Includes BWCAW.															
	Existing	A		B		C		D		MODE		F		G	
MIH		2	10	2	10	2	10	2	10	2	10	2	10	2	10
Upland Forest 1,648,406 acres															
Young	239.8	138.2	152.6	55.1	66.6	150.9	146.9	53.8	31.6	110.8	103.3	89.0	99.5	95.2	106.4
Percent	14.5	8.4	9.3	3.3	4.0	9.2	8.9	3.3	1.9	6.7	6.3	5.4	6.0	5.8	6.5
Mature+	860.2	718.3	874.1	879.8	1233.2	658.8	885.6	864.2	1339.1	797.9	1078.8	826.1	1118.6	806.8	1073.2
Percent	52.2	43.6	53.0	53.4	74.8	40.0	53.7	52.4	81.2	48.4	65.4	50.1	67.9	48.9	65.1
Aspen / Birch Forest 1,648,406 acres															
Young	75.8	111.8	97.6	39.3	40.6	103.8	89.4	23.2	7.3	67.5	62.6	59.2	60.3	69.2	63.8
Percent	4.6	6.8	5.9	2.4	2.5	6.3	5.4	1.4	0.4	4.1	3.8	3.6	3.7	4.2	3.9
Mature+	533.6	335.3	123.3	477.4	163.6	306.5	127.1	419.7	218.0	374.8	193.5	445.0	157.8	420.3	173.6
Percent	32.4	20.3	7.5	29.0	9.9	18.6	7.7	25.5	13.2	22.7	11.7	27.0	9.6	25.5	10.5
All Upland Conifer Forest 1,648,406 acres															
Young acres	163.7	25.5	54.7	15.8	26.0	44.9	57.3	29.5	24.3	42.4	39.8	29.2	38.3	27.3	42.1
Percent	9.9	1.5	3.3	1.0	1.6	2.7	3.5	1.8	1.5	2.6	2.4	1.8	2.3	1.7	2.6
Mature+	490.0	530.6	825.0	548.2	1136.1	522.9	832.0	569.3	1184.9	569.6	956.0	528.6	1030.6	550.0	971.6
Percent	29.7	32.2	50.0	33.3	68.9	31.7	50.5	34.5	71.9	34.6	58.0	32.1	62.5	33.4	58.9
Lowland B. Spruce / Fir Forest 283,051 acres															
Young	13.9	25.9	4.7	14.7	11.6	62.7	15.1	1.4	1.4	16.4	14.4	17.0	16.1	11.6	12.4
Percent	4.9	9.1	1.7	5.2	4.1	22.1	5.3	0.5	0.5	5.8	5.1	6.0	5.7	4.1	4.4
Mature+	224.9	218.5	246.3	229.7	227.2	181.7	236.6	242.9	262.6	228.3	223.6	227.3	217.5	232.7	231.2
Percent	79.4	77.2	87.0	81.1	80.3	64.2	83.6	85.8	92.8	80.7	79.0	80.3	76.8	82.2	81.7

Alternatives A and C would result in a relatively high potential to affect lake, stream, and wetland health because of high levels of even-age harvest in riparian zones, road and trail construction, stream crossings, water access development, and reliance on a mitigative approach to minimize resource degradation. This results in an increased risk for some aquatic species. However, with mitigations these alternatives are expected to, at a minimum, maintain current lake and stream health.

Alternatives B and D would provide conditions for as quickly as possible obtaining the desired conditions and objectives for improving watershed health, riparian areas, and fish habitat resources. This is expected because of their proactive riparian management approach, low levels of new roads, trails, stream crossings, and water access construction. This is expected to result in improved habitat conditions for species of management concern, including rare and game species.

Alternatives F and G would result in improving existing watershed health, riparian areas, and fish habitat resources because of their low to moderate level of new road and trail construction, stream crossings, and even-aged timber management in riparian zones.

Modified Alternative E would also result in gradual improvement of existing watershed health. Because it has relatively high level of regeneration-type timber harvest in riparian zones, the highest level of water access and trail construction, there are potential risks to some species. However, Modified Alternative E has a beneficial proactive riparian management approach, so that riparian zones would be managed to protect or restore riparian and aquatic functions.

Threatened and Endangered Species

The Final EIS for Forest Plan revision analyzes impacts to the three threatened species that occur on both the Chippewa and Superior National Forests: Canada lynx, gray wolf, and bald eagle. This analysis summarizes the findings of the more detailed draft Biological Assessment (planning record).

Effects analysis indicates that all alternatives provide sufficient or greater than sufficient habitat and environmental conditions to support conservation of all three threatened species. All alternatives would continue to provide a high likelihood that gray wolf and bald eagle populations would continue to be viable and that their habitats would remain well-distributed on the National Forests. Canada lynx is known to occur and breed on the Superior and is likely present on the Chippewa, but there is uncertainty about whether or not populations are viable over the long term. However, all alternatives provide for well-distributed habitats to support viability.

The alternatives are expected to support recovery of threatened species through incorporation of management direction (including objectives, standards, and guidelines) that addresses conservation of species in two important ways. First, the alternatives promote the proactive conservation of lynx, wolf, and eagle and their habitats by maintaining or enhancing extensive areas of suitable habitat and by maintaining or enhancing ecosystems on which the species depend. Secondly, conservation measures of all alternatives identify actions to reduce or, where possible, eliminate potential adverse effects or risks to the species and their habitat.

For gray wolf and bald eagle, alternatives incorporate conservation management guidance based on the Recovery Plan for the Eastern Timber Wolf (1992) and Northern States Bald Eagle Recovery Plan (1983).

No recovery plan yet exists for Canada lynx. Alternatives considered and incorporated recommendations based on those presented in the Lynx Conservation Assessment and Strategy and its subsequent modifications, which represent the best available science at a national level. The national measures have been modified to be applicable to Minnesota and the specific conditions on the Chippewa and Superior National Forests.

Analysis indicated that all alternatives would not be likely to adversely affect the bald eagle. The Fish and Wildlife Service concurred with this in a letter dated June 15, 2004. Their concurrence was based on guidance set forth in revised Forest Plans that ensures maintenance, protection, and improvement of habitat for the eagle.

Although all alternatives proactively promote threatened species' conservation and provide measures to reduce risks to the species, the alternatives still are likely to have adverse effects to lynx and wolf some time during the life of the plan. This is due primarily to potential harm associated with human access on roads and trails within the proclamation boundary of the National Forests. However, based on its Biological Opinion (July 15, 2004), the Fish and Wildlife Service concluded that the revised Forest Plans would not be likely to jeopardize the continued existence of the species. Overall, for vegetation management under each alternative would, to varying degrees, provide many beneficial impacts and would provide for vegetative habitat in amounts and distributions sufficient to contribute to species' recovery.

In summary, all alternatives considered and incorporated recommendations from the Lynx Conservation Assessment and Strategy and Federal Recovery Plans for the lynx, wolf, and eagle to proactively promote their conservation and reduce risk.

Regional Forester Sensitive Species

Sensitive species are plants and animals for which there is a concern for population viability on the National Forests. They are designated by the Regional Forester. The evaluation of effects to Regional Forester sensitive species is conducted in detail in the Biological Evaluation.

Between the two National Forests, there are currently

Alt	Positive	Negative	No Change
A	2	17	114
B	18	6	109
C	1	17	115
D	23	6	104
Mod E	8	5	120
F	14	0	119
G	9	0	124

107 terrestrial and aquatic sensitive species listed as sensitive species. These include 47 species on the Chippewa NF and 85 species on the Superior. Sensitive species occur in a wide array of habitats that span all the major biological communities on the National Forests that are affected by management, as well as numerous site level habitat niches or microhabitats.

All alternatives promote the protection, enhancement, or maintenance of sensitive species and the habitats upon which these species depend. However, the role each alternative would play in contributing to the conservation of sensitive species and habitats varies for many, though not all, species.

Analysis determined habitat outcomes for historical, current, and likely future environmental conditions for sensitive species based on conditions on NFS land and for the cumulative effects analysis area which varied by species. Outcomes are an index of the capability of the environment to support population abundance and distribution, not an actual prediction of population characteristics. Outcomes represent a range of environmental conditions from suitable conditions that are broadly distributed and abundant to suitable conditions that are highly isolated and exist at very low abundance. Table 3-4 above shows the change to species' habitat outcomes from direct and indirect effects of alternatives. Analysis considered ecological requirements, life history and geographic range of the species.

For the majority of species, the many positive and negative impacts of alternatives are generally not great enough to cause changed habitat outcomes by decade 2. For some species this may be a) because Forest Plan management objectives, standards, and guidelines would ensure management emphasis on maintaining or improving habitats or b) because of mitigations would be adopted to eliminate or reduce potential negative impacts.

Under Alternative A and C negative changes from current conditions are generally related to: expected decreases in mature and older forest and mature forest interior habitat; increase in potential for habitat fragmentation and deer herbivory; lack of prescribed fire; and impacts associated with timber harvest, road and trail construction.

Positive impacts to those species under Alternative A

result from increased amount of mature, older, and growth lowland conifer forest and large mature patches of northern hardwood. Alternatives A and C provide positive impacts from increase in amount of disturbed forest from timber harvest.

Under Alternative B and D negative changes from current conditions are generally related to an overall expected decrease in the amount of upland disturbed, barrens, or early successional forests due, for the most part, to a relatively low amount of timber harvest and road construction.

Positive impacts to species under Alternatives B and D generally result from increased amount of mature and older forest habitat, upland conifer forest, interior forest habitat, and prescribed burning, improved watershed health, and decreased amount of disturbance from timber harvest and road and trail construction.

Under Alternatives Modified E, F, and G negative changes to species generally result from changes to habitat described for Alternatives A and C, that pose similar, but lesser risks. Conversely, positive changes are similar to those that occur under Alternatives B and D.

In addition to assessing habitat outcome changes, a determination of effect was also conducted for each species. For 102 of 107 individual sensitive species on the two National Forests, it was determined that all alternatives either 1) would have no impact on species, 2) would have beneficial effects on species, or 3) may impact individuals, but not be likely to cause loss of viability on the National Forests or trend toward federal listing under the alternatives. No species were determined to be at high risk of a trend toward federal listing as threatened or endangered. At project implementation, site-specific surveys and analyses would be conducted to identify conservation measures or other mitigations to minimize potential negative effects.

Of the 107 sensitive species, five species were determined to have a risk of a loss of viability in the planning area in one or more alternatives. These species include: northern goshawk, and black-throated blue warbler on the Chippewa and Superior (Alternatives A and C); spruce grouse (Alternatives A and C) and bay-breasted warbler (Alternative A) on the Chippewa, and boreal owl on the Superior (Alternatives A and C). As designed, Alternatives A

and C pose a risk to viability of the above species. With modification or mitigations, these risks may be reduced to provide a higher likelihood that viability would be maintained.

Other Species of Concern

Other species of management concern include species designated under 36.CFR 219.19 as “management indicator species”, defined as species whose population changes are believed to indicate the effects of management. In addition to gray wolf and bald eagle (addressed in Threatened and Endangered Species section above), northern goshawk and white pine were designated as management indicator species and are addressed in this summary. Other species of management concern that are included because of their high public interest are American woodcock, white-tailed deer, and ruffed grouse.

Northern Goshawk

The National Forests in the western Great Lakes region, including the Chippewa and Superior, play a major role in contributing to the viability and well-distributed habitats of the northern goshawk. Habitat preferences are considered to be mature deciduous or mixed deciduous/coniferous forest in fairly contiguous blocks intermixed with younger forest and openings for production of prey species.

Indicators analyzed for the northern goshawk include the mature forest availability, patch size, and stand complexity. Each alternative provided different amounts, quality, and distributions of these habitat components, resulting in a range of effects that varies by alternative. See Tables 3-5 and 3-6 on the next page.

On both the Chippewa and the Superior NFs, Alternatives A and C would create habitat conditions that would add risk to maintaining viable populations of the northern goshawk. On the Chippewa, Alternatives Modified E and G result in a decrease in suitable habitat conditions in the short term, posing a greater risk for species viability Section-wide than currently exists, while over the long term conditions would improve. On the Chippewa, Alternatives B, D, and F change and improve conditions in both the short and long-term to benefit the northern goshawk.

Habitat provided by these alternatives on the Forest would be significant to the viability of the goshawk. On the Superior, Alternatives B, D, F, and G create short-term decreases and long-term increases to habitat conditions. Habitat provided by these alternatives on the Forest would be significant to the viability of the northern goshawk. On the Superior Modified Alternative E maintains adequate mature upland habitat in the short term and over the long term increases this habitat.

White Pine

White pine is a species of high public interest because of its many social, economic and ecological values. It is considered a keystone species, in that its overall effects on critical ecological processes and Biodiversity are greater than would be predicted by its abundance. White pine indicators addressed in the Final EIS are 1) acres of white pine forest type and age and 2) amount of white pine as a component of other forest types.

All the alternatives work toward the increasing white pine as a forest component and increasing the quantity of older white pine. See Table 3-7 on the previous page for summary of the amounts of white pine expected under each alternative.

American woodcock, white-tailed deer and ruffed grouse

American woodcock, white-tailed deer and ruffed grouse are high interest because they are popular game species, contributing to social and economic values of forest users and local communities. In addition, for American woodcock there is concern about range-wide population declines. For white-tail deer there are also concerns about the species' potential to have harmful impacts on biodiversity when populations are high.

For all three species indicators of habitat included young aspen-dominated forest for foraging habitat and brood cover (ruffed grouse). Additionally, upland grass-forb-shrub breeding habitat (woodcock) and conifer forest thermal cover habitat (deer) were considered.

During the planning period, all alternatives are expected to provide sufficient or greater habitat to contribute to huntable populations of these species.

Based on analysis of young aspen, Alternatives A and C would provide the most abundant habitat and Alternatives B and D would provide the least. Modified Alternative E would provide relatively high amounts of habitat, while Alternative F and G would provide similar but lesser amounts.

Non-native Invasive Species

Non-native Invasive Species (NNIS): Non-native species are any species that occupy an ecosystem outside of its historical range. Invasive species are any non-native species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

There would be some general effects on terrestrial and aquatic NNIS common to all alternatives on the Chippewa and Superior NFs. NNIS plants and animals would continue to spread on both Forests. As they spread, they would continue to have negative impacts to the ecosystems where they are found. These potential impacts include: displacing native flora and fauna, changing the structure of native terrestrial and aquatic plant communities, disrupting aquatic food webs, disrupting hydrologic processes of wetlands, increasing erosion, impacting recreational use of lakes and rivers, and altering soils and soil processes. Infestations of NNIS would continue to exist at various densities and population sizes.

The potential for NNIS spread would vary among alternatives and can be measured by the miles of new maintenance level 1 and temporary roads and the level of water access. Because human-related introductions of NNIS depend on travel patterns, both of these measures indicate the level of access to the Forest under each alternative. Roads are related to new terrestrial NNIS infestations, while water access relates to the risk for spread of aquatic NNIS.

On the Chippewa National Forest, Alternatives D and F would result in the lowest risk for spread of NNIS. On the Superior National Forest, Alternatives B and D would have the least risk of spread. Alternatives A, C, and Modified E would have the greatest risk of spread for both Forests, followed by G with a moderate risk of spread. Alternative F presents a moderate risk of spread on the Superior National Forest.

Table 3-5. Goshawk-Indicator 1. Percentage of All Upland Forest in Mature/Older Upland Forest.								
National Forest		Alt. A	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
		No Action						
		%	%	%	%	%	%	%
Chippewa	Existing	49	49	49	49	49	49	49
	Decade 2	31	52	28	51	45	51	47
	Decade 10	28	77	36	88	58	72	64
Superior	Existing	51	51	51	51	51	51	51
	w/BWCAW Decade 2	43	53	39	52	46	49	48
	Decade10	52	74	53	80	53	67	64

Table 3-6. Goshawk-Indicator 2. Percentage of All Upland Forest within 100 acre of Larger Mature/Older Upland Forest Patches.								
National Forest		Alt. A	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
		No Action						
		%	%	%	%	%	%	%
Chippewa	Existing	33	33	33	33	33	33	33
	Decade 2	19	36	19	35	31	35	31
	Decade 10	17	63	25	74	43	56	47
Superior	Existing	60	60	60	60	60	60	60
	w/BWCAW Decade 2	51	60	48	59	56	56	55
	Decade 10	50	72	51	79	61	64	61

Table 3-7 Amount of White Pine Forest Type in thousands of acres and by percent of total upland forest. Totals for Superior are for land outside the BWCAW. ‡														
	Alt. A No Action		Alt. B		Alt. C		Alt. D		Mod. Alt. E		Alt. F		Alt. G	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Chippewa														
Existing: 4.0 acres (1%); Range of Natural Variability Value ^{‡‡} : 8%														
Dec. 2	4.7	1	7.3	2	8.0	2	11.9	3	8.9	2	8.4	2	9.1	2
Dec. 10	5.4	1	43.4	10	18.9	4	48.7	11	28.7	6	35.0	8	32.1	7
Superior														
Existing 29.7 acres (3%); Range of Natural Variability Value ^{‡‡} : 9%														
Dec. 2	30.3	3	32.6	3	33.6	3	40.4	4	33.3	3	34.8	4	34.4	4
Dec. 10	31.1	3	77.4	8	31.5	3	74.4	8	57.8	6	78.1	9	69.2	8
‡Within the BWCAW white pine and red pine are combined and cannot be detected or measured separately. Based on vegetation classified by Natural Resources Research Institute, existing total of both types is estimated at about 22,000 acres (4% of total upland acres).														

3.4 Timber

Forest Plan revision will determine the level of timber harvest that the Chippewa and Superior National Forests could supply while providing for ecological sustainability. Revision will also establish the acreage and location of land that is suitable for timber production. Suitable timberland is land on the Forests where timber harvest is a scheduled management practice.

Timber production is related to several other issues. It is the primary management tool that will be used to meet vegetation objectives for composition and age class distributions. Depending on the amount, timing, location, and outcome timber harvest can have positive or negative effects on social and economic sustainability, vegetation, soil and water resources, visual and recreation resources, and wildlife habitat

Uneven-aged versus Even-aged Management

In general, tree species that require more sunlight to regenerate, survive and grow more successfully under even-aged management. Species that survive under shade can be managed with either even-aged or uneven-aged management. Clearcutting (an even-aged treatment) is a treatment that is often selected for aspen, aspen/fir, paper birch, jack pine, red pine, oak, spruce/fir, and lowland conifer forest types. Clearcutting is currently the most common type of harvest treatment used in Minnesota. In recent years, the amount of trees retained within clearcut harvests has increased and more thinning has occurred on NFS land. Shelterwood harvesting and uneven-aged management are expected to increase in the future on all ownerships due partly to recommendations by the Minnesota Forest Resource Council landscape committee, although even-aged management may remain the most common treatment method.

It is not always easy to label a harvest as even-aged, uneven-aged, or clearcut. The difference between whether the treatment is labeled even-aged or uneven-aged depends on whether most of the retained trees are removed within several years to allow the regeneration to grow. Thinning is most often an intermediate harvest that occurs before a regeneration harvest (stand renewal) in an even-aged management system

Alternative A would have the highest percentage of even-aged harvesting at 92 percent the first decade and 87 percent the third decade. It also would have the highest percentage of clearcutting. The high percentage of even-aged management would be continued into later decades. Alternative B would have the lowest percentage of even-aged harvesting in the short term when compared with the other alternatives. Although Alternative D would have a higher percentage of even-aged harvesting in the first decade, the actual acres of even-aged harvest would be considerably less in the third decade than Alternative B.

Similar to Alternative C, most harvest in Decade 1 in Alternative A would be even-aged (93%). In decade three, levels of even-aged management are similar to Modified Alternative E.

Alternative D has a high percentage of the total treated acres proposed as even-aged treatments; however, Alternative D would have the lowest number of total acres harvested.

Modified Alternative E would result in a relatively lower amounts of even-aged treatments in decade 1 and moderate amounts in decade 3 on the Chippewa and higher levels on the Superior. This would be less than Alternatives A and C. Clearcutting increases on the Chippewa between the first and third decade, but remains at moderate levels. Clearcutting on the Superior remains stable between decades one and three.

Alternative F and G would result in similar amounts of even-aged harvesting. This moderate amount of even-aged harvesting would be less than in Alternatives A, C, and D. on the Chippewa and on the Superior less than A, C, D and Modified E.

Timber Supply

Legal requirements limit the amount of timber harvest to a quantity that can be sustained over time. The limits allow for a departure from a non-declining even-flow of products to meet multiple resource objectives.

During the last few years, the harvest on National Forest land has declined due to numerous factors.

Some factors contributing to lower harvest levels on NFS lands include: lost volume due to flooding or drought; natural decline in volume as stands age; diseases and insect epidemics; NEPA document decisions that incorporate new information to provide for healthy ecosystems, aesthetics, biodiversity, old growth, ever increasing demand from the public to provide a wider range of products, increasing number of sensitive species concerns; and increasing costs associated with timber sale project preparation.

Alternatives A and C propose the highest maximum timber volume that could be sold. These two alternatives would average between 211 and 212 million board feet total from both Forests each year for the ten decades modeled; while the average annual timber sell volume in the recent past for both Forests is 139 million board feet. On both Forests, the maximum timber sell volume in Alternative C would be higher in the first two decades than in subsequent decades. This would result in a departure from non-declining, even-flow in order to capture the volume in the first two decades that would be lost due to aspen, jack pine, paper birch, and spruce-fir stands succumbing to insects and disease as they age.

Compared to the other alternatives, maximum harvest levels would be low under Alternative B.

Alternative D emphasizes a higher maximum harvest level the first two decades than in subsequent decades to change the forest types to those that are less frequent today than they were during the mid-late 1800s (such as white pine, red pine, jack pine, spruce-fir, and northern hardwoods). This would result in a departure from non-declining, even-flow. These volumes would not be considered part of an Allowable Sale Quantity because producing timber products is not part of the management objectives in Alternative D.

Modified Alternative E proposes maximum harvest levels lower than A and C, but higher than B, D, F and G.

Compared to the other alternatives, maximum harvest levels would also be intermediate under Alternatives F and G but lower than in Modified Alternative E.

Reduced harvest levels on National Forest System land in the past several years, an increase in stumpage prices and an increased demand since the early 1990's

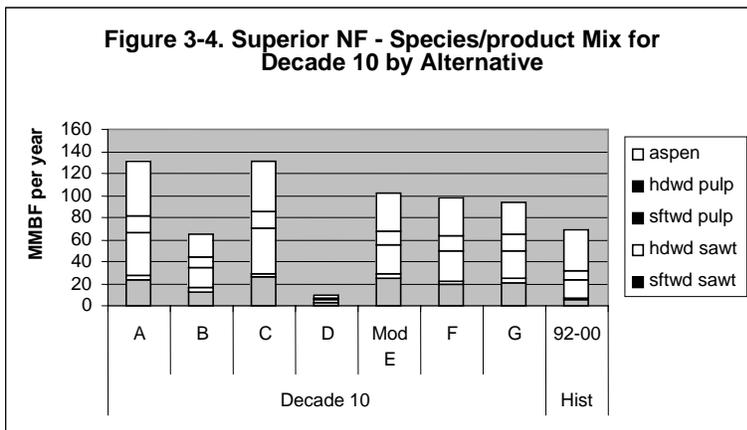
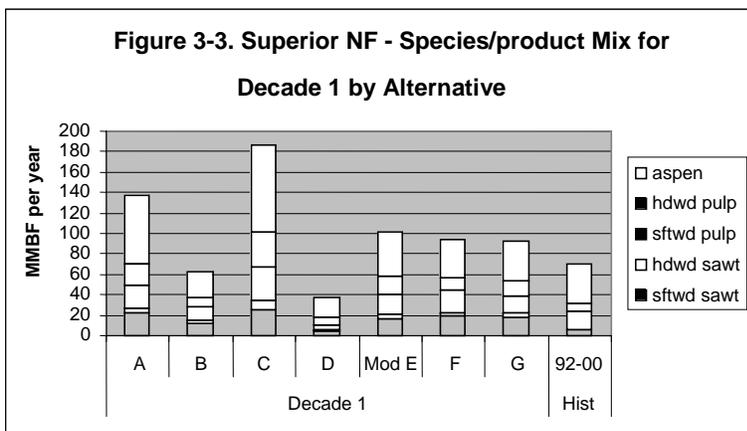
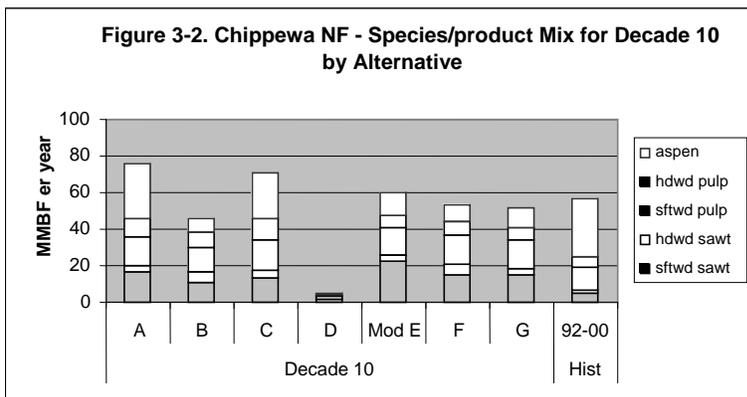
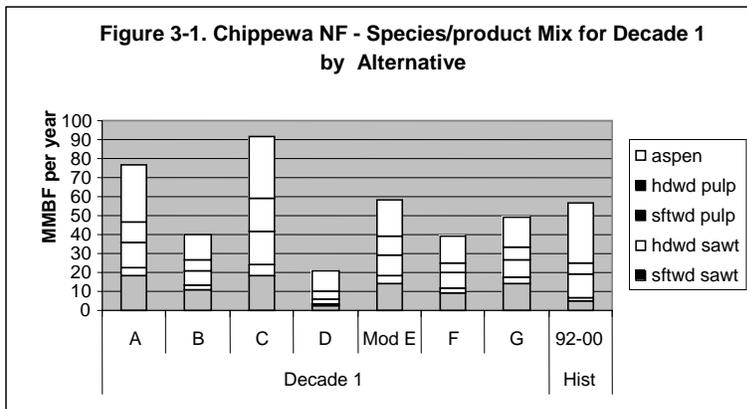
have resulted in an increase in harvest levels on private land in Minnesota and increased imports from Canada, Wisconsin, and Michigan (DNR 2002, State of MN, 2003). Overall, harvesting levels in Minnesota are not expected to change substantially in the foreseeable future.

Mix of Forest Products

Sawmills utilize larger, more expensive sawlogs. Mills making paper or panel board (oriented strand board and hardboard) use the less expensive smaller pulpwood size material. Aspen, balsam fir, and spruce are the most common species used by the paper mills. Aspen is the most common species used in making panel boards, although birch, pine, and maple are also used. The following species currently make up the bulk of the species used in sawmills in Minnesota: jack pine, aspen, red pine, red oak, and birch. White pine is a high value sawtimber species that has been in low supply.

Mills have typically adapted to supplies of different species and products. The 1994 Generic EIS study on Timber Harvesting and Forest Management in Minnesota indicates mills plan to replace aspen with hardwoods as an age class imbalance of aspen causes reductions in availability of aspen. The Minnesota Forest Resource Counsel landscape committee work seems to suggest softwood and sawtimber will increase.

The Final EIS analysis estimated the mix of forest products by alternative over many decades because it takes a long-time to achieve desired conditions that would result in different types of species/products provided by the Forests. Different outcomes would result due to the application of different treatments across management areas under each alternative. Figures 3-1 through 3-4 on the next page compare projected species and product mixes by alternative for Decades 1 and 10 and compare them to current (1992 – 2000 levels).



3.5 The Role of Fire

Throughout the 20th century, fire management policy has evolved in response to three factors:

1. Land and resource management needs,
2. Growing knowledge of the natural role of fire, and
3. Increased effectiveness of fire suppression.

As knowledge, understanding, and experience with managing fire expanded, it became apparent that complete fire exclusion was not the best management direction to support a resource management program. This has led to the current Forest Service fire policy that recognizes prescribed fire as an important tool for treating fuel, preparing sites for regeneration, and achieving ecological objectives

Fuel loading is currently higher than normal across the Chippewa and Superior National Forests due to natural disturbances (winds, insects, disease) and due to the absence of fire on the landscape. In addition, there has been an increase in the number of people building homes and living in forested areas. This has created a need for aggressively reducing fuels. Forest Plan direction is intended to help define the situations where management-ignited prescribed fire would be appropriate based on resource, social, and economic concerns.

Fire contributes to a host of functions and processes in ecosystems, such as:

- Reducing accumulations of organic material, which in turn reduces wildfire hazard
- Recycling nutrients and altering soil chemistry
- Promoting decomposition
- Influencing soil structure and stability
- Altering vegetative characteristics
- Modifying vegetative succession, providing early seral stages important to some wildlife

The effects that fire has on ecosystems vary depending on fire intensity, severity, and frequency. Factors such as weather, timing of ignition, species composition, age, fuel characteristics, and spatial distribution combine to influence the severity, size, and duration of a wildland fire. Fire-related effects, including effects on air quality, occur with either wildfire or prescribed fire.

The effects on ecosystems of not using fire are consistent across the alternatives. Acres not treated with fire or mechanical methods would continue to advance toward climax successional stages, and understory seral species (shrubs and herbs) would decline or become more decadent. This advancement would affect ecosystem process and functions, such as nutrient cycling. Under all the alternatives, landscape patterns would become more homogenous as succession advances if no treatment occurred. By not using fire, ecosystem process and functions, in which fire was historically a primary agent, would be affected.

Use of Management Ignited Fire for Ecological Objectives

For each alternative, areas were identified where prescribed fire could potentially be used, concentrating on the red pine and white pine fire-dependent ecosystems.

The number of acres in the red pine and white pine landscape ecosystems determined the amount of acres available for prescribed fire.

Alternatives A and C would produce the fewest opportunities for management-ignited fire due to their emphasis on mechanical treatments. The continued lack of fire in these fire-dependant ecosystems would contribute to the decline of fire-dependent species and their associated ecosystems over the first decade and throughout the planning period.

Alternatives Modified E, F, and G would produce some opportunities for management-ignited fire. Mimicking natural disturbances by using fire on a small scale (Alternatives Modified E and G) and on a moderate scale (Alternative F) would somewhat enhance these fire-dependant species and their associated ecosystems over the first decade and throughout the planning period.

Alternatives B and D would produce the most opportunities for management-ignited fire due to the emphasis on mimicking natural disturbances by using fire on a moderate scale (Alternative B) and on a large scale (Alternative D). Both alternatives would greatly

enhance these fire-dependant species and their associated ecosystems the first decade and throughout the planning period.

When considered in combination with other past, present, and reasonably foreseeable future actions near the Chippewa and Superior National Forests, none of the alternatives would be expected to result in adverse cumulative effects on any fire-dependant ecosystem.

3.6 Watershed Health

Effects on watershed and riparian resources generally vary by the degree to which management activities are projected to occur over time under each alternative. Forest-wide desired conditions and objectives set the tone for managing specific resources and management area direction further defines how resources will be managed. Even with these over-arching principles and with the application of standards and guidelines which will be part of any Forest Plan, unavoidable effects to water, soil, and riparian resources may occur as a result of implementing projects. Many of these effects are short-term but some entail a long-term commitment of resources that could negatively affect watershed health.

Effects may include soil compaction, erosion, and sedimentation. Compaction can disrupt the movement of air and water through the soil, which can negatively affect root growth of plants and the activity of soil organisms involved in nutrient cycling. Erosion causes soil particles and dissolved nutrients to be redistributed in ways that can reduce a site's ability to grow trees or other plants or result in sedimentation that contributes to loss or reduced quality of stream or lake habitat.

Instability of stream channels and lakeshores may affect the movement of aquatic species. The ability to move freely is of key importance to reproduction, overwinter survival, and multiple other factors that contribute to abundant and healthy populations of fish and other aquatic species. Reduction of stream or lake shoreline stability, and associated sedimentation that sometimes results, can hamper species movement and reduce overall habitat quality.

Riparian habitat disturbance and contamination of surface and groundwater may also occur. Riparian areas provide habitat important to amphibians and many other species, and function as long term sources of energy and contributors to habitat complexity in streams and lakes. Habitat for aquatic organisms and multiple uses of water that benefit humans are dependant on maintaining water quality above key thresholds.

Each alternative, and its ranking relative to other alternatives, was assessed for each of twelve separate indicators of watershed or riparian condition. Most of these indicators portray differences among alternatives based on variables such as the projected number of acres of harvest or prescribed fire; miles of trail; or miles of roads and skid trails in areas where aquatic, watershed, or soils effects may be most detrimental. One indicator specifically assessed each alternative based on the general types of activities that are or are not permitted (such as building of roads or trails, or harvesting of timber) which is an end product of alternative-specific allocations of land to various management areas.

The discussion of effects to watershed and riparian areas groups the analysis indicators into the following five categories:

- Indicators that address the potential effect of the projected transportation system (roads) on streams, lakes, and wetlands
- An indicator that addresses the overall emphasis placed on watershed health, based on the unique theme and management area composition associated with each alternative
- Indicators that measure differences in how projected vegetation management treatments, including use of prescribed fire, potentially affect soil quality, nutrient cycling, and rate of runoff
- An indicator that assesses effects on watersheds, lakes, and streams from winter and summer motorized trails, cross-country use of recreational motor vehicles (RMVs), and water access
- Indicators that assess riparian vegetation composition, age, and management intensity

Taking a very broad overview of the indicators used to gauge watershed health some general trends in the

alternatives become apparent. Relative to other alternatives in the range of alternatives addressed in this analysis:

- Alternatives B and D most commonly represent the lowest level of potential negative effects to watershed health and riparian ecological function.
- Alternatives A and C most commonly represent the highest level of potential negative effects to watershed health and riparian ecological function.
- Alternatives Modified E, F, and G most commonly fall somewhere mid-range in terms of potential negative effects to watershed health and riparian ecological function.

The discussions presented immediately below provide brief additional insight on EIS analysis findings for each of the five indicator groups. These discussions also point out the few situations where EIS analysis results for individual indicators contrast with or contradict the above-stated general trend in ranking the alternatives on the basis of their potential for affecting watershed and riparian health.

Watershed Management

Effects of roads on lakes, streams, and wetlands

Potential negative effects from roads include increased run-off amounts and rates caused by roads; associated sediment delivery; and effects to lakes, streams, and wetlands that are crossed or influenced by roads.

The differences in effects reflect the variation among alternatives in projected amount of timber harvest activity, and the associated variation in the amount of low maintenance level roads and temporary roads needed to accommodate timber harvest. On both Forests, the higher level of projected harvesting and associated roading that are part of Alternatives A and C results in the greatest potential for negative impacts on watershed health. Alternative D would have the least potential for negative impacts from roads. Alternatives B, Modified E, G, and F would generally result in a moderate amount of potential negative effects from roads.

Effects related to the amount of NFS land allocated to management above the basic stewardship level

All alternatives are consistent with laws, regulations, policies, and other stewardship guidelines such as those developed by the Minnesota Forest Resource Council for mitigating the impacts of forest management activities on water quality and riparian areas.

Because of the unique mix of acreages assigned to various management areas under each alternative, some alternatives involve comparatively greater potential to go beyond this basic stewardship level of management and to provide for an even higher level of management emphasis on maintaining or restoring watershed health.

On both Forests, Alternatives B, D, F, and G would manage more than two-thirds of the Forests above the basic stewardship level. Modified Alternative E would result in management of about half of the Chippewa and about two-thirds of the Superior above this level. Alternatives A and C on both Forests would result in lowest potential for management above the stewardship level, with notably lower levels (about one-tenth of the Forest) potentially managed above the stewardship level on the Chippewa NF.

Effects from vegetation management treatments

On each Forest the number of acres to be treated with timber harvest varies from 1,000's to 100,000's of acres across the seven alternatives over ten decades.

Potential effects to soil were evaluated based on the maximum number of acres that could be treated under each alternative and treatment-related development including skid trails, temporary roads, landings, and Objective Maintenance Level 1 roads. The analysis in the EIS also provides a focused assessment of how the alternatives vary in their potential effects of prescribed fire on soil and the amount of treatment activity of all types that could potentially affect NFS lands known to be especially sensitive to nutrient loss.

On both the Chippewa and Superior NFs, the analysis also determined the number of watersheds where the amount of projected regeneration harvest treatments

could potentially result in exceeding a known watershed-scale threshold for amount of land in an open or young forest condition. This threshold is an important factor in protecting habitat quality in streams.

Taken as a group the highest level of the potential negative direct, indirect, and cumulative effects to soil and to the quality of stream habitat on both the Chippewa and Superior NFs would occur with Alternatives A and C. Although results vary somewhat by individual indicator, Alternatives Modified E, F, and G would generally have a moderate effect, and Alternatives B and D would generally have the least effect. Results of the stand-alone analysis of potential fire effects on soil clearly present an anomaly to the general pattern of alternative ranking by showing that the greatest potential negative effects of fire on soil are associated with Alternatives B, D, and F. However, the general pattern of ranking described here accurately portrays how alternatives rank for the soil-related indicators when considered on the basis of net total acreage affected by the combination of all analyzed treatment activities.

Effects from motorized trails and cross-country RMV use

The potential effects of RMV use on watershed health are associated with factors such as increased run-off amounts and rates caused by trails; associated sediment delivery; and effects to lakes, streams, and wetlands that would be crossed or influenced by RMV trails or cross-country use of RMVs.

In general, the highest level of potential negative effects to soil and water from motorized use and cross-country travel by RNVs would occur in Alternatives C and Modified E on the Chippewa NF and Alternatives A, C and Modified E on the Superior NF. This ranking for the Chippewa NF is primarily driven by Alternative C's provision for cross-country ATV travel for hunting and trapping and Modified Alternative E's provision for the highest maximum mileage of additional ATV trail. This ranking for the Superior NF is primarily driven by Alternative A's general allowance for cross country travel, Alternative C's provision for cross-country ATV travel for hunting and trapping, and Modified Alternative E's provision for the highest maximum mileage of additional ATV trail.

On both Forests, Alternative D would clearly have the least effect on watershed and soil resources, primarily because of its emphasis on non-motorized recreation and complete prohibition for any type of cross country travel by RMVs. The other alternatives (Alternatives A, B, F and G on the Chippewa NF and Alternatives B, F and G on the Superior NF) present a medium level of potential effects on soil and water resulting from RMV use and additional RMV trail potential.

Effects from water access development

Effects on watershed health from water access sites are related to the potential maximum development level specified for water accesses in each alternative.

Effects from water access on the Chippewa and Superior NFs parallel each other in that Alternatives A, C, and Modified E would have the most potential effect; Alternatives F and G would have moderate effect; and Alternatives D and B would have the least effect.

Riparian and Fish Management

Effects related to management intensity and vegetation composition and age

On both Forests, the theme that each alternative is uniquely fashioned to achieve dictates the associated level of management intensity within riparian areas. The potential effects of management activity directly relate to whether there would be treatment, particularly in the near-bank portion of riparian areas, as a part of the scheduled timber harvest or, alternatively, whether there would be special management considerations applied to these areas.

On both Forests, Alternatives A, C, and F would have the greatest potential to negatively impact factors such as coarse woody debris, and vegetation species composition and age, that are important to the maintaining the ecological functioning of riparian areas. Alternative D would have the smallest potential for negative impacts.

A key exception to the general pattern of alternative ranking described earlier in this summary is that

Alternative F would consistently result in greater potential for negative effects to riparian ecological function than either Alternatives Modified E or G. This reflects the fact that the mitigative approach to riparian management is used in Alternative F, while the proactive riparian management approach is used in both Alternatives Modified E and G.

3.7 Special Designations

Potential Wilderness Study Areas

The Chippewa and Superior National Forests provide a range of existing forest settings, including areas inventoried as potential wilderness study areas. The issue at hand is the allocation of how much designated wilderness the Forests should provide for a range of recreational opportunities and ecosystem values while at the same time providing for consumptive forest uses.

An inventory, including the original RARE II areas along with new inventoried areas, was completed and these areas were considered as potential wilderness study areas candidates. Two areas met the inventory criteria on the Chippewa NF and 30 areas on the Superior NF. These areas were allocated within the alternatives based on the inventoried area's characteristics and the theme of the alternative. Management of the original RARE II areas as identified in the Roadless Area Conservation Rule January 2002, will comply with all interim and final national direction.

The result of this forest plan revision process will not be the designation of wilderness. It may or may not include recommendations to Congress to have areas become wilderness. Congress must formally designate wilderness areas.

The Boundary Waters Canoe Area Wilderness (BWCAW) Management Plan will continue to provide direction for the BWCAW. This forest plan revision process will not change management direction in the BWCAW. The Forest Service will not respond to comments on the BWCAW Management Plan as part as this analysis.

Alternatives A, C, Modified E and F on both Forests include no potential wilderness study areas. The Chippewa NF includes two potential wilderness study areas in Alternatives B and D, while Alternative G includes one area. The Superior NF includes four areas in Alternative G, 12 areas in Alternative B, and all 30 areas in Alternative D. Some of the areas contribute social and economic benefits in terms of providing non-motorized, remote areas for recreational opportunities and potential economic benefits to local communities. Some also contribute to the spectrum of natural resources within the Forests. Conversely, such allocations limit access and commodity use of these lands.

Potential Research Natural Areas

There would be some general effects of potential research natural area (pRNA) designation common to all alternatives on the Chippewa and Superior NFs. The degree of the effect would depend on the acreage of pRNAs in each alternative. Each of the alternatives would manage a specific combination of pRNAs for potential long-term protection of these sites for research, monitoring, education, and biological diversity conservation. Management of the pRNAs would contribute to the national network of established RNAs. Opportunities for future and current research and monitoring of natural processes and conditions would be available. Ecological processes affecting vegetation, wildlife habitat, soil productivity, and water quality would occur with minimal human intervention. Management of pRNAs would result in differing amounts of land being withdrawn from the suitable timber base. Management activities and consumptive uses that threaten or interfere with the objectives or purposes for which the pRNAs were proposed would not be allowed.

The degree of effect of pRNA management would depend on the acreage of pRNAs in each alternative. On each Forest, the alternatives differ in the number and acres of pRNAs that would be designated. See Table 3-8 below. The key differences in environmental consequences among alternatives are the degree to which the common effects described above would be manifested, which depend on the number of acres of pRNAs. In addition, Alternative A

differs from the other alternatives because the pRNA in Alternative A would have a semi-primitive motorized ROS class objective, while the pRNAs in the other alternatives would have semi-primitive non-motorized ROS class objectives.

Table 3-8. Potential Research Natural Areas: number and acres on each National Forest.

Alt	Chippewa		Superior	
	Number	Acres	Number	Acres
A	1	769	1	792
B	9	6316	41	45,571
C	1	769	1	792
D	8	5617	41	45,571
Mod E	3	1699	11	19,448
F	10	9530	41	45,571
G	9	8831	26	34,537

3.8 Recreation

The Chippewa and Superior National Forests are important destination areas in the State of Minnesota, as well as in the nation. The Forests provide unique forested and water-related developed, dispersed, and remote recreational opportunities.

The Forests designed alternatives that provide a range of quality recreation opportunities to satisfy diverse public demands while maintaining sustainable forest ecosystems. The analysis of alternatives focused on recreation settings and on access issues on the Forests.

Recreational Opportunities and Forest Settings

The Chippewa and Superior National Forests are capable of providing a variety of recreation settings for non-motorized and motorized opportunities. The quantity, quality, and distribution of recreation opportunities depend on the mix of Recreation Opportunity Spectrum (ROS) class objectives for each alternative. ROS is a continuum of settings, activities, and opportunities related to recreation. ROS is

described in six categories (classes) that range from least to most developed.

Primitive and semi-primitive non-motorized ROS classes would provide dispersed, non-motorized recreation activities (such as hiking, canoeing, and backpacking) in natural settings where there is little evidence of other people, more difficult access, and more opportunities for self-reliance.

Semi-primitive motorized and roaded natural ROS classes would provide more developed, motorized forms of recreation (such as camping and picnicking in developed sites, and motorized use of trails) in natural-appearing settings where there is usually evidence of other people, easier access, and few opportunities for self-reliance.

ROS class objectives were assigned to management areas in each alternative. When the BWCAW is included in the analysis, the Superior National Forest has a wider range of ROS classes than the Chippewa NF. The alternatives for the Chippewa NF and Superior NF outside the BWCAW have a similar range of ROS classes. In keeping with the alternative themes that emphasize more development and more intensive management, Alternatives A, C, Modified E, and F have more roaded natural ROS class objectives than Alternative B, D, or G. Alternative B emphasizes lower levels of development and management activity than Alternative G. Alternative D has the lowest emphasis on development and management activities and results in the highest level of semi-primitive ROS class objectives.

Changes in recreation opportunities and associated recreation use, resulting from management activities, would not be immediately evident. Changes would become noticeable towards the end of the Plan implementation period and beyond.

Alternatives A, C with more roaded natural ROS classes would provide recreation opportunities similar to the current condition. Alternatives G, F, and Modified E would provide a broader range of recreation opportunities than the current condition. Alternatives B and especially D with more semi-primitive ROS classes would provide fewer motorized recreation opportunities and more non-motorized recreation opportunities than the current condition.

Scenic Quality

Scenery is an integral component of forest settings and a prime influence on the quality of a Forest visitor's experience. Typically, alterations to vegetation and landforms result in the most obvious effects to the scenic resource. The Forest Service uses the Scenery Management System as a framework to integrate scenic resources into the forest planning process.

Scenic integrity is a key concept within the Scenery Management System. Scenic integrity is the state of naturalness, or conversely, the state of disturbance created by human activities. The highest scenic integrity ratings are given to those landscapes with little or no deviation from the "natural" landscape character. The lowest ratings are given to those forest landscapes whose natural character is most heavily altered by management activities.

When developing the Forest Plan revision alternatives, scenic integrity levels were assigned to areas on the Forests based upon the theme of each alternative. Scenic integrity assignments for the alternatives was also based on how important a role scenic integrity plays in that theme as compared to the other resources being managed for on the Forest's land base. This includes consideration of management activities in visually sensitive travel ways such as roads, recreation sites, trails, major rivers, and lakes. The portion of the Superior NF within the BWCAW was not part of the analysis area.

Alternatives A, C, and F have less of an emphasis on providing high scenic quality than the other alternatives. These three alternatives would also allow for more obvious human-introduced management elements into the landscapes. These alternatives have higher levels of vegetation management, fewer areas designated to less intensive management, and an orientation towards more developed recreation opportunities.

Modified Alternative E and Alternative G would result in similar scenic integrity levels mid-way between the alternatives with highest and lowest scenery emphasis. Both involve similar levels of vegetation management and recreation. However, compared to Modified Alternative E, Alternative G has a slightly lower level of vegetation management, a few more areas

designated to less intensive management, and an orientation to less developed recreation opportunities, resulting in a slight increase in scenic integrity over Modified Alternative E.

Alternatives B and D would result in the highest scenic integrity levels with an emphasis on natural-appearing landscapes over time. Alternative B (with many acres allocated in Potential Research Natural Areas and Special Management Complex MAs) has an emphasis on managing for older age classes that would result in few noticeable human-caused disturbances.

Alternative D (with many acres allocated to Minimum Management Natural Area and Wilderness Study Area MAs) reflects the highest emphasis on providing natural appearing landscapes over time. Very little management-related disturbance would occur after the first decade in Alternative D.

Over time, scenic quality on the Forests in Alternatives A, C, Modified E, and F would be similar to the scenic quality as found in today's Forests. However, Modified Alternative E would have a slight increase in scenic quality in middle ground views from popular travel routes and use areas. Forest management in Alternative B would result in scenery that contains more older-aged trees and little or no visible effects from management activities. In Alternative D, forest management would result in Forests that contain more older-aged trees and, after the first decade, would have very little visible effects from management activities. Forest management in Alternative G would result in a slightly higher level of scenic quality as compared to that found in today's Forests.

Recreational Motor Vehicles

There is debate locally and nationally about the level of recreational motor vehicle use on National Forests that would provide an adequate range of recreational opportunities while not adversely affecting the environment. Recreational Motor Vehicle opportunities on trails, roads, and cross-country vary by alternative. Recreational motor vehicles include all-terrain vehicles (ATV), off-road vehicles (four-wheel drive vehicles), off-highway motorcycles (dirt bikes), and snowmobiles.

All action alternatives would provide similar management direction for recreational motor vehicle use on Forest System roads. Licensed and street-legal off-road vehicles and off-highway motorcycles would be allowed on Forest System roads. Snowmobiles would be allowed on unplowed roads. In general, ATVs would be prohibited on higher standards roads. Site-level decisions would determine appropriate ATV use on existing low standard roads. Public motorized use would generally be prohibited on newly constructed roads.

Cross-country ATV travel would be prohibited in Alternatives B, D, Modified E, F, and G. Cross-country ATV travel would continue to be allowed under Alternative A on the Superior NF. Under Alternative C on both Forests, cross-country ATV travel would be allowed only for big game retrieval and furbearer trapping access in most management areas.

On the Chippewa NF, cross-country snowmobile travel would continue to be prohibited in all alternatives. However, on the Superior NF, cross-country snowmobile travel would be allowed in most management areas in all the alternatives except Alternative D.

New trails specifically designed for off-road vehicles and off-highway motorcycles were not addressed. Off-highway motorcycle users may be allowed on some designated ATV trails where trail design for the vehicles is similar. Off-road vehicle users would be encouraged to use existing low standard roads that are open to high clearance vehicles.

The maximum miles of additional designated ATV and snowmobile trail that may be built in the next 10 to 15 years were addressed for each alternative. Alternative D would not provide additional designated motorized trail.

The Forests' regional share of meeting additional designated ATV trail demand was estimated at 90 miles for each Forest. Modified Alternative E has an objective to meet that demand. The objective in Alternatives A, C, F, and G would meet two-thirds of the demand and Alternative B would meet one-third of the demand.

Alternatives A and C on the Chippewa NF and Modified E on both Forests would fully meet public proposals for additional designated snowmobile trail (100 miles on the Chippewa and 130 miles on the Superior). Alternative A, C, F, and G on the Superior NF and Alternatives F and G on the Chippewa NF would meet about 70 percent of the public demand for additional designated snowmobile trail. Alternative B on both Forests would only provide for minor connections and reroutes that add to the total NFS trail miles.

Overall, Alternatives A and C would provide the most, and Alternative D the least, recreational motorized vehicles riding opportunities. Modified Alternative E would provide more than Alternatives B, F, and G, but less than Alternatives A and C.

Water Access

The Chippewa and Superior National Forests are known regionally and nationally for their high quality water-related recreation opportunities, such as canoeing and fishing. Access to lakes and rivers is key to providing the water-related recreation activities and experiences that are desired by the public. Slightly over half of the lakes on each Forest have some form of access (65 percent of the lakes on the Chippewa and 57 percent of the lakes outside the BWCAW on the Superior).

Although boating use has remained stable in Minnesota, the Forests continue to receive requests for improvements at existing sites or for the development of new water access sites. The requests sometimes reflect a desire to expand existing water access sites in order to accommodate a trend of larger boats and motors.

The maximum number of new water access sites would be the same for all alternatives, except Alternative D on the Chippewa NF where no new water access sites would be developed. Over the next 10 to 15 years, in the other alternatives, a maximum of 5 new water access sites may be developed on the Chippewa NF and 10 on the Superior NF. (Reconstruction that would increase the capacity and type of use at a body of water is considered new access.) This potential development would meet the

anticipated demand for additional accesses, except in Alternative D on the Chippewa NF.

The public could expect to see different kinds of facilities in each alternative. Consistent with the theme of each alternative, facility levels of development would range from:

- Low - such as water-side trails and carry-in accesses
- Moderate - such as small picnic areas and single-lane gravel surfaced ramps
- High - such as toilet buildings and double-lane concrete ramps

All alternatives could provide a variety of facility development levels. In Alternative D (on the Superior NF) and Alternative B (on both Forests), the public would see low facility development levels. In Alternatives F and G, the public would see moderate facility development levels. In Alternatives A, C, and Modified E, the public would see high facility development levels. However, Modified Alternative E differs from Alternatives A and C in that facilities at Natural Environment lakes and small bodies of water would generally be limited to low facility development levels.

3.9 Social and Economic Sustainability

Economic Stability of Local Communities and Social Sustainability

The Chippewa and Superior National Forests contribute in a variety of ways to the social and economic stability of local communities. Forest Plan revision may affect this mix of uses, values, products, and services. Forest management must consider stability contributions with ecological sustainability when making project decisions.

The analysis of alternatives for Forest Plan revision reviewed both quantitative and qualitative data and information within the analysis of social and economic sustainability. Economic quantitative indicators included employment and income by program area and

industry, net present value, county income from National Forest revenues, and county diversity (Shannon-Weaver Index of County Diversity). Counties in and around the National Forests rely to some degree on income provided as a result of revenue generated by the Forests. Some counties may also be more economically resilient to changes in the supply of natural resources.

Most of the economic data derived from the economic model used for Forest Plan revision analysis indicated that Alternative A and C provided for the most income and jobs, while D provided for the least on both Forests. The analysis found the alternatives contribution of jobs and income fairly consistent among indicators.

Measurements of social stability describe potential changes to special places, traditional and culturally important areas, forest access, and community social factors. Some elements of these indicators are discussed more in detail within other parts of the final EIS such as effects to recreation and timber resources. Individuals will compare the existing condition of the forest with any changes as a result of implementation of the selected forest plan alternative. Many of the alterations to the Forest's natural resources would not be noticeable in the first decade, but would become more apparent as time goes on. Many of the modifications among alternatives and alterations from the existing forest conditions can be generally summarized by looking at the intensity of forest management, including amount of access roads and trails and emphasis on treatments that favor early successional forests.

In general, each alternative proposes change from the existing condition and moves the Forests toward the theme of the alternative. People would respond to changes according to their values, needs and desires. People that value conditions similar to the existing condition would likely appreciate Alternatives A and C; while there are other people that would likely value the distinctly different management emphasis of Alternative D. Alternatives B, Modified E, F, and G would provide for different settings as compared to the existing conditions, yet they also continue to use a mixture of natural resource and access options.

Heritage

Significant differences in effects to heritage resources by alternative implementation are not expected.

Because law, regulation, and policy explicitly control heritage resource management on federal lands, forest management practices and their effects would not differ substantially among the alternatives.

Forest management projects may cause surface disturbances and bring additional people in contact with heritage resources, but the difference among alternatives would remain low because of the protection and mitigation measures common to all alternatives.

In general, alternatives that result in more acres of planned and budgeted management activities could reduce adverse cumulative effects to some degree, due to an increase in inventory and evaluation. However, this additional management may also bring more possibility of inadvertent damage. Again, those protection and mitigation measures common to all alternatives provide for identified site integrity.

3.10 Comparison of Alternatives

Tables 3-9 through 3-12 provide a comparison of the alternatives including a summary of environmental effects, outcomes, and outputs.