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DRAFT ENVIRONMENTAL IMPACT STATEMENT

Northwest Howell

Eagle River-Florence Ranger District, Chequamegon-Nicolet National Forest Forest and Florence Counties, WI

Legal description: T39N R14E Sections 2-4; T40N R12E, Sections 11-14, 23-24; T40N R13E Sections 1-26; T40N R14E Sections 1-35; T41N R13E Sections 14,15,21-29,32-36; and T41N R14E Sections 17-36 in Forest County. T40N R15E Section 6; and T41N R15E Sections 30-32 in Florence County.

NORTHWEST HOWELL
Draft Environmental Impact Statement
Forest and Florence Counties, WI

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Comments must be received by 45 days following publication of the Notice of Availability in the Federal Register. Comments should be addressed to **attn: Northwest Howell Project, HC 1 Box 83 Florence, WI 54121**

Northwest Howell Draft EIS Abstract: The Chequamegon-Nicolet National Forest is proposing to harvest timber; maintain wildlife openings; regenerate aspen and jack pine types; plant and protect hardwood and conifer tree seedlings; implement lake habitat improvements in Stevens and Quartz Lakes; and provide the transportation system needed to serve the proposed projects within approximately 43,600 acres on the Eagle River-Florence Ranger District. Public comments were considered in the development of this Draft Environmental Impact Statement (DEIS) to refine the scope of the decision to be made, identify major issues, shape alternatives, and direct the analysis of effects. Major issues identified for the project proposal are loss of aspen habitat, fragmentation and disturbance of mid to late successional habitats, amount of road access and impacts of deer browse on certain species. Four alternatives were identified and analyzed, including the “No Action” alternative. Alternative 2 is the proposed action scoped with the public with slight modifications based on site-specific information gathered during the analysis. Alternative 3 emphasizes maximizing interior habitat and reducing disturbance in patches of mid to late successional interior habitat. Alternative 4 emphasizes aspen habitat. Alternative 2 is the preferred alternative.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3)

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DOCUMENT STRUCTURE

Chapter 1
Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need.

Chapter 2
Public Participation, Concerns, and Alternatives, including the Proposed Action: This section details how the Forest Service informed the public of the proposal and how the public responded. This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Chapter 3
Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by [insert topic (i.e., resource area, significant issues, environmental component)].

Chapter 4
Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.

References
Provides literature citations that were used in the DEIS

Index:
The index provides page numbers by document topic

Glossary
Provides definitions for words and concepts described in the DEIS

Appendices:
The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

CHAPTER 1:
PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

This project will focus on managing vegetative conditions using timber harvest as the primary method (Forest Plan Record of Decision, pp.26-8). The age, structures and species composition of some forest stands in the project area do not match the management objectives called for in the 1986 Nicolet Forest Plan. The purpose of this project is to move toward those management objectives identified in the Forest Plan (Forest Plan, p.86 through 156).

Moving toward the desired forest composition would provide diverse wildlife habitat, visual variety, a more effective transportation system, and economic benefits, while creating stands resistant to insect and disease infestations (Forest Plan, p.45).

CHAPTER 1:

1.2 BACKGROUND

The forest found in the project area today is a direct result of the passage of time and active management throughout the years. The Chequamegon-Nicolet National Forest was logged extensively in the late 1800's and early 1900's before the establishment of the national forests. The Civilian Conservation Corps and the Forest Service started reclamation on these lands in the 1930's when the Nicolet and Chequamegon National Forests were established.

Over the subsequent 70 years, as these areas were revegetated and established, numerous vegetation management projects were implemented by the Forest Service. Early management focused on restoring the area to a forested condition. More recent forest management has focused on creating a mix of forest types and ages using commercial timber harvest and tree planting as the primary tools.

Within the Project Area, available records indicate that a variety of timber harvests have been conducted since the late 70's. Over the last 24 years, roughly 23,300 acres have received silvicultural treatments, such as, thinning, selection cuts, and clearcutting, an average of 966 acres per year.

The earliest harvests during this time period concentrated on managing short rotation species such as aspen and jack pine. Factors for the early short rotation harvest included: the amount of aspen declining from old age, salvage of balsam dying from a spruce budworm outbreak, and poor market conditions for hardwood pulpwood.

More recent harvests have shifted toward managing the longer-lived species such as maple and red pine. Factors that shifted harvest toward "thinning" and "selection" harvests included: an increase in the market for hardwood pulp and sawtimber, pine plantations that have become overcrowded and social concerns regarding aspen clearcutting.

Currently, many of the pine and spruce stands are overstocked and the hardwood stands are lacking optimal multi-aged structure. Under this project, thinning and selection are proposed to address these conditions.

Some of the aspen and jack pine are mature and declining and don't match the age-class distribution described in the Forest Plan.

Under this project, clearcutting is proposed to address these conditions.

1.3 PURPOSE & NEED FOR ACTION

1.3.1 Who

The Chequamegon-Nicolet National Forest, Eagle River-Florence District is proposing the following project:

1.3.2 What (Proposed Action)

The Northwest Howell Vegetation Management Project proposes commercial harvest to improve quality, structure, and growing conditions of forest stands, and to provide wood products and fiber in accordance to goals outlined in the Forest Plan. Road construction and reconstruction would occur as necessary to implement proposed projects.

Road decommissioning is proposed to move towards Forest Plan density goals. Also included are wildlife and aquatic lake habitat improvement projects.

See Appendix B, Maps 4-9 for harvests proposed, and Maps 10-15 for road proposals.

The specific number of acres to be treated by each method is displayed in chapter 2, Table 2.5-5, Comparison of Alternatives. A list of individual stands proposed for treatment is located in Appendix C (Alternative 2). The proposed activities are listed below.

These are general descriptions of harvest types. Individual stand conditions will vary.

1) Selection Harvest: Individual trees of all size classes would be harvested to promote growth of remaining trees and provide space for regeneration. A given number of trees in each diameter class would be maintained (Forest Plan, p.47). High risk, poor form and suppressed trees would be targeted for removal first.

Treatments would include harvesting of merchantable hardwood trees to produce pulpwood and sawlog products. Hand felling of unmerchantable trees (2 to 5 inches in diameter) would be performed within canopy gaps to promote desirable regeneration.

The resultant stands would be a multi-storied, uneven-aged hardwood stands.

2) Plantation Thinning: Harvest of designated trees more or less uniformly throughout the stand to promote growth of remaining trees.

High risk, poor form and suppressed trees would be targeted for removal first, releasing the larger, dominant trees.

Treatments would include merchantable harvest of red pine, white pine, spruce and other species to produce pulpwood and sawlog products.

The resultant stands would be even-aged, fairly uniformly spaced pine and spruce dominated stands

3) Clearcutting jack pine and aspen: Harvesting the majority of trees in a stand to regenerate a new age class.

Treatments would include clearcutting merchantable trees for pulpwood products.

The resultant stands would be even-aged jack pine seedling and aspen saplings with minor component of other species. Some residual overstory trees may be left for visuals, wildlife, or diversity.

4) Removal Harvest: Harvest of designated trees to favor longer lived species remaining in the stand and to release established regeneration.

Treatments would include merchantable harvest of jack pine, aspen, spruce, and balsam fir to produce pulpwood products.

The resultant stand conditions would vary but would be young and generally even-aged condition with a different species composition.

5) Shelterwood Harvest: Harvest of designated trees to release existing understory trees including white pine, spruce, and hardwoods. A component of overstory trees would be left to provide shelter (protection) to the understory trees.

Treatments would include merchantable harvest of aspen and paper birch to produce pulpwood products.

The resultant stand conditions would be multi-storied.

6) Underplant Trees: Treatments would include manual hand scalping and planting trees under an existing canopy. Within the river corridor, XX would be installed in selected areas within to protect regeneration from deer browsing.

7) Site Preparation: In jack pine stands, treatments would include either mechanical roller chopping and tree planting, or prescribed burning to stimulate natural regeneration of jack pine. In aspen stands, hand felling of unmerchantable trees (2 to 5 inches in diameter) would be performed to reduce competition from undesirable trees.

8) Road Construction and Reconstruction: Proposed activities include constructing short segments of Traffic Service Level D roads for log landings, safe decking areas, and back-in spurs. These short segments would not be closed after timber sale activity because they do not provide increased access to the Forest.

All other roads constructed for this project would be closed following the completion of project activities.

Reconstruct existing roads by brush removal, some tree clearing; resurfacing and drainage improvement; and realignment of short segments. Road construction and reconstruction are directly related to the proposed harvesting activities.

9) Decommissioning Roads. Permanently close roads that are not needed. The method of decommissioning would be based on site-specific conditions and could range from closing and letting the roadbed re-vegetate naturally, culvert removal, slope stabilization, and other landscaping procedures.

10) Maintain Wildlife Openings: Reduce the amount of encroaching woody vegetation within existing wildlife openings by hand cutting or mowing.

11) Improve Woody Structure in Stevens and Quartz Lakes: Install whole trees, fish cribs, and half logs to improve structure for aquatic species.

1.3.3 Where

The proposed project is located west of Highway 139, north of the Pine River, south of the Brule River, and east of Howell Lake. The project area encompasses approximately 57,000 acres in size with about 43,600 acres in federal ownership. See Appendix B, Maps 1-2 for the vicinity of the Project Area.

The general legal description of the area under analysis is: T39N R14E Sections 2-4; T40N R12E, Sections 11-14, 23-24; T40N R13E Sections 1-26; T40N R14E Sections 1-35; T41N R13E Sections 14,15,21-29,32-36; and T41N R14E Sections 17-36 in Forest County. T40N R15E Section 6; and T41N R15E Sections 30-32 in Florence County.

1.3.4 When

Commercial timber sales implementing these projects would begin in or about 2003 with activities being completed about 3-5years later. Wildlife openings and fisheries projects would be implemented after the sales are harvested, but within 5 years of sale completion.

1.3.5 Why (Need)

Existing conditions vary from the desired conditions described in the Forest Plan. Detailed discussion of the deviance from desired conditions occurs under each resource in Chapter 3 (See Section 3.1.2 for vegetation discussion, Section 3.3.2 for wildlife, Section 3.6.2 for recreation, Section

3.8.2 for economics and Section 3.7.2 for transportation). Based on Chapter 3 discussion, Project Objectives are:

Improve Forest growth and diversity:

1A. Need: Approximately 14% (760 acres) of the red pine and white spruce stands within the project area have been determined to be in an overstocked condition (data collected during silvicultural exam, project file). Research has determined desirable stocking levels by species and age class (Benzie, 1977 for red pine, Nienstaedt and Zasada, 1990 for white spruce). Appendix C shows existing and desired stocking levels for each stand proposed for treatment.

The Forest Plan states "pine thinnings will emphasize stocking control to maintain optimal growth rates on high quality trees (Forest Plan, p.21)".

1A. Objective: Improve tree vigor in pine and spruce plantations by reducing crowding and competition between trees in accordance with Forest Plan direction (Forest Plan, p.21).

1B. Need: The Forest Plan calls for most hardwood stands on the Eagle River-Florence District to be in an **uneven-aged** condition (Forest Plan, p.89, 97 and 113). Currently 75% of the hardwoods in the project area are in an **even-aged** condition (see Table 3.1.2-5). Because the majority of these hardwoods are second-growth stands that resulted from extensive cutting in the early 1900's, they lack a full range of size classes of trees to meet uneven-age characteristics (data collected during silvicultural exam, project file).

Of the even-aged hardwoods, in the project area, approximately 6000 acres are at stocking levels higher than optimum levels (84-92 square feet of basal area) as recommended in the Forest Plan (Forest Plan, p.47). The stocking levels are high enough to utilize a commercial harvest as a tool to obtain recommended structure.

The Forest Plan states that hardwood selection will "emphasize future production of quality hardwood and veneer products by removing poor quality or surplus volume to increase growth and stand quality (Forest Plan, p.21)".

Uneven-aged stands are not only more diverse in age-classes, but also size-class and structure. A multi-layered vertical canopy favors a multitude of species, thereby enhancing diversity (Scientific Roundtable, p.25)
1B. Objective: :Improve structural diversity of tree, shrub and forb species in hardwood stands by converting them to uneven-aged stands (Forest Plan, p.89, 97,113).

1C. Need: Tree species diversity within many hardwood stands in the project area tends to be limited and dominated by sugar maple which can shade-out mid-tolerant trees and other flora (Forest Plan, p-A2). Therefore, there is a need to improve regeneration opportunities for diverse tree species within hardwood stands.
1C. Objective: Objective: Enhance tree, shrub and forb species diversity in hardwood stands

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1D. Need: The amount of aspen in the project area is below DFC for MA 1.1by about 1037 acres (see table 3.1.2-1). The amount of aspen in MAs 2.1 and 4.1 are very close to Forest Plan DFC (See Tables 3.1.2-2 and 3.1.2-3). However, without disturbance, approximately 1115 acres of aspen (within all 3 MAs) are over 50 years old and at high risk of converting to other species (See Table 3.1.2-5).

Jack pine is below Forest Plan DFC for MAs 1.1, 2.1 and 4.1 in the project area (see tables 3.1.2-1 through 3.1.2-3). Approximately 300 acres of jack pine stands are greater than 60 years old (see Table 3.1.2-5), an age at which there is an increased susceptibility to jack pine budworm infestation and to structural damage from wind and ice.

In addition, the age-class distribution of aspen and jack pine does not match the desired distribution as identified in the Forest Plan (Forest Plan, p. 27). See tables 2.5-1, 3.1.2-5, and Figure 3.1.3.1-1.

An even distribution of age classes of aspen across the landscape would be 20% in each of the 10 year age classes up to 50 years (Forest Plan, p.27). The current versus the

desired distribution is depicted in Figure 3.1.3.1-1.
1D. Objective: Maintain amount of aspen and improve age-class distribution of aspen and jack pine in all Management Areas (Forest Plan, p.27, 89, 97 and 113).

Enhance wildlife, fisheries, and recreation resources through vegetative management:

2A. Need: Recent fish surveys have identified that LWD (large-woody debris) is lacking in both Stevens and Quartz Lakes. Structure is lacking because currently most riparian areas around lakes have a relatively young forest comprised of smaller diameter trees and tree species that are shorter lived

Typically, lake structure includes wood, as in whole or parts of fallen trees, as well as logs, rock, cobble/gravel or emergent vegetation (Forest Plan, p. 39, 44, 65, 66). Therefore, little recruitment of LWD (large-woody debris) has occurred into aquatic systems.

Woody structure is an extremely important habitat component for a wide variety of aquatic organisms ranging from the bottom of the foodchain (phytoplankton) to the top.
2A. Objective: Enhance deficient woody structure level in Quartz and Stevens Lakes (Forest Plan, p.68).

2B. Need: About half of the wildlife openings in the project area (375 out of 813) are growing in with competing vegetation, primarily young trees, and brush. The Forest Plan identifies upland openings as important habitat to maintain for varied wildlife species (Forest Plan, pp. 64, 89, 105, 113). Without a treatment to remove the woody vegetation, the openings will become further grown in and be more difficult and expensive to return to their desired non-forested condition.

On the ERFL District, the existing amount of upland wildlife openings is already below the Desired Future Condition in MAs 1.1, 2.1 and 4.1 (reference Tables 3.1.2-1through 3.1.2-3),and there is a lower percentage of openings across the Forest than that called for in the Forest Plan. Therefore, there is a need to reduce the amount of encroaching woody vegetation within existing wildlife openings.

2B. Objective: Prevent decrease in amount of wildlife openings due to encroaching woody vegetation (Forest Plan, 64).

2C. Need: The current conditions do not meet Forest Plan objectives for river corridor stands which calls for these areas to be populated with long-lived, large-diameter species (Forest Plan p. 152-155). Approximately 128 acres are in jack pine, which is a short-lived species (See Table 3.1.2-4).
2C. Objective: Restore long-lived species and promote larger diameter tree growth in the North Branch of the Pine River Corridor (Forest Plan, p.152-155).

2D. Need: The component of the large diameter long-lived conifer species (white pine, red pine, northern white cedar, hemlock) that used to dominate the North Branch Pine River Corridor is vastly below what it was prior to logging at the turn of the century. Some of these species exist in the river corridor, but are not regenerating adequately, mostly due to browsing.

In particular, immediately adjacent to the river, large-diameter, long-lived trees for future coarse woody debris and shade are severely lacking.
2D. Objective: Regenerate under-represented species in the river corridor. Promote future coarse woody debris recruitment and shade in riparian zone adjacent to the river.

Provide Wood Products and Economic Benefits

3A. Need: The Forest Plan objectives for annual timber harvest on the Eagle River-Florence District (ERFL) for the period of 1996-2005 to be 38.5 MMBF (Forest Plan, p.35). So far, the ERFL District has averaged an annual sale of 15.3 MMBF from 1996-2002 (Dave Poquette, personal communication).

The forest products industry plays a vital role to the economic well being of the local economy. National Forest timber harvests generate substantial economic benefits to the local economy. No specific figures are available at the local level, but in the northeast Wisconsin region, wood-based

sectors account for about 21% of the total economic output.
3A. Objective: To ensure a sustainable supply of timber products as outlined in the Forest Plan p.19-35 while maintaining other features of the landscape.

Generate income and employment in local communities through forest products based industry and related business.

Enhance transportation system:

4A. Need: The timber harvest being proposed would require some road construction for access. Because the road system is mostly in place, the amount of road construction necessary for the proposal is limited to short extensions off of existing roads.

Many of the existing roads that would have to be used for access are starting to brush in or have minor drainage problems

The Nicolet Forest Plan gives direction to construct and maintain roads at an appropriate level for planned uses while minimizing soil and water impacts (pp. 20, 56-57, 77). Therefore, there is a need to maintain and enhance the current transportation system for the timber harvest activities proposed in this project.

4A. Objective: Develop and maintain a safe, cost-effective transportation system for future forest management and recreational use while providing needed access for harvest proposed with minimal impacts to the environment (Forest Plan, p.20-56-57, 77).

4B. Need: The current road mileage in MAs 1.1, 2.1 and 4.1 within the project area is 4.3 mi/mi^2, which exceeds the density of roads called for in the Forest Plan of less than 4.0 mi/mi^2 (see section 3.8.1). Some of these roads are currently non-drivable, but are on the current road inventory. Additionally, the location of some of the existing roads is not appropriate or not needed for management activities. Therefore, there is a need to reduce the density of roads open to motor vehicle use through closure or decommissioning efforts in some areas.

4B. Objective: Reduce road density in all Management areas. Identify roads for decommissioning that are no longer needed for resource management or access.

1.4 DECISION FRAMEWORK

District Ranger, Butch Fitzpatrick is the Deciding Official for the Northwest Howell Project. Decisions will be based on the information and analysis in the Northwest Howell Project Draft and Final Environmental Impact Statement and supporting record, including consideration of all public comments.

Decision-making will be limited to specific activities relating to what needs to be accomplished as well as where and when to respond to the Purpose of and Need for Action for this project. In addition, he will decide what features are necessary to protect the environment (design features or mitigation measures).

1.5 COMPLIANCE WITH LAWS AND REGULATIONS

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations.

This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

In order to eliminate repetitive discussion and documentation, this EIS tiers to the 1986 Nicolet National Forest Land and Resource Management Plan (Forest Plan) Final Environmental Impact Statement (FEIS) and Record of Decision (ROD).

Technical reports prepared for this project are incorporated by reference and are available upon request.

Wild and Scenic Rivers Act
Actions proposed in the North Branch Pine River Corridor are in compliance with the Wisconsin Wild and Scenic Rivers Act. No actions are proposed within the Brule River,

which is a candidate river under the Federal Wild and Scenic Rivers Act.
See discussion under section 3.6.3.

Clean Water Act
Actions proposed are in compliance with the Clean Water Act. See discussion under section 3.5.3 and 3.5.3.1. Any necessary permits would be obtained prior to implementing any stream work.

NEPA at 40 CFR 1502.25
(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

National Historic Preservation Act
All actions would be in compliance with the National Historic Preservation Act. See discussion under Section 3.9.2.

Endangered Species Act
A tentative summary for effects to Federally Threatened and Endangered species has been completed based on a District level analysis of similar actions in the past. This summary indicates a "No Affect" determination by the USFWS is likely, regardless of the selected alternative. See Section 3.3.3.4 for additional discussion.

Clean Air Act
All actions would be in compliance with the Clean Air Act. There are no class I airsheds within or adjacent to the Project Area.

1.6 RELATION TO FOREST PLAN REVISION

The Chequamegon-Nicolet National Forest is in the process of revising and combining the existing Land and Resource Management Plans (Forest Plans) for the Chequamegon National Forest and the Nicolet National Forest, which were administratively separate at the time the Forest Plans were developed.

A Notice of Intent to revise and combine the Forest Plans was issued in 1996. As part of this process, various inventories and evaluations are occurring. Additionally, the Forest is in the process of developing alternative land management scenarios that could change the desired future conditions and management direction for the Forest.

A Draft Environmental Impact Statement (DEIS) will be published in the near future that will disclose the potential effects of the different land management direction scenarios considered in detail.

As a result of the Forest Plan revision effort, the Forest has new and additional information beyond that used to develop the existing Forest Plans. This information has been used where appropriate in the analysis of this project to disclose the effects of the proposed activities and any alternatives developed in detail.
The decisions associated with the analysis of this project will be consistent with the 1986 Nicolet Forest Plan, as amended.

Under regulations of the National Environmental Policy Act (40 CFR 1506.1), the Forest Service can take actions while work on a Forest Plan revision is in progress because a programmatic Environmental Impact Statement – the existing Forest Plan Final EIS, already covers the actions. The relationship of this project to the proposed FP revision will be considered as appropriate as part of this planning effort. This analysis is covered in section 3.1.4.

1.7 MANAGEMENT AREAS

The Forest Plan identified management problems defined by issues and concerns raised by the public and Forest Service Management. The Forest Plan responds to these problems by allocating areas of the forest to Management Area (MA) prescriptions that meet goals and objectives to achieve a balanced use of the Forest.

Management areas are based on ecological land units and overall ecological potential of these areas in regards to vegetative composition, wildlife habitat, aquatic resources and other multiple use goods and services.

There are five MAs in the project area (See Appendix B, Map3). Management areas 1.1, 2.1, 4.1, 8.1, and 9.2 are described in the Forest Plan (see Table 1.7-1).

Vegetation management proposed in this project is designed to comply with general direction for each management area and move towards the desired composition for each management area. See discussion under Vegetation Section 3.1.2 for specific forest composition goals by Management Area.

Table 1.7-1 Management Areas within the Northwest Howell Project Area

MA	Acres and Percent of Project Area	Forest Plan Reference	General Direction
1.1	12,554 acres or 22%	p.86-93	Emphasizes mixed forests with a large aspen component, wildlife species associated with aspen, and aspen pulp production in a roaded natural setting.
2.1	20,466 acres or 36%	p.94-101	Emphasizes uneven-aged hardwood forest and wildlife associated with large stands of uneven-aged northern hardwoods. Features large hardwood sawtimber in a roaded natural motorized recreation environment.
4.1	6,614 acres or 12%	p.110-117	Emphasizes an upland softwood forest and associated wildlife, management for softwood pulpwood and sawtimber in a roaded natural setting.
8.1	459 acres or 1%	p.142-147	Research Natural Area (RNA). Emphasizes the preservation of unique ecosystems for scientific purposes. No management is proposed in this area. These acres are actually a candidate RNA that has not been approved yet.
9.2	3,546 acres or 6%	p.152-155	Emphasizes protection of the qualities of the Brule and Pine Rivers, which could make it eligible for consideration as a Federally designated Wild and Scenic River (WSR). Provides recreation, wildlife and fish resources in a setting that features long-lived large diameter species. No management activities are proposed in the Brule river corridor, but limited activities are proposed in the Pine river corridor.

**Approximately 13,544 acres (24%) within the project area ownership other than Forest Service. No management is proposed on these lands.

CHAPTER 2:
SCOPING, ISSUES AND ALTERNATIVES

CHAPTER 2:

2.1 INTRODUCTION

This chapter describes and compares the alternatives considered for treating the project area. It includes a description and map of each alternative considered. The alternative methods of treating the project area were developed from information obtained through the scoping process.

The alternatives analyzed in detail were designed to respond to the Purpose and Need and the major issues raised, as well as to meet NEPA requirements, and the provisions of applicable laws, regulations, and policies.

The formulation of alternatives to the proposed action complies with Section 102(e) of NEPA, which states that all Federal agencies shall study, develop, and describe appropriate alternatives to recommend courses of action in any proposal that involves resource impacts. Such resource impacts identified through the scoping process are the issues related to the proposed action.

This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social, and economic effects of implementing each alternative.

2.2 SCOPING

Scoping is the process of gathering comments about a site-specific proposed federal action to determine the scope of issues to be addressed and for identifying unresolved issues related to a proposed action.

2.2.1 Tribal Consultation

Proposal letters were sent to 21 tribal contacts on February 20, 2001. Contacts included Tribal Chairmen, foresters, and biologists, including Great Lakes Indian Fish and Wildlife Commission (GLIFWC), and other representatives from Wisconsin, Minnesota, and Michigan tribes.

2.2.2 Public Comments

Comments on the proposed action were solicited from Forest Service employees, members of the public, other public agencies, Tribes, adjacent property owners, and organizations. Various methods were used to request comments. The project has been listed in the Chequamegon-Nicolet NEPA Quarterly since April 2001.

The Notice of Intent (NOI) was published in the Federal Register on April 21, 2001. The NOI asked for public comment on the proposal from April 24-June 15, 2001. Legal notices inviting comment were published in The Forest Republican in Crandon on 5/16/01; The Vilas County News-Review in

Eagle River on 5/16/01; The Florence Mining News in Florence, on 5/16/01 and

The Rhinelander Daily News (newspaper of record) on 5/13/01.

On May 10, 2001, a scoping package including a proposed action with maps was sent to 514 groups and individuals including adjacent property owners, other government agencies, and anyone else who has requested notification (see Chapter 4, List of Agencies and People Consulted).

Almost ninety responses have been received thus far. Summaries of these comments and responses to comments are located in Appendix A in this document.

Using the comments from the public, other agencies, adjacent property owners, Tribes and organizations (see *Issues* section), the interdisciplinary team developed a list of issues to address.

2.3 ISSUES

The scoping comments received in response to the Proposed Action were reviewed by the IDT and categorized. The Council on Environmental Quality (CEQ) NEPA regulations allows delineating non major from major issues in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

2.3.1 Non-Relevant Issues

Issues were determined to be non-major if they fit one of the following categories:
Outside the scope of this project or the deciding officer's jurisdiction
General comments considered but not specific to the Proposed Action
Already decided by law, regulation, Forest Plan, or other higher level decision
Irrelevant to the decision to be made

Issues that fit categories 1-4 above are addressed in Appendix A

2.3.2 Minor Issues

Issues that are addressed through analysis, project design criteria, or mitigation are listed below. They are discussed in Chapter 3 under the appropriate resource and under Mitigation/Design Features (Section 2.6).

Soil
A concern was raised that timber harvesting operations have the potential to cause erosion and compaction of forest soils. These impacts could reduce forest productivity.

Design features A-E, 1-6 and 19 (Section 2.6) were included to address these issues. When these criteria are adhered to along with timber sale contract provisions, they would eliminate or minimize potential adverse impacts to soil. These issues are addressed further under section 3.4.

Water Quality
Concerns were raised that the project could cause sedimentation and erosion that could have adverse effects on water quality.

Design Features 7-11 (Section 2.6) which include following Best Management Practices as defined by the Wisconsin DNR, would be implemented to minimize impacts to water. Past monitoring has shown that when these measures are followed no adverse impact to water quality has occurred. This is discussed further under section 3.5.

A concern was raised regarding potential nutrient loading in Steven's and Quartz Lakes because of proposed lake habitat improvement projects. This is addressed under section 3.3.3.2.

Wildlife
There are concerns that the proposed activities could have negative effects on a threatened and endangered (TE) species or Regional Forester's Sensitive Species (RFSS). Mitigation measures to reduce impacts to TE species are listed in Appendix G. These mitigations would be applied where species are known to exist, or if they are found during project layout and implementation.

These issues are addressed under section 3.3. Effects to TE species are addressed in the Biological Assessment and effects to RFSS are addressed in the Biological Evaluation for this project. These documents are located in the project file.

Vegetation
There are concerns that change in forest structure and composition can directly affect habitat availability for a variety of wildlife species particularly threatened and endangered and sensitive species. It may also include changes to habitats for rare and sensitive

Specifically, concerns were raised about impacts of deer on "browse sensitive" species. Species that tend to be sensitive to browsing are not regenerating adequately in large part due to the pressure from the deer herd. Most of these species are extremely important for wildlife habitat and provide diversity in forest stands. These issues are addressed under section 3.1.3.3, 3.2, and 3.3.2.4.

Non-Native Invasive Species (NNIS)
A concern was raised that the proposal could have the potential to increase the spread of non-native invasive species within the project area. These aggressive species can out compete and negatively impact native flora. Design Features 32-35 (Section 2.6) were incorporated to minimize potential for the spread of NNIS. These issues are addressed further under section 3.2.

Visuals
Concerns were raised regarding the visual effects of tree drops at Steven's Lake, that trees protruding into the water are aesthetically displeasing. This is discussed under section 3.3.3.2

Recreation/Tourism
Some of the comments received in the scoping for this project indicated that timber management was incompatible with recreational use and tourism in the area.

A collaborative study was conducted with the Wisconsin DNR Bureau of Forestry and the University of Wisconsin-Madison/Extension (Marcoullier and Mace, 1999) to examine recreation and timber production in Wisconsin's forests by looking at extent, importance, performance, and compatibility of these two uses.

The study employed recreational use surveys, analysis of timber inventory data and regional economic modeling. The study found that timber production and recreational use of forests were relatively compatible. "

Furthermore, recreationists generally felt that balanced use (for both timber and recreation) was an important component of local economic conditions for communities in forested regions and that forest land uses should account for these localized effects on rural populations (Marcoullier and Mace, p. ii)."

Specific impacts of noise, visual impacts, and traffic associated with timber harvest and impacts to recreational users are discussed under section 3. 6. Design Features 12-18 and 20 (Section 2.6) would be implemented to minimize impacts to recreational users.

Economic Concerns
Commenters are concerned that timber harvesting and road building can be implemented with economic efficiency. That is, that the benefits that would result would be achieved with low relative costs. This issue is addressed under section 3.8.

Commenters are concerned that timber harvesting may devalue certain resources like recreation and tourism opportunities. It has been our experience that traditional forest management practices (including timber harvesting) have been compatible with the recreation and non-consumptive activities that are popular in this area (Jeff Herret Assistant Ranger for Recreation, personal communication). This is consistent with the findings of a statewide study that investigated the economic impacts of woodland use for recreation and timber (Marcoullier and Mace, 1999 p.ii).

Some commenters have suggested that the Forest Service include non-commodity costs and benefits in the economic analysis for this project. Some examples of such non-commodity benefits could include the value of a standing forest in terms of its recreational or aesthetic value, the value of a particular area to birdwatchers, or the value of an area with no roads present. While the Forest Service recognizes that

such areas have special values, it is very difficult and subjective to assign monetary values to them. Therefore they were not included in the Economic Analysis. However, impacts to specific resources were addressed under Chapter 3.

There are concerns that some species need to be harvested before they lose merchantability or there is a loss of wood fiber value.

Forest Plan Revision Relationship
Many commenters expressed concern that five major EISs are on-going to implement the 1986 Chequamegon National Forest Plan. This Plan is currently undergoing revision and a variety of revision alternatives have been developed. They were concerned that implementing proposed actions now could limit the range of options for decision-making and alternative choices to revising the Forest Plan.

All forest type compositional changes that would occur due to vegetative management proposed under the NWH Project would be in alignment with all alternatives of the Forest Plan revision. Except for a minor component (148 acres) under Alternative 4. Compatibility of this project with the Forest Plan Revision is addressed under section 3.1.4.

2.3.3 Major Issues

Other issues represented resource impacts with the Proposed Action and were brought forward as **major issues** used to help formulate alternatives to the Proposed Action.

The following major issues were used to develop alternatives to the Proposed Action.

2.3.3.1 Issue 1 Loss of Aspen Habitat

Concern was expressed that the proposed action does not maintain enough acreage of aspen and that the use of proposed thinnings, shelterwoods and removal cuts would contribute toward the decline of this species. See Table 2.5-1 and Sections 3.1.3.1, 3.1.3.3, and Table 3.1.3.5-1.

Concern was expressed that aspen acreage is declining on the Forest and in the region and that this has a negative effect on species that are dependent on aspen and early successional habitat (grouse, white tailed deer, chestnut sided warbler, some Neotropical migrants). See sections 3.3.1.1, 3.3.2.3 white tailed deer and ruffed grouse.

Specifically, the scoping stated that approximately 1200 acres of aspen stands within the project area are greater than 50 years old, an age at which there is an increased risk of decay and other diseases. See sections 3.1.3.1, 3.1.1.1 and 3.1.3.5.

Indicators of Change in aspen habitat
- Age class and distribution of aspen (Fig. 3.1.3.1-1 and Table 2.5-1)
- Acres of aspen maintained or regenerated (Table 2.5-1 and Sec.3.1.3.1)
- Acres of aspen stands converted to other types (3.1.3.3 and Table 3.1.3.5-1)

2.3.3.2 Issue 2 Increase in carrying capacity of Project Area for the deer herd.

Concerns were expressed that even though the Forest Service manages habitat and not deer herd size, harvest activities would create additional potential browse that would increase the carrying capacity of the project area for deer herd. See section 3.2.3.2 and 3.3.2.3 white-tailed deer.

Indicators of deer carrying capacity
- Amount of harvest by alternative (Tables 2.5-1 and 3.1.3.3-1)
- Amount of edge by alternative (Table 3.2.3-3)

2.3.3.3 Issue 3 Amount of road access

Concerns were raised that improved roads could increase illegal ATV activity, trespassing on private lands, and poaching. See section 3.7.1.1, 3.7.3.2-3.7.3.4.

Conversely, concerns were expressed that too many roads are closed to the public and that access needs to be maintained for recreation, traditionally uses, private property owners and timber management. See section 3.7.1.1, 3.7.3.2-3.7.3.4.

Indicators of road access

- Miles of road constructed, reconstructed, decommissioned (Table 2.5-4, Sec. 3.7)
- Open and closed road density in the project area (3.6, 3.7, 3.7.3.1-1, 3.7.3.2-1, 3.7.3.3-1, 3.7.3.4-1)

2.3.3.4 ISSUE 4 DISTURBANCE AND FRAGMENTATION OF INTERIOR HABITAT

Concern was expressed that activities in the proposal such as clearcutting and road construction could fragment interior habitat. Increased landscape fragmentation benefits "edge-loving" wildlife species, such as deer and some species of birds. Other species, that prefer less edge, can be negatively affected by increased fragmentation. See sections 3.2, 3.2.2, 3.2.3-3.2.3.3 and 3.1.3.4.

Concern was expressed that activities such as timber harvesting, road maintenance and road use would cause habitat disturbance particularly within interior habitat. Disturbance could include noise, soil compaction, impacts to moisture and temperature gradients, and increasing non-native invasive species. Specifically concern was expressed that this type of disturbance could have an adverse effect on TES. See sections 3.3.1.1 Warblers et al., 3.3.3.2, Appendix G.

Indicators of disturbance and fragmentation of interior habitat

- Acres of interior habitat (See Tables 3.2.3-1, 3.2.3-2)
- Patch size of interior habitat (See Tables 3.2.3-4 and 3.2.3-5.
- Miles of Edge (See Table 3.2.3-3)
- Road Density (see Tables 3.7.3.1-1, 3.7.3.2-1, 3.7.3.3-1 and 3.7.3.4-1)2.4

2.4 ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service developed four alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public.

2.4.1 Alternative 1 – No Action

This alternative was developed in response to NEPA requirements for a no action alternative and serves as a baseline for comparison to the action alternatives. This alternative proposes no new activities.

Current management plans would continue to guide management of the project area. Current activities, which are ongoing, would continue such as dispersed recreation use, annual road maintenance, stream improvement activities, and some wildlife opening improvement. This alternative allows the current process of succession to continue.

2.4.2 Alternative 2 – Proposed Action

The action proposed by the Forest Service to meet the purpose and need is listed below. Proposed treatments and road activities are displayed in Appendix B, Maps4-5, and 10-11. Appendix C includes a list of all stands proposed for treatment under Alternative 2.

In response to the identified needs, the Forest Service is proposing the following actions. Harvest timber on approximately 7740 acres to manage growth and diversity. **All acreage figures are approximate.**

Selection Harvest 5800 acres in hardwoods to improve structure and age-class diversity to develop uneven-aged stands.

Plantation Thinning 800 acres of red pine, white pine, white spruce to improve growing conditions by reducing competition and density.

Clearcutting jack pine, aspen 513 acres to regenerate aspen, jack pine, and mixed aspen/conifers. Clearcutting has been determined to be the optimal silvicultural treatment for regeneration of these forest types on the Nicolet (Land and Resources Management Plan A-4, A-6).

Shelterwood Harvest 127 acres aspen, paper birch to release existing understory trees including mixed white pine, white spruce, and hardwoods.

Removal Harvest 265 acres of jack pine, aspen, spruce, balsam fir to release existing understory white pine, oak and mixed hardwoods.

Site Preparation, includes 47 acres of prescribed burning after a jack pine clearcut to stimulate jack pine seeding. Scattered jack pine trees would be reserved for a potential seed source.

Underplant Trees 94 acres of white pine, oak, hemlock, northern white cedar and other species after removal, shelterwood, or selection harvests to improve species diversity. 68 acres of fill-in planting of jack pine where necessary, following clearcut harvest.

Removal Harvest (River Corridor) 100 acres of jack pine, aspen and birch to encourage long-lived species. Canopy gaps would be hand-planted to increase the diversity of long-lived species in the corridor.

Selection Harvest (River Corridor) of 143 acres to develop and retain large-tree character and a continuous canopy. Canopy gaps would be hand-planted with long-lived species that were previously prevalent in the area, such as hemlock, northern white cedar, yellow birch, white pine and oak.

Underplant Trees (River Corridor) Hand-plant approximately 15 acres within the riparian zone immediately adjacent to the river for future coarse woody debris recruitment and shade. Fencing would be installed to protect regeneration.

Maintain Wildlife Openings Maintain 375 acres of existing wildlife openings through hand brushing or mowing.

Improve Woody Structure in Stevens and Quartz Lakes – Steven's Lake--Install 50 whole trees along the federally owned portion of shoreline. Install 40 2-3 ft. high crib structures.

Quartz Lake --Install 50 whole trees along the federally owned portion of shoreline. Install 20 2-3 ft. high crib structures. Place 30 half-log structures in areas not served adequately by the tree drops.

Transportation Management
All mileages presented are estimates based on the best information available.

Construct approximately 1.9 miles of Traffic Service Level D roads would be used for log landings, decking areas, and back-in spurs. Approximately 0.2 miles would not be closed after timber sale activity because they do not access the forest. Approximately 1.7 miles would be closed following the completion of project activities.

Road Reconstruction on 23.6 miles of existing Traffic Service Level D roads to provide safe use and to protect resources. Roads that are currently closed which will be opened for timber sale activities will be closed again at the end of sale activity and roads that are currently open will remain open.

Road Decommissioning Approximately 19.3 miles of roads would be permanently closed to move towards Forest Plan DFC for road densities.

2.4.3 Alternative 3 – Maintain and Enhance Interior Habitat Minimize Disturbance

This alternative was developed to emphasize late successional habitat and address the issue of protecting integrity of interior habitat patches and minimizing disturbance in these areas.

See Appendix B Maps 6-7 and 12-13 for proposed harvest and road actions under this alternative. Appendix C includes a list of all stands proposed for treatment under Alternative 3.

Purpose and need objectives of ; decreasing overstocking in pine and hardwood stands, promoting larger diameter trees and uneven-aged condition in hardwoods; establishing long-lived, large diameter tree species in the river corridor; and reducing road density are emphasized. Disturbance would be reduced by decreasing road density and not maintaining wildlife openings.

The amount of aspen habitat would be decreased. No regeneration of aspen is

included in this alternative. Treatments would be implemented in some of the aspen stands to facilitate conversion of aspen to hardwood or conifer. Some under planting would be implemented to expedite this. Less aspen be less favorable for deer and other early successional species.

Disturbance to existing patches of interior hardwood habitat would be minimized by only treating hardwood stands that have not been harvested in the last 20 years. In uneven-aged systems, typical hardwood management can include harvesting stands every 12 to 15 years depending on site productivity, stocking levels and understory conditions.

Several hardwood stands were dropped from treatment because no road construction would take place and they would not be readily accessed.

This alternative is the same as Alternative 2 with the following exceptions (see Table 2.5-1 Comparison of Alternatives):

- No clearcutting of aspen or site preparation for natural regeneration of aspen would be implemented.
- Approximately 210 acres of shelterwood harvesting of aspen (83 acres greater than the proposed action) would be implemented to facilitate converting these aspen stands to other species.
- Approximately 394 acres of removal cutting of aspen (29 acres greater than the proposed action) would be implemented to facilitate converting these aspen stands to other species.
- Approximately 4057 acres of hardwood stands would receive selection harvest cuts. This is 1884 less than Alternative 2.
- No wildlife opening maintenance would be conducted under this alternative.
- No road construction would be conducted under this alternative.
- Approximately 46.61 miles of roads would be decommissioned (28.31 miles greater than the proposed action) under this alternative.
- 9 acres less pine thinning would occur.

2.4.4 Alternative 4 - Maintain or Enhance Aspen

This alternative was developed to address the issue that the amount of aspen habitat is deficient and declining for game species and a few Neotropical migrants and to keep roads open that are traditionally and currently being used by the public.

See Appendix B Maps 8-9 and 14-15 for proposed harvest and road actions under this alternative. Appendix C includes a list of all stands proposed for treatment under Alternative 4.

Purpose and need objectives emphasized under this alternative include: regenerating jack pine and aspen; decreasing overstocking in pine and hardwood stands, promoting larger diameter trees and uneven-aged condition in hardwoods, reducing the amount of encroaching woody vegetation within existing wildlife openings; providing wood products and fiber in accordance with Forest Plan goals; and maintaining and enhancing the transportation system for timber harvest activities and other needed access.

Additional clearcutting of aspen is included in this alternative, and conversion of poor quality hardwood to aspen is included. Management areas 1.1 and 4.1 are currently higher than DFC in hardwood and lower than DFC in aspen. Conversion will move these areas more towards DFC.

Several roads proposed for decommissioning under the Proposed Action would not be decommissioned under this alternative. Commenters specifically identified these roads indicating that they have traditionally been used and are currently being used for recreational purposes. Analysis confirmed this use (Roads Analysis Process, Project File).

Alternative 4 is the same as Alternative 2 with the following exceptions (see Table 2.5-5 Comparison of Alternatives):

- An additional 448 acres of clearcutting is included. (Includes conversion of 195 acres of hardwood to aspen).
- 54 acres less hardwood selection.
- 9 acres less pine thinning.
- 2.3 miles less road decommissioning than Alternative 2.

2.5 COMPARISON OF ALTERNATIVES

This section provides a summary of the effects of implementing each alternative.

Information in the table is focused on how well each alternative meets the objectives for this project outlined in the purpose and need (Section 1.3.5)

Table 2.5-1 Comparison of Forest Growth and DiversityObjectives by Alternative

Objective	Indicator	Alt 1	Alt 2	Alt 3	Alt 4
Reduce crowding in pine and spruce plantations	Acres of thinning	0	794	785	794
Increase diversity in hardwood stands	Acres of Selection	0	5941	4057	5887
	Acres of under planting	0	257	320	239
Increase structural diversity in hardwood stands	Amount of uneven- aged and even-aged hardwoods Uneven-aged Even-aged 4/	 4417 12560	 5792 11185	 5374 11603	 5776 11201
Maintain amount and age class distribution of aspen and jack pine	Aspen and jack pine age class distribution Aspen 0-10 years 11-20 years 21-30 years 31-40 years 41+ years 2/ Conversion from aspen to other types Jack pine 0-10 years 11-40 years 41+years Conversion from jack pine to other types	 898 2746 2544 585 1588 0 88 55 301 0	 1292 2746 2544 583 956 273 203 55 44 102	 898 2746 2544 570 1272 384 203 55 44 102	 3/ 1627 2746 2544 583 944 129 203 55 44 102
	Acres of aspen forest regenerated by clearcutting	0	417	96	871

1/ Harvests were assumed to happen immediately (2003) and no natural aging from age class to age class was considered.
2/ Harvests such as; clearcuts, removals and shelterwoods where the intent was to convert to another forest type either by natural regeneration, releasing advanced regeneration or planting, were used to identify conversions.
3/ Alt. 4 aspen 0-10 years includes 212 acres of hardwood converted to aspen.
4/ Assume that individual tree selection harvests in stands that are not uneven-aged currently would become uneven- aged after the harvest.

Table 2.5-2 Comparison of Vegetative Management for wildlife, fisheries, and recreation resources objectives by Alternative

Objective	Indicator	Alt 1	Alt 2	Alt 3	Alt 4
Maintain existing wildlife openings	Acres of upland opening maintained in grass/forbs/shrub cover type	0	375	0	375
Regenerate under-represented species and promote larger diameter tree growth in the river corridor	Acres of selection harvest to increase species diversity and larger diameter trees	0	143	143	143
Regenerate under-represented species in the river corridor	Acres of under planting to promote under-represented species in the river corridor	0	175	175	175
Promote shade and future coarse woody debris in the river corridor	Acres of planting in the riparian zone	0o	15	15	15
Restore long-lived species in the river corridor	Acres of short lived stands converted to long-lived species	0	100	100	100
Restore aquatic structure in lakes	Number of woody structures in Quartz and Stevens Lakes	0	100 tree drops 60 cribs 30 half-logs	100 tree drops 60 cribs 30 half-logs	100 tree drops 60 cribs 30 half-logs

Table 2.5-3 Economic Benefits objectives by alternative

Objective	Indicator	Alt 1	Alt 2	Alt 3	Alt 4
Provide wood products as outlined in the Forest Plan p.19-35	Amount of timber products produced	0	22.7 MMBF	15.7 MMBF	24.2 MMBF
Provide economic efficiency	Benefit/Cost Ratio	0	1.06	1.16	1.09
Generate income and employment in local communities	Number of jobs generated	0	325	226	354
	Estimated Amount of $ generated for 25% fund (based on past averages and historical trends)	0	$404,486	$306,173	$426,230

Table 2.5-4 Transportation Management objectives by alternatives

Objective	Indicator	Alt 1	Alt 2	Alt 3	Alt 4
Provide needed access for harvest proposed	Miles of road construction	0	1.9	0	1.9
	Miles of road reconstructed	0	24	18	24
Identify roads for decommissioning that are no longer needed for resource management or access	Miles of road decommissioned	0	18	47	16
Move towards Forest Plan DFC road densities (Less than 4 mi/mi^2 open road density for MAs X.1	Mi/mi^2 of open road	3.95	3.85	3.54	3.86
	Mi/mi^2 of closed roads 1/	1.89	1.75	1.61	1.78

1/ This number decreases through decommissioning

Table 2.5-5 Activity by Alternative for Northwest Howell

Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	Approximate Totals	Approximate Totals	Approximate Totals	Approximate Totals
Clearcut	0 acres	513 acres	115 acres	961 acres
Shelterwood	0 acres	127 acres	210 acres	127 acres
Removal	0 acres	365 acres	394 acres	211 acres
Selection Harvest	0 acres	5941 acres	4057 acres	5887 acres
Thin	0 acres	794 acres	785 acres	794 acres
Total Timber Harvest Acres	0 acres	7740 acres	5561 acres	7979 acres
Prescribed burning for natural regeneration	0 acres	47 acres	47 acres	47 acres
Underplanting	0 acres	257 acres	320 acres	239 acres
Full Planting	0 acres	68 acres	68 acres	68 acres
Site preparation for natural regeneration of aspen	0 acres	398 acres	0 acres	845 acres
Fencing to minimize browsing of underplanted trees	0 acres	20 acres	20 acres	20 acres
Road Construction	0 miles	1.9 miles	0 miles	1.9 miles
Road Reconstruction	0 miles	24 miles	18 miles	24 miles
Road Decommissioning	0 miles	18.3 miles	46.61	16.03
Maintenance and improvement of existing upland openings	0 acres	375 acres	0 acres	375 acres
Lake Structure Improvements	0 structures	100 tree drops 60 crib structures 30 half-log structures	100 tree drops 60 crib structures 30 half-log structures	100 tree drops 60 crib structures 30 half-log structures

2.6 DESIGN FEATURES

The Forest Service developed the following design features to be used as part of all of the action alternatives (alternatives 2-4).

Appendix E contains tables depicting all stands proposed for treatment, by alternative. These tables list which of these features to each stand. This was determined on a site-specific basis for each stand by resource professionals on the Forest.

For situations that are unknown at this time, but arise during project layout and implementation, the appropriate measures will be applied at the time of discovery.

Some of these design features, such as timing restrictions to protect rare and endangered species or buffer areas to protect heritage resources, would only be implemented in specific areas where the Forest Service has identified a known presence.

However, specific locations of such features are not listed in Appendix E. This is to protect the sites.

Soils
These measures would be applied to all stands as needed.

A. Avoid skidding on slopes 30 percent grade or greater. This would be limited in sale layout and design and further controlled in timber sale administration.

B. Designate log landing and temporary road locations where necessary as determined by the FS sale administrator to prevent impacts on heritage resources and other sensitive sites.

C. All exposed mineral soil associated with timber sale, road reconstruction or road construction activities would be revegetated either naturally or artificially to establish ground cover which prevents soil erosion. (see pg. 34, Pub. No. FR093). If artificial revegetation were needed, a pre-approved, weed-free mix would be used.

D. Erosion prevention structures for trails, roads, skid trails, and other disturbed areas would be constructed during the same growing season by mulching and seeding where necessary (see p.34, Wisconsin BMPs). This would be overseen primarily by the Timber Sale Administrator and would prevent soil loss and sedimentation. The Sale Administrator would monitor these structures for 1 year after the sale.

E. For all operating periods, on all soil types operating season may be changed by written agreement with the operator. The Forest Service sale administrator will determine when conditions are appropriate for a change from the normal operating period (i.e. drier than normal conditions). If timing restrictions are in place to protect resources other than soils, the operating period would not be changed, unless approved by appropriate specialist. The sale administrator has the authority to shut down sale operations any time that conditions could lead to un-acceptable damage.

Soils continued

Feature #	Equipment Operations	Season of Operability
1	Allowed only during frozen ground conditions	Usually December 1 through March 15, to minimize soil disturbance.
2	Allowed only during frozen ground conditions.	Usually December 15 through March 1, to minimize soil disturbance. This would be included as part of the timber sale contract and enforced by the Timber Sale Administrator.
3	Allowed only during frozen or unsaturated ground conditions.	Usually July 15 through March 15, to minimize soil disturbance and prevent bark damage. This would be included as part of the timber sale contract and enforced by the Timber Sale Administrator.
4	Allowed year-round except for spring thaw conditions.	Thaw is approximately March 15 through May 1 to minimize soil disturbance and protect roads. This would be included as part of the timber sale contract and enforced by the Timber Sale Administrator.
5	Allowed only during frozen or unsaturated ground conditions.	Usually May 15 through March 15 to minimize soil disturbance. This would be included as part of the timber sale contract and enforced by the Timber Sale Administrator.
6	Allowed only during frozen or unsaturated ground conditions.	Usually June 15 through March 15 to minimize soil disturbance. This would be included as part of the timber sale contract and enforced by the Timber Sale Administrator. (see also mitigation measure 19 for slash)

Water and Riparian
Utilize erosion control practices outlined in the Soil and Water Conservation Handbook (FSH 2509.22), and "Wisconsin's Forestry Best Management Practices for Water Quality", publication number FR093, Wisconsin Department of Natural Resources. BMPs for road construction and stream crossings would be followed as described in pages 18-20 of the BMP handbook. These measures would be incorporated during sale layout and design.

Water and Riparian

Feature #	Water Body	Design Features
7	Various	Designate the location of water diversion structures for constructed trails, roads, and landings when it is determined that erosive water runoff may take place.
8	Woodland Ponds	Follow Forest Plan Standards and Guidelines p.56-57. …
9	Perennial Streams, Rivers and Lakes	- Leave a no cut buffer 50 feet wide measured from the ordinary high-water mark (p. 19 BMPs). - Do not locate decking area and landings within. Do not pile slash within 100 feet of the high water mark (p.18-19 BMPs) - Within 100 feet of the high water mark basal areas should be maintained at a minimum of 60 square feet. Manage for larger diameter trees, 12 inches and greater. - No clearcutting within 200 feet along Class I and II trout streams (Forest Plan, page. 69). See table 3.5.2.2-1
10	Intermittent Streams	- Operate wheeled or tracked harvesting equipment within 15 feet of the ordinary high water mark only when the ground is frozen or dry.
11	Wetlands	Whenever practical, avoid locating roads and landings in wetlands (p. 47 BMPs). - Forest management activities in will not typically occur within wetlands. If necessary, they should occur on frozen ground during to winter to minimize rutting (p. 47 BMPs). - Keep slash out of wetland areas (p. 47 BMPs).

Recreation/Safety

Feature #	Location	Design Feature
12	Along snowmobile trails during the snowmobile season.	Require signing and coordination with snowmobile clubs. This would be implemented by the Sale Administrator or by members of local snowmobile clubs.
13		Where necessary, restrict logging to snow-free periods to reduce snowmobile trail conflicts with logging operations. This would occur only where soils and other resources will tolerate summer logging. This would be included in the timber sale contract and ensured during implementation by the Timber Sale Administrator.
14		Hauling is not permitted on active snowmobile trails during weekends and holidays. This would be included in the timber sale contract and ensured during implementation by the Timber Sale Administrator.

Slash Reduction for Visuals and Soils

These measures would be included during timber sale design and layout, included in the timber sale contract, and ensured during implementation by the Timber Sale Administrator.

Feature #	Location	Design Feature
15	Along FR2176 recreation sites, Hwy 70, 2174, Hwy 55, 2206, 2458, 2193, 2172, 2454, 2457, 2423, 2424, 2426, 2427, 2169, 2485	All logging slash would be lopped and scattered to lie within 2 feet of the ground for 100 feet from the road
16	Along FR2175, 2453	All logging slash would be lopped and scattered to lie within 3 feet of the ground for 100 feet from cleared right-of-way.
17	Along snowmobile trails, or other routes	All logging slash would be lopped and scattered to lie within 3 feet of the ground for 50 feet from the trail.
18	Along other ownership.	All logging slash would be removed for a distance of 10 feet from the property line.
19	Slash including tops, branches, and unmerchantable material	Would be left in place in clearcut and overstory removal harvest on Viilas soils to maintain long-term soil nutrient status. A Forest Service Sale Administrator would monitor slash treatments through regular sale inspections.

River Corridor

These measures would be included during timber sale design and layout, included in the timber sale contract, and ensured during implementation by the Timber Sale Administrator.

Feature #	Compliance	Design Feature
20	Comply with standards and guidelines in State of Wisconsin River Plan for the North Branch of the Pine River.	- No harvesting within 150 feet of the edge of the Pine River. - No road construction or reconstruction would be allowed within the river corridor. - A biologist will be involved in the layout of all treatments within the river corridor.

Cultural Resources

Feature #	Cultural Resource Sites	Design Feature
21	All known and discovered cultural resource sites that are eligible and potentially eligible for the National Register of Historic Places would be protected. If they cannot be protected they will be evaluated and mitigated. These measures would be included during timber sale design and layout, included in the timber sale contract, and ensured during implementation by the Timber Sale Administrator.	- No timber harvesting, road construction, wildlife opening maintenance, or other project would be allowed within a cultural resource site and its required buffer zone, as determined by cultural resource professional and site protection plan. - Existing roads through a site may be used, but no additional soil disturbance within the roadbed and beyond the edge of the existing road would be allowed - No landings or storage of equipment or machinery may take place in these sites and their required buffer zone. - Sites will be monitored during and after the project to ensure that no site damage has occurred to known and discovered cultural resource sites.

Wildlife and Plants

These measures would be included during timber sale design and layout, included in the timber sale contract, and ensured during implementation by the Timber Sale Administrator.

Features #	Design Features
22	Restrict harvest activities to December 1 through March 1 to protect threatened, endangered, and sensitive (TES) species. See Appendix F for a detailed listing of mitigation measures that would be employed if any TES species are found.
23	Restrict harvest activities to July 15 through March 15 to minimize disturbance to breeding birds.
24	Snags, snag replacements, woody ground debris, cavity trees and other selected trees valuable to wildlife would be retained in all managed areas (Forest Plan,p.66). This would be coordinated with the wildlife biologist.
25	No hemlock, super canopy white pine, and northern white cedar would be harvested unless necessary for access and safety considerations
26	Wildlife biologist and botanist would be involved in laying out the stand design to protect sensitive species.
27	Regeneration already present and desirable for future mgmt goal would be protected from harvest activities by establishing skid trails, equipment restrictions, and season of operation.
28	Equipment operations allowed only during frozen ground conditions, usually December 15 through March 1, to protect TES plants.
29	Equipment operations allowed only during frozen ground conditions usually December 1 through March 15, to protect TES plants.
30	Maintain understory conifer component for RFSS species.

Regeneration

This would be implemented after the timber harvest is completed, probably through a contract.

Feature #	Design Features
31	After the timber harvest fencing would be installed To exclude browsing wildlife to protect natural regeneration and under planted trees.

Non-Native Invasive Species
These would occur in any stands necessary

Feature #	Where Necessary	Design Feature
32	Monitor gravel sources (pit)	-If possible before use in the project area to determine if there is contamination by NNIS. -Where fill is used in stands considered high risk for the types of invasive found in the pit, monitor annually for a minimum of 3 years to determine if NNIS plants become established following harvest activity. -Weeds will be addressed with appropriate removal method available at that time.
33	Minimize soil disturbance	To the extent practical, consistent with the project objectives.
34	Revegetate disturbed areas	With native and desirable non-native species to quickly establish cover.
35	Education/Prevention	Provide awareness sessions for timber sale contractors, at the pre-work session, and provide identification booklets for identification.

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

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

No harvest, restoration-only alternative
One respondent requested that the Forest Service consider an alternative with a restoration emphasis that does not include commercial timber harvest. This alternative is not being analyzed in detail because one of the key purposes of the project is to use timber sales as the primary method for making desired changes to forest vegetation and to provide forest products. While the Forest Service could develop an alternative that includes only such activities as planting, riparian restoration, and prescribed burning, it would not meet may of the purposes stated in Section 1.3.5.

Maximizing aspen regeneration
In order to respond to the issue of maintaining young aspen, an alternative was considered which maximized aspen clearcutting beyond Alternative 4. All mature aspen (50 years and older) in the project area was considered for clearcutting to regenerate younger age classes of aspen (IDT notes, project file).

This was not feasible since approximately 640 acres of mature aspen occurs in areas that are not accessible or where the Forest Plan precludes clearcutting such as the river corridors and riparian areas(Forest Plan, p. 69, 152-155). For a list of these acres and reason for unavailability for harvest see section 3.1.3.1.

No River Corridor Management
An alternative was considered excluding river corridor management from this project. The District Ranger determined that these projects were important to accomplish at this point in time. In addition, there were no major issues raised concerning River Corridor management.

Additional Non-Vegetation Related Projects
An alternative was considered including additional projects such as constructing 2 walk-in campsites at Steven's Lake Campground, watershed improvement projects on Elvoy and Brule Creeks, and prescribed burning to restore fire to the ecosystem in several mixed pine stands. This alternative was dropped from detailed study. The purpose and scope of the project is to focus on vegetative management and it determined that these projects were not connected to the proposal or would have a related purpose and need. Therefore, these activities will be analyzed as independent proposals under NEPA (See Section 3.5.3.3).

CHAPTER 3:
AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

CHAPTER 3

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the chart above.

3.1 FOREST VEGETATION

3.1.1 Issue Measurement Indicators

Issue 1 Loss of aspen habitat
This issue was identified by conflicting views on the amount and management of aspen forest. Concern was expressed about the decline of this species due to insufficient management activities to maintain aspen.

Conversely, concern was also expressed about excessive amounts of aspen forest contributing to fragmentation and a larger deer herd.

In the absence of stand level natural disturbance, forest management is required to maintain the aspen ecosystem. For this reason, the amount of aspen regenerated by alternative will be used as an indicator for comparison.

Also the acres of aspen converted to other species will be used as an indicator.

The age class distribution of aspen is important to the analysis of the future of the species and will be displayed in this chapter. The distribution of aspen forest across the project area will be displayed on a map of the forest types and a map of aspen age classes. Both maps are included in Appendix B, Maps 21, and 22.

Issue 4 Fragmentation and disturbance of interior habitat
This issue was identified by a concern that timber harvesting would cause habitat disturbance, particularly to interior habitat.

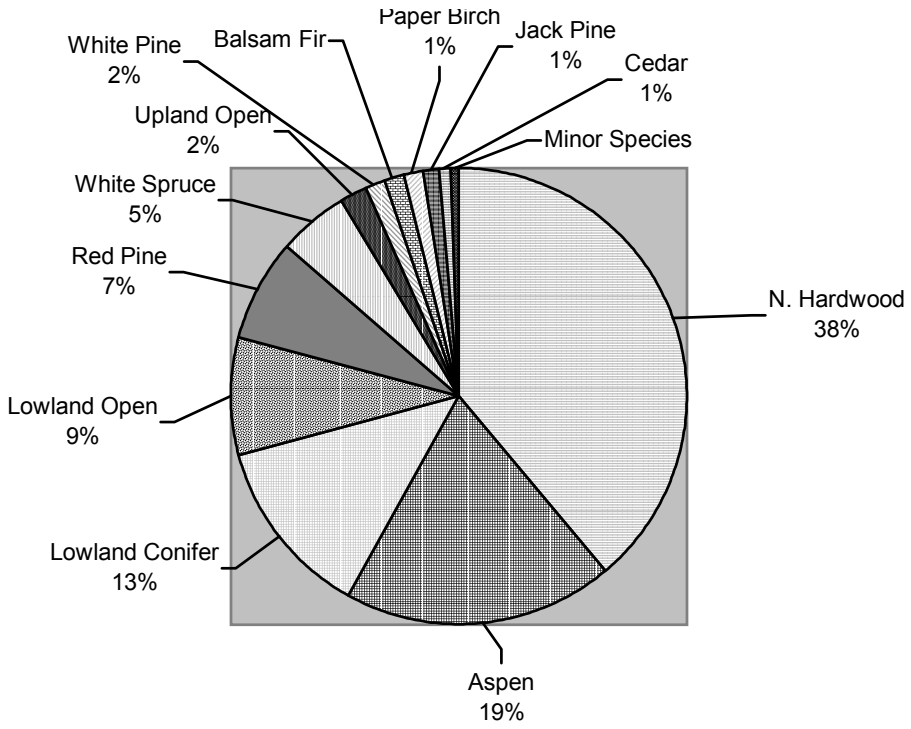
Concern was also expressed about clearcut harvesting fragmenting interior habitat (see Section 3.2 for additional explanation). An indicator for comparison of this issue would be the amount and type of harvesting by alternative. This will be summarized in section 3.1.2.

A summary of past harvest was described in section 1.2. A complete list year by year by type of cut for the last 25 years within this project area is located in the project file.

3.1.2 Existing Condition

Three forest types comprise the vast majority of the project area: northern hardwood, aspen and lowland conifer. Less prevalent are red pine, white spruce and lowland openings. Figure 3.1.2-1 depicts the amount of each cover type.

Figure 3.1.2-1 Current Forest Types of Project Area



There are five Management Areas contained within the project area. The descriptions of these Management Areas are contained in Table 1.7-1. The following sets of tables display the current composition of the vegetation types within the project area by each Management Area.

The existing forest composition is broken down by the Northwest (old Florence District) and Howell (old Eagle River District) Opportunity Areas in the individual Management Area tables in order to compare them to the desired composition for each Management Area as listed in the tables in the Nicolet Forest Plan (pages 89, 97 and 113 of the plan).

Table 3.1.2-1 Existing and Desired Upland Forest Types in Management Area 1.1 within the Northwest Howell Project Area

Upland Forest Type	NW OA Existing Acres	NW OA Existing %	Florence Dist. Existing %	Florence Dist Desired %	Howell OA Existing Acres	Howell OA Existing %	ER District Existing %	ER District Desired %
Jack Pine	0	0.0%	1%	<1%	227	6.1%	7%	8%
Red Pine	291	5.8%	10%	6%	1197	32.5%	22%	7%
White Pine	114	2.3%	2%	4%	297	8.1%	9%	5%
Hemlock	0	0.0%	0	<1%	6	0.2%	1%	1%
Balsam Fir	44	0.9%	3%	4%	101	2.7%	3%	6%
White Spruce	158	3.2%	4%	2%	89	2.4%	2%	2%
Hardwoods	2385	48.0%	36%	34%	518	14.2%	23%	20%
Oak	0	0.0%	0	<1%	34	0.9%	1%	1%
Paper Birch	70	1.4%	2%	2%	149	4.0%	3%	3%
Aspen	1794	36.1%	39%	45%	1025	27.9%	26%	44%
Upland Opening	114	2.3%	3%	3%	36	1.0%	2%	3%
Totals	4970	100.0%	100%	100%	3679	100.0%	100%	100%

Table 3.1.2-2 Existing and Desired Upland Forest Types in Management Area 2.1 within the Northwest Howell Project Area

Upland Forest Type	NW OA Existing Acres	NW OA Existing %	Florence Dist. Existing %	Florence Dist Desired %	Howell OA Existing Acres	Howell OA Existing %	ER District Existing %	ER District Desired %
Jack Pine	22	0.2%	0	<1%	0	0.0%	0	<1%
Red Pine	436	3.9%	5%	5%	242	4.1%	6%	3%
White Pine	99	0.9%	1%	2%	31	0.5%	3%	3%
Hemlock	22	0.2%	1%	1%	11	0.2%	1%	1%
Balsam Fir	87	0.8%	1%	6%	83	1.4%	2%	5%
W Spruce	619	5.5%	4%	3%	78	1.3%	2%	1%
Hardwoods	7351	64.8%	63%	62%	4308	72.7%	69%	64%
Oak	0	0.0%	0	1%	10	0.2%	0	1%
P Birch	99	0.9%	1%	1%	143	2.4%	2%	4%
Aspen	2369	20.9%	21%	16%	847	14.3%	13%	15%
Upland Opening	215	1.9%	3%	3%	169	2.9%	2%	3%
Totals	11319	100.0%	100%	100%	5922	100.0%	100%	100%

Table 3.1.2-3 Existing and Desired Upland Forest Types in Management Area 4.1 within the Northwest Howell Project Area

Upland Forest Type	NW OA Existing Acres	NW OA Existing %	Florence Dist. Existing%	Florence Dist. Desired %	Howell OA Existing Acres	Howell OA Existing %	ER District Existing %	ER District Desired %
Jack Pine	39	0.9%	1%	5%	28	5.7%	15%	13%
Red Pine	486	10.7%	22%	22%	115	23.6%	26%	19%
White Pine	42	0.9%	2%	8%	0	0.0%	8%	12%
Hemlock	10	0.2%	0	<1%	13	2.7%	2%	3%
Balsam Fir	128	2.8%	4%	7%	7	1.4%	4%	5%
W Spruce	1182	26.1%	17%	8%	9	1.8%	1%	6%
Hardwoods	1091	24.1%	20%	19%	194	39.8%	20%	13%
Oak	0	0.0%	0	1%	0	0.0%	0	1%
P Birch	20	0.4%	3%	4%	81	16.6%	2%	2%
Aspen	1395	30.8%	28%	22%	23	4.7%	18%	22%
Upland Opening	140	3.1%	4%	4%	18	3.7%	3%	4%
Totals	4533	100.0%	100%	100%	488	100.0%	100%	100%

Table 3.1.2-4 Existing Upland Forest Types in Management Area 9.2

The Forest Plan did not provide vegetation composition goals for MA 9.2. This table is included to show the existing condition for MA 9.2 in the NWH Project Area.

Upland Forest Type	NW OA Existing Acres	NW OA Existing %	Howell OA Existing Acres	Howell OA Existing %
Jack Pine	10	0.7%	118	10.2%
Red Pine	118	8.2%	194	16.9%
White Pine	28	1.9%	7	0.6%
Hemlock	0	0.0%	0	0.0%
Balsam Fir	91	6.4%	54	4.7%
W Spruce	32	2.2%	12	0.9%
Hardwoods	502	35.1%	378	32.8%
Oak	0	0.0%	0	0.0%
P Birch	19	1.3%	35	3.0%
Aspen	572	40.0%	346	28.2%
Upland Opening	60	4.2%	37	2.6%
Totals	1432	100.0%	1151	100.0%

ACRES BY FOREST TYPE AND 20-YEAR AGE CLASS

EAGLE RIVER – FLORENCE DISTRICT – NW AND HOWELL OAS

The table below displays the forest type composition of the project area by type groups similar to those in the M.A. tables above. The table also shows the age class distribution of each type group by 20-year age class intervals. The No Age column lists the acres of each type group where one definable age class is not apparent or where age is not relevant (non-forest or open areas). For the northern hardwood group this column shows stands where more than two age classes are represented in the stand. Other type groups may have two or more age classes. (Federal Ownership only)

Table 3.1.2-5 Acres by Forest Type in 20 Year age Class

Age Classes	0 - 19	20 - 39	40 - 59	60 - 79	80 - 99	100 - 119	120 +	No Age	Total	% Of Total
Forest Type Groups										
Jack pine	143	0	0	301	0	0	0	0	444	1.0%
Red pine	586	132	689	1321	289	62	0	0	3079	7.1%
White pine	19	6	62	105	209	193	29	2	625	1.5%
Hemlock	0	0	0	0	13	15	54	20	102	0.2%
Balsam fir	15	191	69	229	90	0	0	22	616	1.4%
Lowland Conifer	26	132	509	2676	830	709	528	134	5544	12.7%
Cedar	11	4	13	44	39	207	141	0	459	1.0%
White spruce	79	332	992	733	39	4	0	0	2179	5.0%
Oak	0	0	0	10	19	15	0	0	44	0.1%
Lowland Hwd	0	0	30	46	22	0	0	4	102	0.2%
N. Hardwood	126	72	408	6467	4363	432	692	4417	16977	38.9%
Aspen	3644	3129	627	759	212	0	0	0	8371	19.2%
Paper Birch	7	0	5	396	207	0	0	0	615	1.4%
Lowland open	0	0	0	0	0	0	0	3692	3692	8.5%
Upland open	0	0	0	0	0	0	0	790	790	1.8%
	------	------	------	-------	-------	------	------	-------	-------	-------
Total	4656	4003	3359	13127	6332	1637	1444	9081	43639	100%

Hardwoods
The northern hardwood type group occurs within large blocks throughout the project area. The desired future condition in the Forest Plan for the Eagle River-Florence District for Management Areas 1.1, 2.1 and 4.1 is for all but 1-3% of the hardwood forest to be in an uneven-aged condition. Therefore, the current structure is well short of that desired in the Plan.

A large portion of the hardwood forest is 60 – 100 years old (64% in the 60 and 80 year age classes in Table 3.1.2-5). Over one-quarter of the hardwood forest has developed enough age-class diversity to be classified as uneven-aged and is listed in the no age column in table 3.1.2-5.

The rest of the hardwood forest lacks age class diversity and much of it is even-aged (74%).

The amount of hardwood forest is at or above the forest plan desired levels for all Management Areas.

Aspen
The approximately 8400 acres of aspen forest is generally scattered throughout the project area and found in all of the management areas. Though most of this aspen (75%) is under 30 years old, there are 1115 acres of aspen stands over 50 years old, which are approaching, or beyond economic maturity.

Some of these stands are converting to other types such as northern hardwood or spruce/fir. Many stands have little understory of other tree species.

Within the project area the amount of aspen is under forest plan desired levels in Management Area 1.1 but is at or above desired levels in Management Areas 2.1 and 4.1. The amount of aspen in the project area is very close to the Plan DFC (Desired Future Condition) when viewed at the district scale (see Tables 3.1.2-1, 3.1.2-2 and 3.1.2-3).

Jack Pine
Nearly 70% of the jack pine is mature at over 60 years old (300 acres). Nearly 40% of those acres are within the North Branch Pine River Corridor. This mature jack pine, are now susceptible to insect and disease attack and structural damage to high wind and heavy snow/ice.

Health and vigor are declining in these stands and will accelerate with advancing age. Some of these stands have developed an understory component of balsam fir trees and some have a scattered red pine or oak component. The amount of jack pine is at or below Plan DFC in all management Areas.

Red Pine
The red pine stands are of plantation origin, most of which is CCC era planting from 50 to 70 years old (55%). Another 22% was established from more recent planting and is under 30 years old.

All of current levels of red pine are very close to Forest Plan desired levels except Management Area 1.1 in the Howell O.A. portion where the current level is higher than the Forest Plan level.

White Spruce
The white spruce plantations are of similar age as the red pine with 60% of those acres in the 50 to 70 year age range. Nearly all the white spruce stands are under 90 years old. There are some natural stands of white spruce.

All of the current levels of white spruce are also very close to Forest Plan desired levels except Management Area 4.1 in the Northwest O.A. portion where the current level is higher than the Forest Plan level.

Approximately 14% (760 acres) of all the red pine and white spruce stands within the project area have been determined to be in an overstocked condition (Benzie, 1977 for red pine, Nienstaedt and Zasada, 1990 for white spruce). A stand by stand list of current conditions for all stands considered for harvest compared to desired conditions can be found in Appendix C.

Other Species
There are only small amounts of white pine; hemlock and oak forest types within the project area and in nearly all cases they are represented below forest plan DFC in all the Management Areas.

These types of trees are found as a component in other forest types such as northern hardwood but do not exist over large areas where they dominate the stand. These species are important for wildlife.

Upland Openings
The amount of upland openings (1-3%) is close to the desired plan DFC though at the low end of that range for most Management Areas

3.1.3 Direct and Indirect Effects on Vegetation

Area of Potential Effect
The boundary of analysis to be used in determining the direct and indirect effects of the proposed vegetative management activities will be the Northwest – Howell Project Area that is composed of the Northwest and Howell Opportunity Areas. These two opportunity areas were analyzed together due to similar issues, forest types, and geographic area. Comparisons are made up to the forest level where appropriate.

The project area also includes the non-federal lands although much information is lacking concerning their management. The proposed vegetative management activities will be the Northwest Howell Project Area that is composed of the Northwest and Howell Opportunity Areas. These two opportunity areas were analyzed together due to similar issues, forest types, and geographic area. Comparisons are made up to the forest level where appropriate.

Compliance with NFMA
All sites proposed for timber harvesting have been identified in the Forest Plan as suited for timber production. All sites to be harvested have been inventoried on the ground. Based upon a review of the on-the-ground inventories by a certified silviculturist, all have been determined to meet suitability pursuant to 36 CFR 219.27(c)(1). Reference Appendix C for a list of each stand and site specific information for each stand including proposed harvest by alternative.

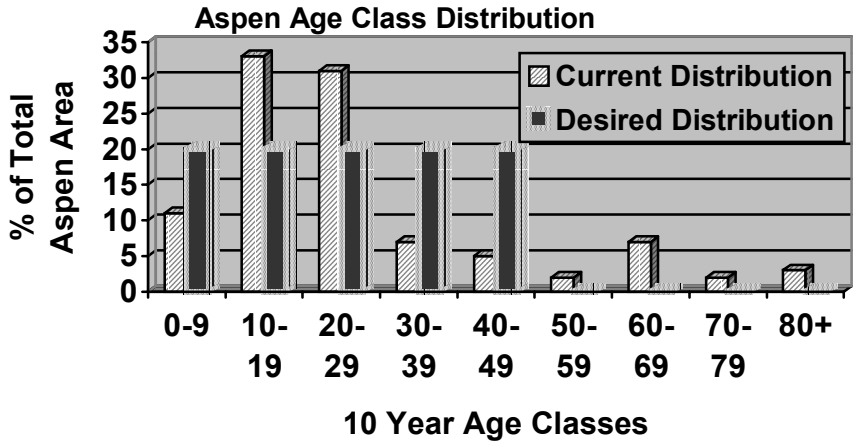
A certified silviculturist has reviewed all proposed timber harvest sites. Based upon this review, and the review of reforestation success on similar sites (Reference Table 3.1.3.3-3), it is safe to assume that the technology and knowledge exist to adequately restock the stands within five years after final harvest.

3.1.3.1 Aspen Issue 1

The ages of the 8400 acres of aspen stands within the project area are not well distributed. A better distribution of age classes is important for wildlife such as grouse and snowshoe hare (Forest Plan p.27). Different wildlife species utilize different ages of aspen and the same species will utilize different ages of aspen at different times of their lives and at different times of the year to meet their habitat needs.

An even distribution of age classes of aspen across the landscape would be 20% in each of the 10-year age classes up to 50 years. The current distribution is depicted in Figure 3.1.3.1-1. The trees in these age classes will grow into the next class over time but to bolster the youngest class and maintain the diversity of age classes, older stands must be cut and regenerated.

To get to a more even distribution of age classes sooner, some of the aspen from the younger classes that are over-represented could also be cut but only 28 acres of aspen under 50 years of age was considered for clearcutting. Also 32 acres of multiple-aged aspen was proposed for clearcutting.Figure 3.1.3.1-1 Aspen Age Class Distribution



Aspen levels are below the forest plan DFC in M.A. 1.1. (see Table 3.1.2-1) Seventy-seven acres are proposed for harvest within this M.A. This includes all of the available mature aspen in M.A. 1.1.

At the district level, aspen is very close to desired plan levels in M.A.s 2.1 and 4.1. In order to help maintain these levels, 186 acres within M.A. 2.1 and 131 acres within M.A. 4.1 are proposed for harvest.

Aspen-birch acreage within the State of Wisconsin has declined by 36% since 1935 based on the last 5 inventory cycles (1935, 1956, 1968, 1983, 1996) of the state FIA forest inventories (Cunningham and Moser, 1938, Stone and Thorne, 1961, Spencer and Thorne, 1972, Raile, 1985 and Schmidt, 1997).

There are approximately 640 acres of mature aspen that would not be clearcut under any alternative for the following reasons:

- Brule River Corridor (190 acres) – Federally designated study river
- Riparian zones including those along trout streams (163 acres)
- N. Branch of the Pine River Corridor (106 acres)
- Visually sensitive zones (41 acres)
- Lack of access (33 acres)
- Excessive slope (11 acres)
- Unique ecosystems – Ecological Reference Areas (32 acres)
- Other miscellaneous reasons (65 acres).

No treatments are proposed for these areas.

The following list shows the amount of aspen forest that is either maintained or regenerated as aspen forest by some harvest treatment for each alternative.

- Alternative 1 – 0 acres
- Alternative 2 – 417 acres
- Alternative 3 – 96 acres (maintained as aspen/spruce/fir forest with removal harvest)
- Alternative 4 – 871 acres

3.1.3.2 ALTERNATIVE 1

Under this alternative, no vegetative management would occur except those areas that are currently under timber sale contracts from the Red Pine EA. There are six sales from this EA that have been sold totaling 976 acres of pine thinning.

Only natural processes such as windthrow, wildfire, insect, and disease related mortality and natural succession would alter the current vegetative conditions.

The opportunity to provide wood products for local markets would be delayed or lost. The amount of dead and down trees would increase.

Hardwoods
Growth rates in the northern hardwood stands would decline and eventually stagnate until some kind of natural disturbance caused enough mortality to open up the forest canopy.

Mid-tolerant species such as yellow birch and basswood would gradually disappear and be replaced by the more shade tolerant sugar maple. Also a diversity of age/size classes would take much longer to develop naturally.

Canopy gaps, which can provide the opportunity for seedling establishment, would not be created through management but would only occur by natural causes of tree mortality such as windthrow or insect and disease which may take some time to occur.

Aspen
Mature aspen stands would not be regenerated back to aspen with management treatments. These stands would continue to decline with an increasing rate of mortality due to advanced age and susceptibility to damage from wind, insect and disease.

The older aspen stands would gradually convert to other trees species such as balsam fir, spruce and hardwood.

Some aspen may be regenerated from natural, widespread fire or blowdown events.

Jack Pine
Jack pine plantations would continue to age and the risk of physical damage from wind and heavy snow and ice and for insect and disease attack would increase with time.

Dieback and mortality would eventually eliminate the jack pine and natural succession would replace the jack pine with other species such as balsam fir, white spruce, red maple and oak. This replacement may take some time however and more open shrub conditions may persist for a time. The amount of time spent in this condition will depend on the soil type, the presence of any advanced regeneration and any nearby seed source. The fire hazard would continue to increase during this period of mortality.

Red Pine
Red pine and white spruce plantations would show increases in stocking levels until conditions would become so crowded that growth would slow, then stagnate except for those stands currently under a timber sale contract that would be thinned.

Much of the understory vegetation would become completely shaded out and disappear. In the long term, the intense competition with cause tree mortality and natural thinning. It will take a much longer time for larger diameter trees to develop.

White pine, oak, hemlock, and northern white cedar trees would not be underplanted. Any species diversity would have to occur naturally though browsing would limit the growth and establishment of those species.

Upland Openings
Permanent upland openings would not be maintained and would continue to fill in with tree species from the adjacent stands. Some openings would persist longer due to frost pocket conditions.

Eventually most openings would become smaller and smaller and disappear which would reduce the diversity of shrub and herb species within the project area.

It is estimated this process could take up to 20 years in the areas of hardwood forest and 5 to 10 years adjacent to aspen forest.

3.1.3.3 ALTERNATIVE 2

This proposed alternative contains many different timber harvest and reforestation activities. Table 3.1.3.3-1 displays the amount and types of harvests by alternative.

Table 3.1.3.3 –1 Types of Harvest by Alternative

This table provides a comparison of harvest by alternative

Type of Harvest	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Clearcut	0	513	115	961
Shelterwood	0	127	210	127
Removal	0	265	294	111
Selection	0	5800	3914	5744
Thinning	0	792	783	792
River Corridor - Removal	0	100	100	100
River Corridor - Selection	0	143	143	143

Hardwoods
The harvest activity with the largest amount number of acres is the selection harvests (individual tree selection) in northern hardwood stands. The intended objectives of these harvests included the following:

- Create conditions that favor the establishment and development of multiple age classes and canopy levels of trees by establishing canopy gaps to create favorable seedbeds for seedling establishment and future development. This would also enhance any existing age class structure that may already exist.
- Create conditions that favor the development of shade mid-tolerant species such as yellow birch and basswood by strategically placing the above mentioned canopy gaps next to seed trees of these species and also by favoring these species by removing more tolerant species such as sugar maple. This would increase species diversity.
- Reduce stocking levels that would increase growth rates. Grow larger trees sooner and remove some insect, disease damaged trees and low quality trees. That would increase stand quality, health and vigor.

Aspen
Aspen levels are below forest plan levels in M.A. 1.1 (see Table 3.1.2-1). Seventy-seven acres are proposed for harvest within this M.A. At the district level, aspen is very close to the plan DFC in M.A.s 2.1 and 4.1. In order to help maintain these levels, 186 acres within M.A. 2.1 and 131 acres within M.A. 4.1 are proposed for harvest.

Approximately 333 of the 1115 acres of mature aspen (50 years or older) within the project area are proposed for clearcutting and regeneration back to aspen with this alternative. There are also 28 acres proposed for harvest that are in the 40-49 year old class and 32 acres of multiple-aged aspen stands that contain many mature aspen trees. These treatments would ensure that these areas continue as aspen forest into the future as opposed to eventually converting to other forest types.

There are approximately 800 acres of mature aspen that would not be clearcut with this alternative. Some of this mature aspen (approx. 160 acres) has shelterwood or removal harvests proposed with this alternative.

There are also 272 acres of shelterwood and removal harvests proposed with this alternative for aspen stands within the project area. Most of these harvests would result in conversion of the aspen to other types. The following is a list by M.A. with the anticipated change from the aspen forest type after harvest.

M.A. 1.1
- 17 acres to a white pine and hardwood mix
- 21 acres to white pine
- 15 acres to hardwood
- 19 acres would remain as aspen

M.A. 2.1
- 47 acres to white spruce
- 34 acres to hardwood
- 30 acres would remain, as aspen but would have an increased oak, paper birch, and other hardwood component. Oak underplanting is proposed.

M.A. 4.1
- 63 acres to a balsam fir and aspen mix
- 14 acres to hardwood
- 8 acres would remain as aspen but with a spruce/fir component

M.A. 9.2
- 5 acres to hardwood

All of the stands above, where the harvest would cause a conversion to something other than aspen, already have an advanced understory established of some other species that would be allowed to grow freely after the aspen overstory is removed. M.A. 1.1 is the only M.A. within the project area that is below the Forest Plan desired level for aspen and this alternative would convert 53 acres from aspen to some other type in this M.A.

All of these areas have a soil type of stambaugh-padus and are capable of growing aspen, hardwood, or white pine. The two stands totaling 15 acres that would be converted to hardwood under this alternative would be clearcut and regenerated to aspen in alternative 4.

These stands have well-established hardwood under a scattered aspen overstory and could have easily been typed as hardwood.

Of the 21 acres of M.A. 1.1 aspen that would be converted to white pine, 19 of those acres are along Allen Creek, which is a trout stream so aspen is not desired. Replacing the aspen would discourage beaver whose activity is detrimental to stream conditions for trout.

The other two acres are a small and narrow stand along Morgan Lake Road. White pine was chosen to be added as a component of the stand to enhance visual quality along the road. The remaining 17 acres that are listed as converting to white pine and hardwood already have large white pine and young hardwood well established within the stand. The shelterwood harvest would remove some aspen and allow this to continue.

There are also four stands covering 58 acres within M.A. 2.1 and 4.1 where no harvest is proposed but planting is proposed under an existing aspen overstory. The species identified for planting are; white pine, oak, and white spruce. The effect of this treatment would be the addition of some species diversity.

Optimal Treatment of Aspen and Jack Pine
The management of the aspen and jack pine units by clearcutting in alternatives 2 and 4 is the optimal silvicultural method for regenerating aspen and jack pine (Forest Plan, pages A-4 and A-6).

The regeneration of aspen and jack pine is best accomplished by clearcutting, as these species require full sunlight for vigorous growth and successful competition with shade-tolerant species.

As little as 10-15 square feet of basal area of residual overstory will slow (aspen) sucker growth by 35 to 40 percent (USDA General Technical Report NC-36).

Jack pine seedlings require full sunlight to be successfully established (USDA General Technical Report NC-32). Thus, the shelterwood, seed tree and individual tree selection methods would not be as effective in regenerating these stands because the overstory left behind reduces the sunlight reaching the ground.

Group selection would not be as effective in regenerating aspen or jack pine because of the small size of the openings (less than 2 acres) as the perimeter trees shade the regeneration opening. These other harvest methods do not provide the necessary light conditions to regenerate the desired species composition (see Forest Plan, Appendix A p. A1-A12, references are incorporated by reference).

Under natural conditions, aspen and jack pine are regenerated by natural disturbance such as wildfire and windstorms. The decision to manage for aspen and jack pine in these stands was based on site-specific analysis considering land type management area (DFC for each M.A.), and soils data.

Decisions on what aspen and jack pine stands were to be treated and how best to treat them were made using data from field examination, field notes, and observations (data located in the project file). All stands were examined within the last 10 years with most examined within the last five years.

Thinning aspen stands and underplanting white pine and hemlock is desirable because it reduces the level of high shade while not allowing enough sunlight for aspen regeneration. Moderately shade tolerant white pine and very tolerant hemlock would be able to thrive in such an environment. This would allow for an effective forest type conversion over time.

Underplanting white pine and hemlock is appropriate for the soil type, vegetative objective, visual objective, and riparian enhancement on these areas. The emphasis on these species is based on Forest Plan objectives, site-specific analysis, and landscape planning at multiple scales.

Jack Pine
Approximately 115 acres of mature jack pine is proposed for clearcutting and regeneration back to jack pine either by planting or by use of prescribed burning to open serotinous cones to facilitate natural reseeding.

Current levels of jack pine forest are at or below forest plan desired levels in all M.A.s except in M.A. 9.2, which had no desired levels listed in the forest plan.

There are four jack pine stands totaling 95 acres that are within the N. Branch of the Pine River corridor. These stands have removal harvests with underplantings proposed with this alternative. The desired effect of this treatment is to replace the shorter lived, maturing jack pine with longer lived species such as red pine, oak and white pine.

One of the stands would also have a component of balsam fir that is not a long lived species but is already established in the understory and will help stock the stand for some time.

Table 3.1.3.3 -2 shows the acres of proposed reforestation activities by alternative. These treatments would increase species diversity in the affected stands by the amount listed for that alternative.

In many cases, longer-lived species would replace short-lived species such as aspen and jack pine and in other cases under-represented species would be added as a component of the stands, most of which are within the N. Branch of the Pine River Corridor.

A stand-by-stand list with the specific species and forest types can be found in Appendix C.

Red Pine and Spruce

Approximately 760 acres of red pine and white spruce plantations are proposed for thinning under alternatives 2 - 4. This even-aged thinning treatment would reduce the stocking to recommended levels and increase growth and vigor of the remaining trees.

Larger diameter trees would develop quicker and understory vegetation would become established or further expand once more sunlight reaches the forest floor.

A stand by stand list of current verses desired stocking for these stands can be found in Appendix C.

Planting

Table 3.1.3.3-2 depicts the amount of proposed planting by alternative.

Table 3.1.3.3-2 Species Reforested by Alternative

Species to be Reforested	Alt. 1	Alt. 2	Alt. 3	Alt. 4
White pine - underplanting	0	0	103	39
White pine & red oak - underplanting	0	91	25	64
White Pine, red oak, red pine - underplanting	0	42	29	29
White pine & white spruce - underplanting	0	23	23	23
White pine, hemlock, yellow birch - underplanting	0	19	19	19
White pine & red pine - underplanting	0	0	13	0
Red oak - underplanting	0	6	6	6
Red oak, red pine, white pine - underplanting	0	17	15	0
White spruce - underplanting	0	17	22	17
Hemlock & yellow birch - underplanting	0	86	86	86
Hemlock & northern white cedar - underplanting	0	22	22	22
Cedar - underplanting	0	5	11	5
Jack pine – full planting	0	58	58	58
Jack pine and red pine – full planting with site prep.	0	10	10	10
Jack pine natural – burning site prep.	0	47	47	47
Site preparation for natural aspen regeneration	0	398	0	845

The planting of jack pine and underplanting of white pine, red oak, and hemlock has occurred for some time on the Nicolet National forest.

Table 3.1.3.3-3 displays the survival of those planted trees for the surveys taken over the last four years (1998 – 2001).

Table 3.1.3.3-3 Survival of Planted Trees on the Chequamegon Nicolet N.F

Year Planted	Species Planted	% Survival (3rd Year)	Acres planted
1995	White Pine	72%	156
	Red Oak	77%	149
	Jack Pine	82%	154
1996	White Pine	85%	94
	Red Oak	96%	162
	Jack Pine	82%	229
	Hemlock	29% (14 trees sampled)	8
1997	White Pine	83%	253
	Red Oak	85%	112
	Jack Pine	91%	66
	Hemlock	50%	29
1998	White Pine	89%	313
	Red Oak	56%	53
	Jack Pine	90%	202
	Hemlock	100%	79

As can be seen in the table, most species have done rather well except hemlock. Reasons for this lower survival are a combination of drought stress on the trees, the hardiness of the nursery stock and deer browsing.

Protection from deer browsing may be needed for hemlock, northern white cedar, and yellow birch, which are proposed for planting.

Cedar and yellow birch have not been extensively planted on the forest so little data is available to determine how they would fare.

This data was taken three years after planting which occurred during the period 1995 to 1998. The survival rates below for 1995 and 1996 are weighted averages for the Nicolet N.F. and 1997 and 1998 are for the Chequamegon-Nicolet N.F. after the forests were combined

3.1.3.4 ALTERNATIVE 3

This alternative was developed in response to Issue Number 4 to emphasize late successional species. The following modifications were made to Alternative 2 to create this emphasis:

- No regeneration of early successional aspen forest (no clearcutting)
- Reduce the frequency of disturbance in the larger interior habitat patches (no selection harvests where the previous harvest was less than 20 years earlier)
- Lower road density (no road construction).

Changes from Alternative 2 are described below. All other treatment effects are the same as Alternative 2

Hardwoods

Compared to Alternative 2, twenty northern hardwood stands totaling approximately 1800 acres would not be harvested to reduce the frequency of disturbance in interior habitat patches (see discussion in paragraph above).

There would also be an additional 94 acres that would not be harvested because they could not be accessed without road construction. The effect on those stands would be the same as the hardwood stands in alternative 1.

ASPEN

Eleven aspen stands totaling 266 acres which were listed for clearcutting in Alternative 2, will not be treated. The effect on these areas would be the same as that described for mature aspen stands in Alternative 1. These stands would no longer be considered for harvest due to a lack of regeneration options to other species and/or no road access.

There would also be 20 acres of aspen that have canopies that are currently open enough to allow underplanting of other species such as white pine and spruce without any harvest treatment.

Another 98 acres of aspen forest would be thinned using a shelterwood or removal harvest. These harvests would create favorable conditions for underplanting and would be planted with species such as white pine and spruce. Many of these stands have small components of other species that would not be harvested and would be allowed to flourish after the aspen is removed. These include trees such as balsam fir, red pine, white spruce, and hardwood species.

One other aspen stand would have a removal harvest without any planting and would release a balsam fir understory to that come up with the remaining aspen. The effect on all of these stands would be a

gradual conversion to species other than aspen. This conversion would be aided by the underplanting of other species and the removal of some of the aspen to create conditions favorable for those species to become established and grow into the canopy.

Red Pine and Spruce
There would be one white spruce stand of 9 acres that would not be harvested without road construction.

3.1.3.5 ALTERNATIVE 4

This alternative was developed in response to **issue 1** to emphasize aspen management. All of the aspen clearcut harvests from Alternative 2 are included in this alternative as well as adding some additional aspen stands for clearcutting, changing some removal harvests to clearcuts and clearcutting some hardwood stands with high aspen components and regenerating those stands to aspen also. These changes are displayed in Table 3.1.3.5-1.

Table 3.1.3.5-1 Comparison of Changes from Alternative 2 to Alternative 4

Change Compared to Alternative 2	MA 1.1 acres	MA. 2.1 acres	MA 4.1 acres	Total acres
Aspen Removal Harvest Changed to Clearcut	44	64	46	154
Additional Aspen Stands to Clearcut	44	0	13	57
Clearcut of Additional Hardwood Stands with an Aspen Component	111	34	42	187
Hardwood Selection Harvest Changed to Clearcut	17	0	38	55

Hardwoods
The selection harvests in the hardwood stands would be the same as those in Alternative 2 except for the 55 acres listed above.

Aspen
This alternative would maintain 192 acres of aspen by regenerating these stands back to aspen that would have otherwise been converted to another type with the removal harvest in Alternative 2 or would not have been harvested with the other alternatives where natural selection would occur. Also a total of 242 acres would be converted to aspen that is currently typed as northern hardwood but have sufficient amounts of aspen that when clearcut, would re-sprout to aspen.

Aspen is the desired species for these stands in Alternative 4, therefore, clearcutting is the optimal silvicultural method to regenerate aspen by root suckering. Without clearcutting, aspen would not regenerate adequately and would die out of these stands over time. Aspen requires full sunlight for successful suckering and growth.

None of these stands occur within interior habitat patches. There is a 19-acre aspen stand that is listed with a removal harvest in Alternative 2 that was not to change to another forest type but would be clearcut and regenerated to aspen instead with this alternative.

All of the above situations would add 453 acres to the youngest aspen age class.

Red Pine and Spruce
The thinning in pine and spruce stands would be unchanged from Alternative 2.

3.1.4 Cumulative Effects on Vegetation of All Alternatives

Past
Much of this area like the rest of the Nicolet National Forest was logged heavily for its' pine resource from around 1860 to the turn of the century. These logs were floated down the river systems including the North Branch of the Pine River. By the early 1900's the pine resource was nearly exhausted.

In the late 1800's, the railroad pushed into Northern Wisconsin and what is now the

Nicolet National Forest. Around 1900 logging reached its peak. After the pine was gone, logging of the hardwood resource began.

In some areas, after the timber was cut, fires were set to the slash. Drought and the presence of vast areas of slash created ideal conditions for wildfires. Many areas burned repeatedly which permitted the establishment of pioneer species such as aspen, jack pine and paper birch.

The acquisition of lands by the federal government began in late 1928 for what was to become the Nicolet National Forest. One of the first missions was the suppression of forest fires. Many of the burned over areas were planted by the CCC in the early to mid-1930's with red pine and jack pine.

The hardwood areas that were cut heavily have grown back to what is referred to as "second growth hardwood". Some of the aspen that became established early in the century or even prior to 1900 from fire events had been harvested regenerated and have grown into a second maturing aspen forest.

Computer records of more recent harvests are stored in a database that goes back to 1977. A detailed record of harvesting over the past 25 years for this project area can be found in the project file. Harvests are listed by type of cut by year by forest type. Some of the even-aged thinnings and selection harvests may have been multiple entries on same acres due to the time period involved (thinnings may occur every 10-20 years depending on the forest type).

This data shows that there was a steady amount of aspen clearcutting in the 1980's up to 1992, a period of salvage harvesting in the early 1980's (elm mortality), thinning of red pine and white spruce plantations from 1985 on and a steady amount of selection harvests throughout the period in hardwood forests. Harvesting has dropped sharply in the project area since 1994 due to the way areas have been scheduled for analysis and because of the increased amount of time that analysis has taken.

There has been almost no activity in the last two years. Six red pine thinning sales are currently under contract in the project area with a total of 976 acres all prepared from a previous environmental document (Red Pine E.A.) These stands will be harvested over the next three to five years. A map of this harvest activity over the past 20 years in five-year groups is available in the project files.

Non-Forest Service Lands

Natural occurrences and past management of lands in other than Forest Service ownership has resulted in the mixture of forest types listed in Table 3.1.4-1. A total of 82% of the non-national forest ownership is forested. About one-quarter of the total area is aspen forest. With a bit more than that in hardwood forest and a bit less in lowland forest types.

Upland openings make up 10% of the Non-National Forest lands within the project area. Nearly 82% of these lands are forested. Table 3.1.4-1 displays types of vegetation on these lands.

These Non-National Forest lands make up approximately one-quarter of the project area. The largest portion (3500 acres) is managed by the Commissioners of Public Lands for the State of Wisconsin. Private non-industrial landowners own the rest of the area.

Table 3.1.4-1 Summary of Forest Types for Non-National Forest Lands within the Project Area.

Forest Type Group	Existing Acres*	% Of Total Non-NF
Upland Conifer	954	7.0%
Hardwoods	3660	27.0%
Aspen	3419	25.2%
Lowland Forest	3069	22.7%
Non-forested Type	**Existing Acres***	**% Of Total Non-NF**
Lowland Non-forest	500	3.7%
Upland Non-forest	1361	10.1%
Water (Lakes and ponds)	581	4.3%
Total	**13,544**	**100%**

Forest type and area determined from aerial photo interpretation.

Future

In addition to the harvests proposed under the alternatives of this EIS, there are three timber sales involving red pine plantation thinnings that are currently under contract in

the project area – the Ominish Lake, Lily Pad and Black Bear Timber Sales. Those contracts are to be completed by late 2003. This will involve the harvesting of a total of 522 acres by that time.

Past activities have altered the vegetative conditions found in this project area.

The effects from potential future activities from this project that would add to the effects of the past will depend on what alternative is selected. The effects of each alternative were discussed earlier.

Alternative 1 would not regenerate any of the aspen that exists due to past activities. Some of this aspen would continue to convert to other species by natural succession. Without any harvesting, the second growth even-aged hardwood would not be treated to develop structural diversity (multiple age classes and canopy layers) and growth rates will decline.

Sugar maple would dominate with mid-tolerant species eventually dying out under the dense canopy.

Some natural events may accomplish some of the objectives as harvesting in small areas.

The plantations that are becoming quite dense would have much reduced growth rates and little species diversity developing in the understory due to lack of sunlight.

Species diversity would remain what it is now and only change with natural regeneration without the proposed underplanting.

Alternative 2, as described earlier, would regenerate some of the aging aspen. This would perpetuate the aspen where it developed from earlier practices. Also, some hardwood areas would receive selection harvests that would help develop structure, increase growth rates and open up the canopies for mid-tolerant species.

The overstocked plantations would be thinned which would increase growth rates and allow an understory to develop.

Some additional species diversity would occur with underplanting. Over time, CCC era jack pine in the N. Branch of the Pine River zone would be replaced with longer-lived species.

The future condition of the hardwood stands proposed in **Alternative 3** would be the same as in Alternative 2. The length of time between disturbances (harvesting) would be longer for the stands that were dropped from this alternative (compared to Alternative 2) than it has been in the past in the interior blocks.

The future of the aspen stands would be that same as in Alternative 1 since none would be regenerated to aspen.

Alternative 4 would perpetuate aspen where it has developed and even re-establish it where some succession to other species has started. The future of most of the hardwood stands would be the same as in Alternative 2.

Non-Forest Service Lands

The Board of Commissioners of Public Lands (BCPL) manages the most lands within the project area (other than the Forest Service) for the State of Wisconsin. They manage approximately 3,500 acres out of the approximately 13,500 acres of non-national forestlands.

The type of management that occurs on these lands is described in a letter from Mike Paus; District Administrator from BCPL dated 6/15/01 and can be found in the project file.

Hardwood management on these lands consists of large tree retention, winter logging with low standard roads, retention of conifer component, favoring yellow birch as a component and for regeneration, retaining super canopy white pine, allowing aspen on good sites or in hardwood areas to convert to hardwood, average 15 year cutting cycle and leaving higher residual basal areas.

They also are favoring conifer components in aspen stands. Most of these management practices are very similar to that taking place on nearby national forest lands especially those that would occur with Alternative 3.

A sale schedule for the BCPL lands is available in the project file.

Compatibility of Harvest Activities in the Northwest Howell EIS with the Forest Plan Revision Alternatives

All harvesting proposed in this project would be compatible with the current (1986) Forest Plan. However, the desired future condition (DFC) for portions of the NWH Project Area may change under the Forest Plan Revision, depending on which Forest Plan alternative is selected.

An analysis of the compatibility of harvests proposed in this project with Forest Plan Revision alternatives was completed. Each Alternative under Northwest Howell was compared with all alternatives under the Forest Plan Revision. This analysis displays all harvests including number and type of cut that would create conditions that would be incompatible with the desired vegetative condition under Forest Plan Revision Alternatives. This complete analysis is included in the Project File (Compatibility with Forest Plan Revision).

The expected compositional changes under Alternatives 2-4 from this project would result in minor changes that would not be measurable at the forest level, or barely measurable at the project level. All other effects on composition would be compatible with the revision alternatives.

The majority of the NWH Project Area is currently designated in MAs 1.1, 2.1 and 4.1 (see Table 1.7-1). Under Plan Revision Alternatives 3-9, the majority of the NWH Project would be designated in MA 2B. MA 2B emphasizes uneven-aged, northern hardwood, interior forest. Early successional forest patches are generally allowed to succeed or are converted to long-lived species. A relatively continuous canopy and large patch size conditions are desired.

Under NWH Alternatives 2-4, temporary openings in the forested landscape would be created by harvests such as shelterwood, removal and clearcut harvests. These harvests vary in the effect on a continuous canopy in intensity and amount of time that the canopy is opened. They would create conditions that would delay the continuous canopy goal for the 2B M.A.

The percent of MA 2B in the Project Area that would result in temporary openings from activities proposed in NWH ranges from 0.7% to 2.5%. These small changes would do little to affect the percent of early successional forest over the new 2B M.A. They would delay the desired composition by at least another 40-60 years while these stands mature.

A small portion of the NWH Project area would be designated under MA 2C in some alternatives in the Forest Plan Revision. Management Area 2C emphasizes uneven-aged northern hardwood mixed forest where open patches are small and do not normally break up large patches of northern hardwoods. The harvests that would cause temporary openings proposed in the Northwest Howell project are generally outside of the large hardwood patches or are the edge of those patches. Very few are within those large
patches and would not cause the break up of those large hardwood areas.

3.2 BIOLOGICAL DIVERSITY

Biodiversity is the variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms including their relative complexity at spatial scales or various levels.

There are commonly five levels of biodiversity:

- Genetic level
- Species level
- Community or ecosystem level
- Landscape level
- Regional level

Each level of diversity has three components: (a) compositional diversity or the number of parts or elements within a system (e.g. number of species); (b) structural diversity or the variety of patterns or organizations within a system (e.g. habitat structure); and (c) functional diversity or the number of ecological processes within a

system (e.g. natural disturbance regimes, nutrient cycling, and energy flows). Each component of diversity operates at multiple scales and no component can be maintained without the other components (Crow et al. 1994).

For the purposes of this EIS, four elements of biological diversity will be analyzed including: landscape pattern (emphasizing interior forest and edge), patch size, coarse woody debris, and non-native invasive species.

Landscape Pattern (Interior Forest – Edge)
"Landscape pattern" is the term most commonly used to describe the arrangement of species and communities in a natural setting. A landscape is an area of land with clusters of interacting ecosystems (Forman and Godron 1986, p. 594). It is larger than a stand of trees and smaller than a region. Landscapes have three structural levels: (a)matrix, which is the most connected portion of similar vegetation within the landscape; (b) patches (analyzed at stand level) which are isolated portions of similar vegetation within the matrix; and (c) corridors which are relatively narrow areas which connect patches (Diaz and Apostol 1992). The discussion of landscape pattern will focus on interior forest conditions and edge habitat conditions.

Coarse Woody Debris
Coarse woody debris, which includes snags and down logs, provides some of the structural diversity that is important both in terms of ecological processes and wildlife habitat. Dead, dying, and down logs and woody debris provide critical habitat for a variety of vertebrates, many invertebrates, and fungi. Coarse woody debris provides important microsites for seedling establishment of yellow birch, hemlock, and other tree species (Crow et al. 1994). More coarse woody debris in a forest stand increases the structural complexity of the stand.

Non-Native Invasive Species
Non-native invasive species (NNIS) are plant species that are not native to the Northwest Howell area and are so aggressively invasive that they pose a threat to existing native species and natural communities.

3.2.1 Methodology

For the purposes of this discussion, a GIS model developed by the U.S. Forest Service will be used to analyze the landscape pattern of the Northwest Howell project area. Several assumptions are built into the model including:

- All non-forested vegetation types create edge (forest types 97, 98, 99)
- All seedling/sapling and poorly-stocked pole-sized stands create edge (size/density 0-4)
- The depth of edge influence extends 100 meters into the adjacent forested stand
- Due to their wider corridors, A, B, and C traffic level roads create edge
- The depth of edge influence extends to 100 meters on either side of a TSL A, B, C road

3.2.1.1 MEASUREMENT INDICATORS

Measurement indicators relating to aspen habitat are discussed in section 3.1. Measurement indicators relating to deer browse are discussed in section 3.3 and indicators relating to roads are in section 3.7.

The GIS model generates maps and a variety of data for use in analyzing landscape patterns. Alternative maps showing interior habitat and edge producing stands are available in Appendix B. The primary indicators used for this analysis include:

- Acres of interior habitat
- Acres of edge affected habitat
- Miles of edge
- Size of interior forest patches
- Edge/interior ratio (miles/acres)

3.2.2 Existing Condition

Like all of northern Wisconsin, the Northwest Howell project area is recovering from the logging and burn during the 1800's and early 1900's as discussed in Section 3.1. Second growth hardwoods and increased amounts of early successional forests have replaced

the mature and old growth hemlock/hardwoods that were dominant in pre-settlement times.

Today's forests are dominated by deciduous species, and some of the longer-lived conifers such as hemlock and white pine are greatly reduced in numbers (Chequamegon-Nicolet NF 1999). Following pre-settlement times, hardwood stands experienced a loss of coarse woody debris, structural complexity, and an increase in early successional species, fragmentation, and edge.

Aspen acreage peaked in the 1930's following the cutover and has since declined in abundance, although it remains higher than pre-settlement levels (Cleland et al. 2001).

Invasive species, pine plantations, and roads, not present in pre-settlement times, are now found in the project area. Edge species are more common than during pre-settlement times and Forest Plan direction tends to maintain edge habitat (Chequamegon-Nicolet NF 1999).

Landscape Pattern (Interior Forest – Edge – Patch Size)

When compared to pre-settlement times, the Northwest Howell project area currently has a landscape pattern in which small patches dominate, large patches and interior conditions are lacking, and some patch types, such as old growth, are isolated. Once common ecosystems and once dominant species (e.g., hemlock) have become rare, while previously uncommon species (e.g., aspen) are now commonplace. This overall existing condition is dissimilar with the historical range of natural variability for both landscape structure (size and distribution of patches) and composition (mix of forest types and successional stages) (Chequamegon-Nicolet NF 1999).

The Forest Plan has no specific goals or objectives for patch size or interior forest, but the Plan does have an old growth objective of 5% of upland stands. The Nicolet NF currently has 6.89% of upland stands designated as old growth. Within the project area, seven ecological reference areas have been identified for possible future designation as Research Natural Areas, Special Management Areas, or old growth. This designation would occur under the Forest Plan Revision. These seven areas are Alvin Creek Headwaters, Huff Creek Hardwoods, Alvin Hemlocks, Brule Creek Red Pines, Wapoose Lakes, Pine River Corridor, and Meadowbrook Pines. These areas would provide an opportunity to contribute future old growth values to the landscape.

Many factors affect the density of white-tailed deer in the project area. In addition to hunter harvest levels, winter severity, disease, and distribution of suitable habitat across the landscape can influence population levels of deer in the project area.

High deer densities can have negative impacts on the reproduction of browse sensitive plant species including hemlock, northern white northern white cedar, Canada yew, and some understory herbaceous species (Alverson et al. 1988, Anderson and Katz 1993, Crow et al. 1994). In some areas, lack of seed source for these species can affect regeneration, as well as periodic events such as drought. Additional discussion of the white-tailed deer population can be found in Section 3.3.

Coarse Woody Debris

Turn of the century logging and subsequent fires removed most of the coarse woody debris from the project area. The second growth forest of the Northwest Howell project area has fewer large diameter trees with cavities and dens, a smaller amount of coarse woody debris, and less complex structure than existed during pre-settlement times. The coarse woody debris present in the project area is composed primarily of much small diameter second growth trees. However, coarse woody debris has been more abundant in recent years due to wind events on the district in 1999 and 2002.

Non-Native Invasive Species

NNIS were not present in the pre-settlement forest of the project area. A few of the more aggressive species of NNIS can now be found scattered throughout the project area including: Swamp thistle (Cirsium palustre), spotted knapweed (Centaurea biebersteinii), and Canada thistle (Cirsium arvense). Many other non-native species are found in the

project area, but the majority of them are not considered invasive.

Roads are the primary pathways for NNIS dispersal, and in the project area most NNIS have not yet spread outside the road corridor. An exception is swamp thistle, which can be found in undisturbed white northern white cedar swamps. Ground disturbance associated with road construction and reconstruction tends to promote the spread of NNIS (USDA Forest Service 2000).

3.2.2.1 Area of Potential Effect

The Northwest Howell Project Area is the primary area that would be affected by the proposed activities. The actual physical activities would take place inside the project area, but landscape scale effects should be considered as part of Northeast Wisconsin and the Upper Peninsula of Michigan.

Landscape Pattern (Interior Forest – Edge – Patch Size)
The landscape pattern in the project area is very similar to adjacent National Forest lands in Wisconsin. As shown in Table 3.1.4-1 82% of non-federal lands within the project area are forested. The pattern changes at the Michigan border along the Brule River, where much of the land is in private ownership and open agricultural fields are common. The predominately forested project area changes rather abruptly to a predominately agricultural landscape at the state border.

Coarse Woody Debris
For the purposes of this report, analysis of potential effects on coarse woody debris will be confined to the Northwest Howell project area.

Non-Native Invasive Species
NNIS are invading the project area from the surrounding landscape. For example, swamp thistle in the project area likely originated in the Upper Peninsula of Michigan (Sheehan, 2002 pers. comm). Analysis of potential effects of NNIS will be considered beyond the project boundaries into Northeast Wisconsin and the Upper Peninsula of Michigan.

3.2.3 Effects on Biological Diversity

Summary
Alternative 1, where no activities are proposed, would not result in any direct changes to landscape pattern, patch size, or coarse woody debris except through natural processes such as wind, fire, insect, or disease events. This alternative would also have the lowest potential for promoting NNIS spread.

Analysis of effects among the action alternatives and action alternatives compared with existing condition indicate small changes in acreage to landscape pattern and patch size. Analysis of the action alternatives indicates that Alternative 3 would cause the least amount of change from the existing condition when compared to alternatives 2 and 4. Alternative 3 maintains the greatest interior habitat acres, largest average interior patch size, and the lowest potential for promoting NNIS spread.

Effects on coarse woody debris among the action alternatives would be very similar to Alternative 1. Coarse woody debris will be rare for many years until existing trees can reach large sizes. Alternatives 1 and 3 would be more beneficial to plant and animal species associated with interior forest habitat and species sensitive to logging activity.

Effects concerning the spread of NNIS would be similar across all the alternatives. A lack of soil disturbance associated with road construction and reconstruction activities may help to keep the spread of NNIS at a low rate.

Among the four alternatives, Alternative 2 and 4 would likely be the most beneficial for plant and animal species associated with early successional habitat as this alternative proposes the largest amount of regeneration harvest.

Table 3.2.3-1 Fragmentation indicators by Alternative
Shown are acres of interior habitat and total miles of edge within the project area. Also shown is the percent change of each indicator from the existing condition (using Alt. 1 as the existing condition).

Alternative	Acres Interior	% Change	Miles Of Edge	% Change
1	18,283	0%	750.134	0%
2	17,797	-2.8%	747.040	-0.4%
3	17,946	-1.9%	750.652	~0%
4	17,497	-4.5%	748.862	-0.2%

Table 3.2.3-2 Interior forest patches by Alternative
Shown are the average patch size, the numbers of patches in each size grouping, and the percent change from the existing condition (using Alt. 1 as the existing condition). Very small interior patches (<10 acres each) are excluded from the calculations. The 10-acre cut off is based on Species Viability Evaluation (SVE) Data developed for the Forest Plan Revision analysis process (USDA Forest Service 2001).

Alternative	Mean patch size (acres)	# Of 10-50 acre patches	# Of 51-100 acre patches	# Of 101-500 acre patches	# Of 501-1000 acre patches	# Of 1001-2000 acre patches
1	172.5	54	16	26	7	3
2	169.4 (-1.8%)	51 (-6%)	16 (0%)	27 (4%)	9 (29%)	2 (-33%)
3	170.9 (-0.9%)	51 (-6%)	16 (0%)	27 (4%)	9 (29%)	2 (-33%)
4	165.1 (-4.5%)	51 (-6%)	18 (13%)	26 (0%)	9 (29%)	2 (-33%)

Table 3.2.3-3 Edge and Interior averages.
Shown are average interior patch perimeter (in miles), and the average interior patch area (in acres) by Alternative.

Alternative	Mean perimeter (miles)	Mean area (acres)
1	3.52	172.48
2	3.49	169.43
3	3.50	170.92
4	3.42	165.07

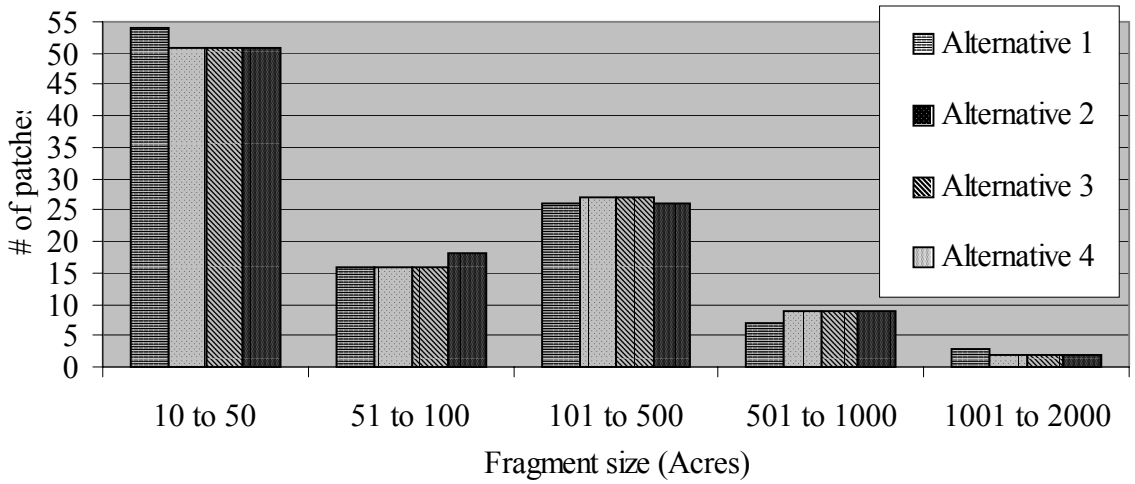
Table 3.2.3-4 Interior forest patches of mature northern hardwoods
Shown are the total acres and the percent change from the existing condition (using Alt. 1 as existing condition)

Alternative	Mature northern hardwoods (total acres)	% Change
1	7656	-
2	7562	-1.2%
3	7586	-0.9%
4	7388	-3.6%

Table 3.2.3-5 Interior forest patches of mature aspen-birch-fir
Shown are the total acres and the percent change from the existing condition (using Alt 1 as existing condition.)

Alternative	Mature aspen – birch – fir (total acres)	% Change
1	731	-
2	685	-6.7%
3	710	-3.0%
4	666	-9.8%

Figure 3.2-1: Interior forest fragments. Shown is the number of patches in each size grouping. Very small interior fragments (<10 acres each) are excluded from the calculations based on SVE recommendations.



3.2.3.1 DIRECT AND INDIRECT EFFECTS ON BIOLOGICAL DIVERSITY FOR ALTERNATIVE 1

Landscape Pattern (Interior Forest – Edge)
Alternative 1, where no activities are proposed, would not result in any direct changes to landscape pattern except through natural processes such as wind, fire, insect, or disease events. In the short-term, no additional open or early seral habitats would be created, and mature aspen stands would convert to longer-lived hardwoods via natural succession. Road densities would not be reduced by decommissioning and ground-disturbing activities would primarily be limited to road maintenance such as grading and culvert repair. The amount of edge would not change except as past regeneration harvests continue to mature and blend with adjacent mature stands. For example, an aspen clearcut surrounded by mature forest will eventually mature and blend with the adjacent forest, and thus reduce the amount of edge. Over the long-term the amount of interior habitat would increase as early seral forests continue to mature.

Plant species sensitive to deer browse would continue to be negatively impacted, until browse pressure is reduced. Anderson and Katz (1993) found that in northern Wisconsin, hemlock stands may need up to 70 years to achieve an all-aged forest size class distribution following the removal of deer browse pressure.

Alternative 1 would not increase the amount of early successional habitat for plant and animal species associated with such habitat. As a result, plant and animal species associated with such habitat may be negatively impacted. Over time, the amount of interior forest habitat would increase as early successional stands mature, which in turn would benefit plant and animal species associated with interior forest habitat.

Patch Size
Over the short-term, patch sizes and configurations in the project area would not change. Over the long-term, interior patches would increase in size as early successional patches mature and become part of existing interior patches.

Coarse Woody Debris
Amounts of coarse woody debris would increase slowly over time as trees die and fall, or are blown down by wind events. A lack of large trees in the existing second growth forest means that large coarse woody debris would be rare for many years until existing trees grow to large sizes.

Non-Native Invasive Species
Existing populations of NNIS would likely continue to spread through natural dispersal processes and with vehicle assistance along roadways. A lack of soil disturbance associated with road construction and reconstruction activities may help to keep the spread of NNIS at a low rate.

3.2.3.2 Direct and Indirect Effects on Biological Diversity for Alternatives 2, 3, and 4

Landscape Pattern (Interior Forest – Edge)
Each of the three action alternatives has the effect of reducing interior forest habitat from the existing condition. As shown in Table 3.2.3-1, reduction of interior forest acres has a range of 786 acres in Alt. 4, 486 acres in Alt. 2, and 337 acres in Alt. 3. The difference in "miles of edge" among alternatives is fairly small at less than 0.5%.

Among all three action alternatives, interior patch size and numbers of patches does not change greatly from the existing condition, although one patch greater than 1000 acres is broken into two patches less than 1000 acres(Table 3.2.3-2).

Over the long term, as in Alternative 1, the amount of edge in all three-action alternatives would decline as past and proposed regeneration harvests would continue to mature and blend with adjacent mature stands.

Alternatives 2 and 4 would reduce interior habitat acres by 2.8 and 4.5 percent and reduce the amount of edge by approximately 3 and 1.2 miles respectively. These changes would primarily be a result of the approximately 500 (alt. 2) and 1000 (alt. 4) acres of regeneration harvests for aspen and jack pine.

Miles of edge are reduced slightly due to the existing clearcuts, with a high amount of edge, are consolidated with proposed clearcuts. In other areas, miles of edge may increase due to road construction and clearcuts in interior areas.

Regeneration harvests in this alternative would increase the amount of early successional habitat for the benefit of species that depend on such habitat (see section 3.3.3 Therefore alternative 4 would have more negative impacts on species dependent on interior forest habitat than alternative 3 or alternative 2. Effects of alternative 2 would fall between alternative 3 and 4.

Alternative 3 has the smallest reduction of interior forest habitat at about 2% but increases the amount of edge, though there is very little change from existing condition (+.518 miles). The changes would primarily be a result of the 115 acres of jack pine regeneration harvests. No aspen regeneration or road construction is proposed in this alternative in an attempt to maintain the largest amount of interior habitat, and to reduce habitat available for deer. Actions reducing available suitable deer habitat may help contribute to a reduction in the deer herd in the project area, which would lessen the pressure on browse sensitive plant species.

In this alternative, wildlife and plant species associated with interior forest habitat would be least affected when compared to the other two action alternatives. The Regional Forester's list of Sensitive Species that are found in the project area, are associated with interior forest habitats (see section 3.3.3).

Patch Size
Tables 3.2.3-1 through 3.2.3-5 include a variety of data related to interior forest patches for each alternative. Each of the three action alternatives has the effect of reducing the average size of interior forest patches from the existing condition. As shown in Table 3.2.3-2, the reduction in average interior patch size would range from 0.9% to 4.5%. The existing condition has three interior patches of 1000 acres or more, and each of the alternatives breaks one of

those large patches into two patches of less than 1000 acres each.

Alternative 3 maintains the largest average interior patch size and has the smallest edge/interior ratio, which means Alternative 3 maintains the most interior habitat per unit of edge as shown in Table 3.2.3-3. Alternative 2 follows with the second smallest interior patch size and edge/interior ratio. Alternative 4 has the smallest average interior patch size and largest edge/interior ratio.

As with other indicators, Alternative 2 falls in the middle of Alternatives 3 and 4 having approximately 2% of reduction in average interior patch size. As shown in Tables 3.2.3-4 and 3.2.3-5, the mature northern hardwood type would decline by 1.2% from existing acreage and the mature aspen/birch/fir type would decline by 6.7%.

The interior, edge, and patch analysis numbers, combined, all place Alternative 3 closest to the existing condition though miles of edge slightly increases from existing condition. Average patch size would be reduced about 1%, mature northern hardwood acres would decline about 1%, and mature aspen/birch/fir would decline about 3%.

In Alternative 4, average interior patch size would decline by 4.5%, mature northern hardwood type would decline by 3.6%, and mature aspen/birch/fir type would decline by nearly 10.0%.

Coarse Woody Debris
Effects on coarse woody debris among the action alternatives would be very similar to Alternative 1. The current lack of large trees in the existing second growth forest means that large coarse woody debris will be rare for many years until existing trees can reach large sizes. Proposed selection harvests can help to increase tree growth, enabling trees to reach larger size classes more quickly. In general the amount of coarse woody debris would increase slowly over time as trees die and fall, or are blown down by wind events.

Design features and mitigation measures relating to the maintenance of coarse woody debris in stands are included in Chapter 2 (Section 2.6).

- In all treated stands, individual trees and/or clumps of trees would be retained – for structure, future den trees, and future coarse woody debris. These retaining efforts would be coordinated with the wildlife biologist.

- All hemlock, super canopy white pine, and northern white cedar would be retained – Unless necessary for access and safety considerations

Non-Native Invasive Species
As described in Alternative1, NNIS can spread in the project area even in the absence of active management. Roadways are the primary corridors for NNIS spread in the Northwest Howell project area, and all three-action alternatives include some degree of ground disturbing activities involving roads. Haul roads have been shown to be the primary conduit for the dispersal of introduced species into the interior of managed stands (Buckley et al. 2002).

Alternative 3 has the smallest amount of road building activities and consequently should provide the fewest opportunities for NNIS dispersal and establishment. Alternatives 2 and 4 have nearly identical road building activities and would both provide more opportunities for NNIS dispersal and establishment.

As shown in Section 3.7, Alternatives 2 and 4 have identical amounts of road construction and reconstruction, and Alternative. 2 has slightly more miles of road decommissioning than Alternative 4. Alternative 3 proposes no road construction, less reconstruction, and more than twice the amount of decommissioning than Alternative 2 or 4.

Road construction and reconstruction activities involve both soil disturbance, and filling with gravel from local gravel sources. Soil disturbance can create a substrate favorable for establishment of NNIS, and gravel hauled from local gravel sources has a very high likelihood of contamination with NNIS seeds. The combination of soil

disturbance and contaminated gravel can contribute to increased spread of NNIS.

NNIS can also spread via other methods such as mud on the undercarriage of vehicles, seeds attached to the fur of an animal such as deer or horses, or in the case of swamp thistle, seeds carried and dropped by birds.

Design features would be implemented as part of an effort to prevent or reduce the spread of NNIS. These measures include:

- Monitor gravel sources (pit) if possible before use in the project area to determine if there is contamination by NNIS

- Where fill is used in stands considered high risk for the types of invasive found in the pit, monitor annually for a minimum of 3 years to determine if NNIS plants become established following harvest activity. Weeds will be addressed with appropriate removal method available at that time.

- Minimize soil disturbance to the extent practical, consistent with the project objectives.

- Revegetate with native and desirable non-native species to quickly establish cover

- Provide awareness sessions for timber sale contractors, at the pre-work session, provide ID booklets.

3.2.3.3 Cumulative Effects on Biological Diversity of All Alternatives

Summary

In the long term, (greater than 10 years) the cumulative effects of all actions in the project area are likely to continue to follow the trend of past actions. Hardwood forests will continue to mature while supporting timber harvest, and scattered temporary openings will be created by regeneration harvests. Road closures and new road construction would likely decrease as the road system is fully developed to meet management needs.

In the short term, (less than 10 years) Alternatives 2 and 4 would cause the greatest change to the existing landscape pattern. Regeneration harvests would work to reduce the acreage of interior habitat and increase the acreage of edge-affected early successional habitat. Alternative 3 would cause the least amount of change to the existing landscape pattern on Federal lands as it has the smallest amount of proposed regeneration harvests.

Private lands will likely continue recent trends of development as large parcels are broken into smaller lots for rural home development and associated road construction. Lakeshore property will continue to be under the greatest development pressure and many private lakes may lose remaining natural shoreline.

Past Actions

Past actions have greatly influenced the current landscape patterns in the project area. Turn of the century logging and fires removed nearly all the primary forest in the project area. Narrow gauge railroad networks were constructed to remove the original timber, and many of these railroad corridors are still visible on the landscape or are part of the current road network. The cutover forest in the project area has since regenerated to “second growth” forest. In addition, conifer plantations were established by the CCC (50 to 70 years ago) and the Forest Service (1960’s and 70’s). A more complete discussion on the harvest history of the project area can be found in Section 3.1.

In general, forest types and landscape patterns on private properties within and adjacent to the project area are a continuation of those found on federal lands. An exception is to the north of the project area in Michigan, where private lands have been maintained open for agriculture. These open lands are a break in the more continuous forest found further north in the Upper Peninsula.

Since pre-settlement times, the landscape of the project area has been exposed to dramatic changes in disturbance patterns including logging, agriculture, and fire. Patch size has declined due to increased fragmentation and edge. Aspen has a much greater representation on the landscape, Coarse Woody Debris has greatly declined

in abundance, and NNIS have been introduced to the landscape.

Present and Future Actions
Currently the Forest Service is implementing the Red Pine EA and the Elvoy Brule EA in the project area. Activities such as, timber harvest, road construction and maintenance, and stream habitat work are included in these projects and are likely to take place again in the future.

Development pressure on private lands is likely to continue, especially on lakefront property. According to the Wisconsin Department of Natural Resources, using the current development trend, all undeveloped lakes in Wisconsin not in public ownership could be developed within 20 years (WDNR 2002).

Private ownership is likely to continue the pattern of larger forested tracts being parceled off into smaller and smaller lots for residential development. Such development involves forest clearing for homes and road building, which are permanent fragmentation features. NNIS dispersal may be enhanced in these areas due to increased road traffic and off road vehicle use. Along with increasing development for seasonal homes, such private lands generally see a decrease in active forest management and a subsequent decline in timber products coming from private lands.

Not all non-federal lands in the project area are under the threat of development. As discussed in Section 3.1.4, 25% of the non-federal lands are owned by the State of Wisconsin and managed by the Board of Commissioners of Public Lands. These lands are managed in a manner similar to those proposed in Alternative 3 of the project. Interior forest habitat on these State lands blends well with interior forest habitat on adjacent Forest Service lands.

3.3 WILDLIFE AND FISH INCLUDING FEDERALLY ENDANGERED, THREATENED AND REGIONAL FORESTER'S SENSITIVE SPECIES

3.3.1 General Introduction

This section describes the existing condition and potential project related effects on wildlife, fisheries, and aquatic resources. General effects of management activities affecting the fish and wildlife resources are described in the Nicolet Forest Plan FEIS on pages 4-107 and 4-108; and riparian area effects are described on page 4-106.

In an attempt to reduce document size, considering the large number of species analyzed, various tables are utilized and appendices referenced.

Wildlife in general is briefly reviewed below by describing potential effects on selected Management Indicator Species (MIS), and in more detail in a document entitled "Monitoring Methods and Wildlife Population Trend Data", located in the Project File. Table 3.3.2.1-1 provides a quick review of the selected MIS to be used in describing potential effects specific to this project. The potential long and short term effects to the MIS species are discussed under section

Federally endangered and threatened wildlife are also described in this section.

Regional Forester's Sensitive Species (RFSS) are discussed in detail in the Biological Evaluation (BE) with a summary of findings and effects described in Section 3.3.1.1. Appendix H includes a comprehensive list of RFSS animals and plants, including fish, invertebrates, and insects that are known to occur or could potentially occur in the NWH Project Area. Table 3.3.2.3-1 and 3.3.2.3-2 provide a list of the RFSS and RFSS "Likely to Occur" that are known to occur or have a high probability of occurring in the project area.

A summary of the fisheries and aquatic resources on the NWHPA is provided in Tables 3.5.2.1-1 and 3.5.2.1-2

The analysis discussed below considered the most up to date sources of information available, which included contact with various species experts, recent literature reviews, and numerous site specific field surveys conducted by USDA Forest Service (FS) professional and technical level biologists, ecologists, and botanists. Additional highly intensive field surveys for songbirds and woodland raptors were conducted under contact often using taped calls for sensitive/reclusive species. The results of the field surveys are maintained in the project file, and summarized in the BE.

3.3.1.1 Issue Measurement Indicators

In order to adequately assess potential effects among the various alternatives, specific issue-based indicators were selected. A summary of issues specifically related to wildlife and plant resources is provided below.

Issue
Lack of management and maintenance of aspen habitat.

Potential effect (concern)
A decline in the aspen forest type and amount of early succession vegetation (typically edge habitat) will have a negative affect on species dependent on this forest type. Species of concern include white-tailed deer, ruffed grouse, chestnut-sided warbler and other Neotropical migratory birds. The potential affect would be fewer numbers of these species with a corresponding decline in hunter success ratios specifically for both deer and grouse.

Measurement indicator
This issue is addressed by providing a comparison of aspen and edge habitat across all alternatives as compared to the existing condition. The aspen component is analyzed by providing a summary of aspen acreage by age class (Table 3.1.2-5). Edge habitat, on the other hand, is analyzed by comparing the number of miles of edge across alternatives in relation to patch size (Tables 3.2.3-1 and 3.2.3-2

Issue
Harvest activities would provide additional browse for deer which could increase the carry capacity of the project area for deer.

Potential effect
High numbers of deer are inhibiting the natural or artificial regeneration of various trees, shrubs, and forbs, including sensitive species, by repeated browsing. Species such as yellow birch, northern white northern white cedar, eastern hemlock, red oak, and basswood, among others, are already greatly under-represented across much of the northern forest landscape. Many of these species are favored forage for deer and other wildlife, and species such as hemlock and northern white cedar provide critical thermal cover for deer in winter.

Measurement indicator
Amount of harvest and amount of edge by alternative.

Issue
Road construction and improvement may cause the loss or decline of interior forest habitat. Road construction and improvement, as well as certain harvest treatments, especially clear-cut harvest, can fragment interior forest habitat and may negatively affect animal and plant habitat through disturbance and loss of quality habitat.

Potential effect
Timber harvest, and road construction, maintenance and use often result in a change in forest structure. Potential effects include changes in soil conditions, especially increased compaction, or changes in moisture/temperature gradients, noise disturbance, increased edge especially the creation of edge corridors, and the transmission and spread of nonnative invasive exotic plant species.

The affect on wildlife and plant habitat is variable but could include changed use patterns such as habitat avoidance, displacement or abandonment; increased competition (for both plants and animals); and the loss of or reduction in quality of remote refuge areas favored by forest interior species.

Measurement indicator
Indicators for the effects described above include a comparison by alternative of; road density as expressed in miles of road per square mile of land area; forest patch size by forest type as well as the amount of interior forest habitat; and the miles of edge created by the various treatments.

3.3.2 Wildlife, Fisheries, and TES Existing Condition

The vegetative composition within the NWH Project Area consists of forest habitat types found throughout northern Wisconsin. Generally, the vegetative cover consists of pole and mature size northern hardwood, and regenerating through mature aged aspen, paper birch, balsam fir, red pine, and jack pine. Scattered super canopy red and white pine as well as occasional small stands of mature red oak are also found across the project area. Non-forest habitat typical of the area includes small grassy openings, sedge meadows, bogs, and wetlands of various types. These characteristics in turn support a wide variety of animal and plant life.

The animal community within the project area is typical of most of northern Wisconsin, supporting white-tailed deer, bear, coyote, bobcat, fisher, red fox, beaver, otter, and a whole host of other small mammals, birds, reptiles, amphibians, insects and fish. Species less commonly seen include American pine marten, timber wolf, badger, (rarely) moose, Connecticut warbler and black-backed woodpecker.

Habitat within the project area is mostly undeveloped which greatly enhances opportunities for many of the above-mentioned species to exist here.

The various forest types also create conditions suitable for supporting a wide variety of plant life. According to Nicolet National Forest Wildlife Documents (Rinaldi 1986, p. 36) approximately 1,000 species of plants are thought to occur on the forest, but not all of these would occur in the project area.

3.3.2.1 EXISTING CONDITION WILDLIFE

Management Indicator Species (MIS)
Every action affecting forest vegetation or water resources affects fish and/or wildlife. Management Indicator Species (MIS) were identified in the Nicolet National Forest during the Forest planning process to determine the potential effects of forest management activities (FEIS pp. 3-33 through 3-37).

A document entitled “Monitoring Methods and Wildlife Population Trend Data” (herein referred to as Monitoring Methods document) is included in the Project File. This document summarizes data for all key MIS identified in this DEIS.

MIS Selected for Analysis
Key MIS were selected for analysis in this DEIS that would be expected to show a response to activities proposed in the Project Area. Reasons for selecting these indicator species are given by species below. Table 3.3.2.1-1 summarizes the affects to MIS along with estimated population levels of these species. Methods used to determine population levels and monitoring techniques are discussed for each species in the Monitoring Methods document in the Project File

White-tailed Deer –The white-tailed deer is a habitat generalist and highly regarded game species. It represents all wildlife species that use a variety of habitats and species that use edge or other disturbed habitats. Alternatives may demonstrate changes in habitat quality to this species and its associates.

Bobcat –This species occurs in suitable, mostly remote habitat throughout the project area, is highly secretive, typically occupies a large territory, and is sensitive to human disturbance. The project area is large and has a variable road density as well as a moderate to high human disturbance level. This species will be used to evaluate disturbance among the alternatives, as determined by open road density and amount of remote, mostly lowland conifer habitat. Although the number of individuals is few (see Table 3.3.2.1-1).

Red-eyed Vireo - Selected - Alternatives vary in the amount of hardwood habitat available to this species and its associates.

Black-throated Green Warbler - Alternatives may demonstrate changes to this species or its associates, especially in mixed upland conifer habitat.

Ovenbird - A limited amount of long rotation habitat is present in the project area. Alternatives may demonstrate changes to this species or its associates.

Chestnut-sided Warbler - Regenerating deciduous habitat could develop as a result of both hardwood and aspen timber harvest. The potential affects related to the amount of regenerating aspen habitat are also compared under ruffed grouse.

Blackburnian Warbler - Hemlock, the primary habitat type associated with this species, would not be harvested under any of the proposed alternatives, but harvest treatments could potentially affect this species and its habitat both positively and negatively.

Pine Warbler – The amount of conifer habitat varies by alternative and would be expected to show changes to this species and its associates.

Barred Owl - Target habitat for this species is large cavity trees, which are present across the northern hardwood forest within the project area. Management guidelines would protect potential cavity trees in all alternatives, but proposed treatments could still affect the habitat of this MIS.

Ruffed Grouse –The amount of preferred habitat (aspen) varies by alternative and would be expected to show changes to this species and its associates.

Table 3.3.2.1-1. Estimated Population Levels and Habitat availability of selected MIS

Project Management Indicator Species	Representative Habitat Type	Existing Habitat in Project Area. Acres or Miles	Population Estimate in Project Area - Individuals	Mean Territory Size/Individual
White-tailed deer	Total forest (upland component)	43,639 acres (federal lands only)	1,600	40-640 ac.
Bobcat	Lowland/swamp conifer, riparian forest w/low road density, low level of disturbance	8,798 ac.	8-10	8-25 sq./mi.
Red-eyed vireo [1]	Hardwood stands including aspen	18,616 ac.	18,616	1 ac.
Black-throated green warbler [1]	Mixed upland conifer/hardwood forest	17,414 ac.	17,414	1 ac.
Ovenbird [1]	Hardwood stands including aspen	18,616 ac.	23,270	0.8 ac.
Chestnut-sided warbler [2]	Regenerating deciduous forest	3,777 ac.	6,295	0.6 ac.
Blackburnian warbler [1]	Mature upland and lowland conifer forest	14,177 ac.	14,177	1 ac.
Pine warbler	Mature red, white, and jack pine	3,262 ac.	932	3.5 ac.
Barred owl [1]	Mature mixed hardwood/conifer forest	10,485 ac.	19	565 ac.
Ruffed grouse [2]	Aspen	8,986 ac.	2,696	10-40 ac.

[1] Forest Interior Species, [2] Early Seral Stage Species

3.3.2.2 EXISTING CONDITION FISHERIES AND AQUATICS

The aquatic resources in the NWH project area provide a variety habitat types and thus supports a diversity animals and plants.

The Northwest Howell project area contains 11 named lakes, two shallow water impoundments, and all or portions of 17 streams in addition to several spring ponds (see Tables 3.5.2.1-1 and 3.5.2.2-1).

The two larger lakes, Steven's and Howell offer good recreational opportunities for sport fishing for such species as northern pike, bass, walleye and pan fish.

Steven's Lake is a developed lake, with houses and boat docks visible along the shore. A federally maintained boat ramp and small six-unit campground as well as a private resort are also available at the lake.

The heavily wooded shoreline of Quartz Lake, one of the smaller lakes in the project area, is entirely in federal ownership and has a small campsite with only walk-in access to the lake. No motors are permitted on this 47-acre lake.

Several of the other smaller lakes in the project area also offer fishing opportunities, while others are lakes that typically undergo winter-kill (loss of dissolved oxygen during the winter months or occasionally during summer as well), and would therefore not support a "sport-fish" fishery. Winter-killed lakes contain no fish, stunted fish, or only minnow species that are highly tolerant of low oxygen levels.

Lakes and ponds that contain no or very low densities of fish serve to provide excellent habitat for reptiles, amphibians and a variety of insects, thus adding to the overall species diversity of the Chequamegon-Nicolet National Forest.

Shoreline habitat along most of the lakes and the two impoundments is mostly natural, and provides excellent riparian conditions for songbirds, ducks, and various other aquatic animals and plants.

However, near-shore old-forest habitat on most of the lakes has been altered such that most of the larger trees were removed during the logging era of the early 19th century resulting in a serious lack of structure that would naturally occur along lake edges and extending out into the lake.

Trees that fall into lakes provide excellent structural complexity both above and below the waterline. These areas are important in providing waterfowl, fish, reptile, amphibians and insects with sites for feeding, nesting, resting and hiding.

Stream habitat conditions range from good quality Class I, coldwater "trout" streams to beaver impacted warm water systems. Generally, most streams in the project are low gradient, narrow, shallow and have clear water. Bottom substrate ranges from gravel hard-bottom to sand or silt over sand.

Lake and stream habitat improvements implemented over the last 10-15 years have included channel restoration work on Allen, Alvin, Brule, and Elvoy Creeks, and placement of log cover and nesting structures on Quartz Lake.

The two impoundments, West Allen Creek and Alvin Creek were constructed around 1988 or 1989, primarily for eagle and osprey habitat, but because they are unable to support a fishery, they have since been managed as shallow water marsh habitat. Presently, these marshes support nesting ducks and geese, numerous songbirds, sandhill cranes, otter, muskrat, and beaver, as well as reptiles and amphibians.

Both impoundments are actively managed by implementing occasional "draw-downs" and using prescribed fire to control cattails and other emergent aquatic vegetation. This is done in order to maintain a desirable ratio of open water to emergent vegetation most favorable for a variety of wetland species.

3.3.2.3 Existing Condition Threatened, Endangered, and Regional Forester's Sensitive Species

Threatened and Endangered Species

Gray Wolf The entire Eagle River-Florence District is considered primary wolf habitat according to the Wisconsin Wolf Management Plan (Wisconsin Wolf Management Plan, p. 14, 1999), and each year, wolves are reported in the project area. A breeding population of wolves, however, has not been confirmed to date on the Nicolet portion of the Chequamegon-Nicolet National Forest.

Bald Eagle - Presently, bald eagles occupy most of the habitat available to them. Forest-wide territories occur on most of the larger lakes, and many of the smaller ones as well. Statewide, numbers have been increasing, with occasional dips in the population. Generally, eagles have been nesting at three sites within the project area. At least two other alternate nesting sites are present as well.

Canadian Lynx - One of the most recent animals listed by the USFWL is the Canadian lynx. Lynx tracks were identified in snow in 1994 near the project area, but field scent-post surveys conducted during fall/winter 1999, 2000, and 2001 indicated no lynx present. Habitat for lynx typically includes areas of thick/dense conifer and deep winter snows.

Habitat in the Northwest Howell project area is not suitable for this species due to insufficient snow depths that allow both bobcat and coyote to out-compete the lynx.

Regional Forester's Sensitive Species
Regional Forester's Sensitive Species (Table 3.3.2.3-1) are wildlife and plant species identified by the Regional Forester for which population viability is a concern (FSM 2600-91-3, p. 13). Appendix H provides a complete listing of all RFSS considered in this evaluation.

The existing conditions for the following RFSS are described in both the BE as well as the Biological Evaluation Reference Document (Project File).

Regional Forester's Sensitive Species Likely to Occur (Table 3.3.2.3-2), are species that have not been verified on the Chequamegon-Nicolet National Forest to date, but have high likelihood of occurrence.

This table displays a summary RFSS known to occur or that have a very high likelihood occurrence within the NWH Project Area. The tables below display a summary RFSS confirmed "C" or with a high probability "P" of occurrence in the project area. The "Status" column describes the global and state ranking of the various species with codes more specifically explained in the BE.

Table 3.3.2.3-1. Regional Forester's Sensitive Species

Species	Common Name	Status	Likelihood of occurrence*	Potential Habitat Y/N
Martes americana	American marten	G5, S3,END	C	Y
Accipiter gentilis	Northern goshawk	G5,S2N,S2S3B,SC	C	Y
Buteo lineatus	Red-shouldered hawk	G5,S1N,S3S4B,ST	C	Y
Catharus ustulatus	Swainson's thrush	G5,S2B,SC	C	Y
Chlidonia niger	Black tern	G4,S3B,SC	C	Y
Cygnus buccinator	Trumpeter swan	G4,S1B,SE	C	Y
Oporornis agilis	Connecticut warbler	G4,S3B,SC	P	Y
Picoides arcticus	Black-backed woodpecker	G5,S2B,SC	C	Y
Clemmys insculpta	Wood turtle	G4,S3,ST	C	Y
Pieris virginiensis	West Virginia white	G4,S2.SC	P	Y
Stylurus scudderi	Zebra clubtail	G3,G4,S3,SC	C	Y
Amerorchis rotundifolia	Round-leaved orchis	G5,S1,ST	P	Y
Asplenium trichomanes-ramosum	Green spleenwort	G4,S1,SE	P	Y
Botrychium minganense	Mingan's moonwort	G4,S2,SC	C	Y
Botrychium mormo	Goblin fern	G3,S2,SE	C	Y
Botrychium oneidense	Blunt-lobed grapefern	G3,S2,SC	C	Y
Botrychium rugulosum	St. Lawrence (Ternate) grapefern	G3,S2,SC	P	Y
Calypso bulbosa	Calypso orchid - Fairy slipper	G5,S2,ST	C	N
Carex assiniboinensis	Assiniboine sedge	G4G5,S2,SC	P	Y
Carex vaginata	Sheathed sedge	G5,S1,SC	P	Y
Ceratophyllum echinatum	Spineless hornwort	G4?,S2,SC	P	Y
Cynoglossum virginianum var. boreale	Northern wild comfrey	G5,(N3)	P	Y
Cypripedium arietinum	Ram's head lady's slipper	G3,S1,ST	P	Y
Dryopteris expansa	Spreading woodfern	G5,S1,SC	P	Y
Epilobium palustre	Marsh willow-herb	G5,S2,SC	P	Y
Malaxis brachypoda	White adder's mouth	G4,S2,SC	P	Y
Oryzopsis canadensis	Canada mountain rice-grass	G5,S1,SC	P	Y
Panax quinquifolius	Ginseng	G4,S4,SC	C	Y
Polystichum braunii	Braun's holly fern	G5,S2,ST	P	Y
Potamogeton confervoides	Algae-like pondweed	G3G4,S1,ST	P	Y
Ranunculus gmelinii	Small yellow water-crowfoot	G5,S1,END	P	Y
Rhynchospora fusca	Brown beak-sedge	G4G5,S2,SC	P	Y
Tiarella cordifolia	Foamflower	G5,S1,SE	P	Y
Valeriana uliginosa	Marsh valerian	G4G5,S1,ST	P	Y

Table 3.3.2.3-2. Regional Forester's Sensitive Species – Likely to Occur.

Species	Common Name	Status	Likelihood of Occurrence	Potential Habitat Y/N
Myotis septentriopnalis	Northern (long-eared) myotis	G4,S4, SC	P	Y
Pipistrellus subflavus	Eastern pipistrelle	G5,S3S4,SC	P	Y

3.3.3 Wildlife, Fisheries, and TES Direct and Indirect Effects

3.3.3.1 EFFECTS TO MIS

Management Indicator Species are used to determine the potential effect to other wildlife species.

Potential short-term and long-term effects on MIS are summarized in for MIS warblers in Tables 3.3.3.1-2a through 3.3.3.1-2c. Potential effects to other MIS are included in the species analysis provided below. Regardless of which alternative is implemented, including Alternative 1, populations of wildlife and plant species known to occur in the project area are expected to remain at viable numbers.

White-tailed Deer

Deer use almost every terrestrial habitat on the forest to some degree as well as edges of wetlands. Conditions that promote and maintain an abundance of grasses and small stem woody vegetation will favor deer.

Within the NWH project area, the best habitat would include wildlife openings, road edge, and recent areas of timber harvest, especially aspen clear-cut areas.

Additionally, white-tailed deer require large areas of thermal cover interspersed across the landscape. The need for thermal cover varies from year to year, becoming a critical need during long harsh winters, but less critical during milder winters.

Within the Northwest Howell project area, there are no major dense areas of conifer that provide critical winter thermal cover, although many smaller pockets are present. The smaller areas are typically along stream courses, or other wetland associated areas that support such species as white northern white cedar and hemlock.

In addition to their role as indicators of edge and disturbed habitats, white-tailed deer can have a substantial effect on vegetation. Studies have shown that deer dramatically alter vegetation in an area when deer populations are high Balgooyen and Waller 1995, Augustine and Frelich 1998, Alverson et al 1988.

As mentioned above, deer require a large amount of vegetation as forage, although the amount of woody vegetation (browse) varies by season and availability. According to French (1955), in Chapman and Feldhamer (1982, pg. 885), the energy requirement for a 150 lbs deer is about 6.5-7.5 lbs of forage/day.

Depending on the season, the amount of forage required would not necessarily be comprised of woody vegetation. However, preferred species, which often include basswood, Canada yew, eastern hemlock, white northern white cedar, red oak, and numerous herbaceous plants. These plants can be heavily impacted in areas where deer concentrate, such as wintering grounds or areas with very high densities due to overpopulation.

Alverson et al (1988) and Balgooyen and Waller (1995) recommend deer densities of less than 10-13 deer/mi^2 to avoid detrimental impacts to individual species and systems.

The Wisconsin DNR monitors deer populations annually through harvest records, summer observation surveys, and other methods. Table 3.3.3.1-1 provides more detailed information on deer including some historic population data by management unit.

Deer populations fluctuate from year to year, primarily in response to the severity of the winter, but also in response to hunting pressure and disease. When deer numbers increase beyond desired levels, the DNR increases hunter harvest incentives, thus limiting herd expansion. Population trend data in relation to changes in winter severity and harvest levels is shown in Table 3.3.3.1-1.

Deer Management Units (DMUs) were established by the WDNR in the mid-1950's to facilitate management of the deer population. The DMUs are linked to post hunting population goals. That is, the desired goal of numbers of deer per square mile of deer range (habitat) is based on what the DMU will biologically and socially support.

The desired goal is calculated in part as a percentage of the overall biological carrying capacity of a specific DMU. For a complete review of the DMU process and biological carrying capacity for Wisconsin deer, see Vander zouwen and Waranke, 1995, pages 52-53 and 61-68.

The project area is included in parts of two Deer Management Units (35 and 39) each having a target over-winter/post harvest goal of not more than 20 deer per square mile of deer range.

Recently, milder winters have allowed deer numbers have stayed at or above DNR post harvest goals.

Table 3.3.3.1-1 Deer population trends by WDNR Management Unit in relation to timber harvest and winter severity over time. Numbers of deer are expressed as individuals by Management Units. Management Units 35, 39 and 40 encompass the Eagle River-Florence District. The population levels represent pre-hunt harvest. Timber harvest data shows Forest Service harvesting levels for the Eagle River-Florence District. See Appendix B for a map of Deer Management Units.

Year	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
Deer Unit 35	12,888	11,601	10,423	14,988	21,947	13,302	13,686	22,058	23,391	18,786	18,410
Deer Unit 39	13,703	10,437	9,093	12,506	19,194	8,767	6,699	10,836	12,223	14,477	10,054
Deer Unit 40 [1/]	13,168	11,366	14,151	10,838	20,320	8,700	5,624	10,374	11,375	13,253	9,639
Thinning/Selection /Removal Harvest (ac.)	4,747	6,562	6,327	5,117	4,399	3,734	3,133	3,356	2,796	1433	2152
Clearcut Harvest (ac.)	694	943	736	320	200	322	246	279	109	118	468
Total Timber Harvest (ac.)	5,441	7,505	7,063	5,437	4,599	4,056	3,379	3,635	2,905	1551	2620
Winter Severity Index –Florence Co.	50	43	48	32	127	116	16	44	33	56	12

1/ Deer Unit 40 is NOT located within the NWH Project Area

Effects of Alternative 1 on white tailed Deer
Alternative 1 would not alter deer habitat directly. Indirectly, it would not regenerate aspen forest to replace the saplings that are becoming trees and are no longer forage, nor would other new forage areas be developed.

Under this alternative other harvest treatments that typically provide good winter forage, mostly by promoting new tree growth, would not occur on federal lands within the project area.

Permanent openings would not be maintained and some would gradually revert to forest, but much of the existing edge associated with roads and trails, including closed roads, would remain and continue to provide good summer forage.

Thermal cover would remain as it is. If this alternative were selected, deer numbers would likely be easier to manage at or near goal the DNR goal of 20 deer/mi^2 and would not be as likely to expand much beyond the DNR over-winter goals.

However, deer numbers would still remain at a density that is well above the 10-13 per square mile suggested by some ecologists as necessary for allowing the natural regeneration of browse sensitive species identified above.

Effects of Alternative 2-4 on White-tailed Deer
While timber harvesting would produce biomass available for deer browse, there is not a direct correlation to herd size (see Table 3.3.3.1-1. Other conditions including winter severity, DNR population goals and hunting pressure are major factors in deer herd size.

The DNR maintains the deer herd size at a density of 20 deer/mi^2 in the deer management units which encompass the project area. This goal herd size is well above the 10-13 deer/mi^2 upper limit ecologists suggest for deer densities to allow for regeneration of browse sensitive

species. Therefore, unless the DNR deer herd size goals are adjusted, the deer population will likely continue to remain at a high enough level to limit natural regeneration of browse sensitive species regardless of the amount of browse produced by this project.

Under action alternatives 2-4**,** suitable habitat would be altered, with each alternative providing more potential browse as compared to Alternative 1. Among the three action alternatives, Alternatives 4 and 2 provide the greatest amount of browse because a greater amount of early successional habitat is created. Alternative 3 provides the least, relative to Alternatives 2 and 4, but still provides an ample amount of early successional habitat.

Compared to the other alternatives, Alternative 4 provides the greatest amount of longer lasting early successional conditions most favored by this MIS since a variety of forest types are clearcut, including northern hardwoods and greater amounts of aspen, paper birch and balsam fir.

Under Alternatives 2-4, 102 acres of mature mixed jack pine, red pine-red oak forest are proposed for removal harvest. This area is mostly within the one-quarter mile wide Pine River Corridor, but for the most part, only the jack pine would be thinned. This area would then be allowed to convert to a mixed red pine/oak forest that also maintains a component of white pine and balsam fir.

This type of habitat would provide better conditions for this MIS than does the existing over-mature and densely stocked jack pine forest.

Also under each of the three action alternatives, under-story planting of white pine, oak and white spruce is proposed in both treated and untreated stands. The long-term benefit of these plantings would improve habitat for white-tailed deer by providing additional thermal cover (conifer planting), and mast in the form of acorns.

Thinning of the jack pine/oak forest would also reduce competition for growing space and encourage better growth, healthier crowns, and promote increased mast production on released oak trees.

Alternatives 2-4 would each increase the amount of edge habitat as compared to Alternative 1. Table 3.2.3-1 displays the estimated amount of edge by alternative.

Permanent edge would continue to be provided along existing and newly constructed roads as well as in wildlife openings proposed for maintenance. Some edge conditions would be short-term, such as where harvest treatments are implemented, and over time would once again become reforested. Edge conditions would vary from year to year, depending on when a harvest, primarily clear-cut or shelterwood harvest occurred.

Under Alternatives 2-4, there would be no direct effect on “deer yard” habitat. Indirectly, maintaining consistently high numbers of deer for long periods of time could result in no new areas of dense conifer habitat being established, while at the same time, existing thermal cover could continue to deteriorate due to over-browsing and natural aging.

Fencing natural or artificially regenerated conifer, especially white northern white cedar and hemlock areas, in order to exclude deer, would mitigate some of the browsing effects but the excessive cost of fencing precludes all potential sites from being protected using this method.

Fencing would also provide a means of maintaining vegetative diversity, since the fenced areas would protect all plant species favored by deer.

Red-eyed Vireo, Black-throated Green Warbler, Ovenbird, and Blackburnian Warbler, Chestnut-sided Warbler, and Pine Warbler

In northern Wisconsin according to Nicolet National Forest breeding bird survey data (Dobiesz, 1998), the red-eyed vireo, black-throated green warbler, ovenbird, and blackburnian warbler are typically found in mature, mostly interior, hardwood to mixed conifer-hardwood forest. They are at times recorded singing at the same sampling point, but each still has a niche it exploits and thus would only occur where habitat is suitable.

The chestnut-sided warbler, on the other hand, prefers regenerating forest, edge conditions and shrub-forest habitat while the pine warbler is more habitat specific preferring mature red and white pine forest.

Generally, both the blackburnian and black-throated green warblers have a close association with conifer or mixed conifer habitat, while the red-eyed vireo and ovenbird can be found in either hardwood or mixed habitat.

Management activities that maintain forest interior conditions such that the tree canopy remains mostly closed (basal areas of 80 square feet or more) will have less impact on these species than activities that result in the loss of mature forest conditions and the creation of edge or early successional conditions.

Generally, selection and improvement harvest (thinnings) treatments will have less impact than clear-cut, shelterwood and removal harvest treatments, with regard to affects on canopy closure and overall basal area.

Other activities such as road construction, or reconstruction could also affect interior habitat conditions if “edge” is created, such as by opening the tree canopy so that tree crowns no longer are contiguous.

Wherever early seral or edge conditions are created, habitat would be improved or maintained for chestnut-sided warblers, while this MIS will avoid the areas preferred by the “interior” species described above. The pine warbler does not appear to avoid edge habitat, and will utilize small groups of mature pine trees in forested areas as well as in mostly open or non-forested areas. Activities that maintain or promote mature pine forest will favor this MIS.

Other potential impacts to these and other spring nesting songbirds, especially neo-tropical migratory birds, would include disturbance during the nesting season directly within the nesting habitat. Reference tables 3.3.3.1-2a through 3.3.3.1-2c. Design features 22,23,28 and 29 would limit timing of harvest activities to minimize disturbance to breeding birds (Section 2.6).

Tables 3.2.3-1, 3.2.3-2 and 3.2.3-4 display the relationship among the four alternatives with respect to miles of edge and various sizes of contiguous forest habitat, or patch size. It is important to note that fewer miles of edge does not necessarily indicate less timber harvest activity, but it may indicate a decline in forest fragmentation.

Typically, numerous small harvest units (specifically those that would create early seral conditions) would tend to create more “edge” than would one or two very large harvest units.

Tables 3.2.3-1 through 3.2.3-5 are provided as an analysis tool useful in describing potential adverse effects or benefits among the four alternatives on the various MIS.

Interior habitat conditions are desirable for certain neotropical migratory birds such as the ones described above because this habitat tends to be avoided by edge-associated predators, or at least, when these predators do occur in the forest interior, they would occur at lower densities.

Because relatively fewer edge-associated predators would occur in the larger blocks or patches of interior forest habitat, conditions would tend to be more secure.

The various interior-associated neotropical migrants would still have to contend with predators more typical of interior forests such as American (pine) marten, and fisher, as well as some species of woodland hawks.

Overall, the number of predators existing in interior habitat would be fewer as compared to the numbers that would occur in an edge-fragmented forest.

Conversely, species such as the chestnut-sided warbler would prefer edge conditions because it nests in shrubby, or regenerating deciduous forests.

Effects to Red-eyed Vireo, Black-throated Green Warbler, Ovenbird, and Blackburnian Warbler, Chestnut-sided Warbler, and Pine Warbler Under Alternative s 1-4

Under Alternative 1, habitat would remain in its current state, which would be beneficial for red-eyed vireo, black-throated green warbler, ovenbird, and blackburnian warbler, because no new habitat disturbing treatments would occur, and no new early successional habitat would be created.

Existing younger aged forest habitat and edge conditions would move toward older forest habitat favoring these interior habitat species. Alternative 1 would likely provide the best conditions for these species relative to the other action alternatives.

Of the remaining three alternatives, Alternative 4 would decrease the number of patches of larger blocks (see Table 3.2.3-2) of mature forest habitat, and create more edge and early succession forest conditions, and convert more of the preferred forest type, namely hardwoods, to non-hardwood, specifically aspen.

Alternative 4 would likely provide the least favorable conditions for these forest interior indicator species.

Alternative 3 would on the other hand provide the best conditions among the action alternatives, because harvest treatments maintain more canopy closure and therefore less edge conditions are created.

Alternative 2 maintains most of the existing contiguous hardwood forest habitat, but also provides for maintaining aspen (early succession habitat) where forest soils and conditions are most suitable.

In considering habitat favorable for those species represented by the chestnut-sided warbler, Alternatives 1 and 3 would be least favorable since little or no regenerating deciduous forest is created, while Alternative 4 would be most favorable and again, Alternative 2 moderately favorable.

Under Alternatives 1 and 3, existing regenerating forest conditions where they do occur, would slowly mature and no longer be suitable for this MIS.

However, the chestnut-sided warbler would still find suitable early successsional habitat along the brushy edges of roads or along naturally occurring edges as well as on private lands where harvest treatments have generated early successional deciduous forest.

In the long-term, the chestnut-sided warbler and its associated species would likely exist at lower numbers under Alternatives 1 and 3 relative to the other action alternatives.

Habitat for the pine warbler would remain the same in the short-term, with little change occurring in the mature pine forest habitat.

Although portions of the NWH project area provide good pine warbler habitat, some areas such as the jack pine area planted in the 1930's along the Pine River would likely deteriorate and may no longer provide suitable habitat for this MIS. This dense jack pine area presently has a mix of mature red and white pine as well as red oak scattered throughout, but the understory is dominated by balsam fir and hazel shrub.

In the very long term, this area may or may not convert to a mixed white pine-red oak forest, but it will likely first convert to balsam fir, which may inhibit white pine and certainly the establishment of red pine.

Thinning the jack pine, as proposed under the Alternatives 2-4 would more easily facilitate the conversion or establishment of this area to a longer-lived mixed red pine and white pine forest that is the preferred habitat of this MIS.

Appendix G provides a detailed analysis of the affects of harvest treatments on these MIS by habitat type. The below Tables provide a summary of these affects.

Table 3.3.3.1-2a. Summary of effects on MIS warblers for Alternative 2 for all habitats combined. Shown are the total acres and the percent change from the existing condition (using Alt 1 as existing condition.)

Alternative 2	Species	Estimated population in the project area in numbers of individuals	Range of numbers of individuals displaced in the short-term	Range of numbers of individuals displaced in the long-term	Range of numbers of individuals colonizing new habitat following clearcut treatment
	Red-eyed Vireo	18,616	0-735	165-703	0
	Black-throated Green Warbler	17,414	0-735	165-703	0
	Ovenbird	23,270	0-919	207-879	0
	Blackburnian Warbler	14,177	0-879	165-703	0
	Pine Warbler	932	0-100	0-33	0
	Chestnut-sided Warbler	6,295	0	0	657

Table 3.3.3.1-2b. Summary of effects on MIS warblers for Alternative 3 for all habitats combined.

Alternative 3	Species	Estimated population in the project area in numbers of individuals	Range of numbers of individuals displaced in the short-term	Range of numbers of individuals displaced in the long-term	Range of numbers of individuals colonizing new habitat following clearcut treatment
	Red-eyed Vireo	18,616	0-84	89-378	0
	Black-throated Green Warbler	17,414	0-84	89-378	0
	Ovenbird	23,270	0-105	111-473	0
	Blackburnian Warbler	14,177	0-84	89-378	0
	Pine Warbler	932	0-136	0-33	0
	Chestnut-sided Warbler	6,295	0	0	0

Table 3.3.3.1-2c. Summary of effects on MIS warblers for Alternative 4 for all habitats combined.

Alternative 4	Species	Estimated population in the project area in numbers of individuals	Range of numbers of individuals displaced in the short-term	Range of numbers of individuals displaced in the long-term	Range of numbers of individuals colonizing new habitat following clearcut treatment
	Red-eyed Vireo	18,616	0- 322	214-910	0
	Black-throated Green Warbler	17,414	0- 322	214-910	0
	Ovenbird	23,270	0- 403	268-1138	0
	Blackburnian Warbler	14,177	0- 322	214-910	0
	Pine Warbler	932	0-136	0-33	0
	Chestnut-sided Warbler	6,295	0	0	1295

Bobcat

This species uses a variety of habitat types, but shows a preference for lowland conifer forest, riparian corridors, regenerating forest (especially aspen), and upland conifer if a dense shrubby under-story is present that is comprised of conifer, especially balsam fir. No low-land forest is proposed for harvest under this project.

Not evident in Table 3.2.3-2, is a measure of the quality of the remote habitat. Ideally, larger areas of preferred habitat, namely lowland conifer with adequate amounts of prey would be better than remote or interior habitat that does not provide prey supporting habitat. Under all alternatives, the largest patches of remote lowland conifer do not change.

When considering all factors combined, conflicts become very evident. Alternative 1 allows little disturbance, but in the long-term would provide little new habitat for maintaining an adequate prey base in the future.

Alternative 4 provides the greatest amount of prey-producing habitat conditions, but also decreases the numbers and size of remote habitat patches, or interior habitat.

Alternative 3 maintains fewer open roads on the landscape, thus maintaining more remote habitat conditions, but does not provide for an abundant prey base for the future.

Alternative 2 reduces the open road density as compared to Alternative 1, yet also provides regenerating forest habitat favorable for bobcat prey, although a lesser amount as compared to Alternative 4.

For the most part, hardwood forests tend to provide low quality habitat for this MIS. The bobcat is also highly secretive usually avoiding areas of high human disturbance, thus from the viewpoint of reproduction, it is probably more successful in remote forest habitat.

The prey of the bobcat includes white-tailed deer, but snowshoe hare and rodents probably comprise the bulk of the bobcat's diet, which is reflected in its choice of habitat preferences as described above.

Potential management impacts or "direct effects" affecting this MIS would include activities that increase disturbance in its preferred habitat, especially remote habitat; activities that result in the reduction in the amount of preferred habitat; or activities that lead to the loss of remote habitat.

Analysis tools useful in determining potential effects on this MIS among the four alternatives include a comparison of open road densities (Table 3.7.3-1), the amount of remote habitat, as displayed by interior habitat patch size (Table 3.2.3-2), and amount of regenerating forest (Table 3.1.2-5), which is important for providing a future prey base for maintaining a healthy bobcat population over time.

Effects to Bobcat under Alternative 1

Under Alternative 1, open road density would remain unchanged at 4.03 and 2.82 miles/sq. mile for Management Areas 1.1-4.1 and 9.2 respectively. Compared to the other action alternatives, the miles per square mile of open road density would be slightly higher (see Table 3.7.3-1) under this Alternative.

Regardless of which alternative is selected, any proposed road closures or "decommissioning" would occur only on Traffic Service Level D roads. The "D" level roads are the lowest standard roads on the forest, and many tend to be very low use most of the year with the exception of during hunting season.

The direct effect on bobcat with respect to Alternative 1 would be a greater likelihood of disturbance caused by forest users into potential bobcat habitat that is, as access improves across the forest, access into potential bobcat habitat becomes easier.

For example, hunting or trapping of bobcat, which is closely regulated under a permit system coordinated by the Wisconsin Department of Natural Resources (WDNR), becomes relatively easier as access improves. Good access allows those bobcat hunters that use dogs as well as those that set traps improved chances of harvest

because they can decrease the time it takes to get to their dogs, or traps.

In other words, more area can be covered in a shorter time period, thus the chance of a successful harvest is increased.

Of special note regarding trapping of bobcat specific to the Chequamegon-Nicolet National Forest, is that both the Chequamegon and Nicolet portions of the forest have designated two large areas that are closed to all dry-land trapping called "Fisher Management Units".

The unit occurring on the Nicolet is comprised of about 120,000 acres and is located west of State Highway 55 to Military Road (FR 2178) and south from Highway 70 to Highway 32. Only a portion, about 12,000 acres, of the 43,000 total acre NWH Project Area falls within the Fisher Management Unit. Bobcat can be hunted, usually with dogs, but not trapped within the Fisher Management Unit. Both the marten and fisher are still protected from harvest within these two closed zones.

This area was originally set up in cooperation between the WDNR and the US Forest Service to protect American marten and fisher from trapping at the time of their respective reintroductions.

Direct effects on this MIS would include habitat avoidance because of noise or other disturbance and improved bobcat harvest opportunities because a well-maintained transportation system is in place.

Indirect affects could include a reduction in the amount of prey species due to the natural aging of key forest-types. The primary prey of the bobcat, namely snowshoe hare and small rodents, and to some extent deer, do well in areas of regenerating forest, especially the aspen, paper birch and balsam fir forest-types because these areas provide excellent forage and dense hiding cover.

Effects to Bobcat under Alternatives 2-4

With regard to action alternatives 2-4, and specific to the concern of potential disturbance effects associated with either road use or road construction and reconstruction, Table 3.7.3-1 displays the various differences among alternatives.

From the perspective of road access, Alternative 3 would likely provide the greatest amount of remote or at least, less disturbed habitat because all new road construction is dropped while road decommissioning is implemented.

Other factors that affect this MIS include the amount of remote habitat, especially remote lowland conifer habitat, and the amount of regenerating forest. Table 3.2.3-2 displays the amount of remote habitat among alternatives, while Table 2.5-1displays the amount of aspen clear-cut harvest.

Remote habitat is important for bobcat for the same reasons as described above under the discussion on road access. Generally, the larger the area of remote habitat, the greater is the likelihood that species associated with remote conditions will be undisturbed.

Disturbance at certain times of the year can increase stress levels potentially resulting in decreased reproductive output.

Comparing alternatives, Alternative 1 maintains the greatest number of larger sized patches, while Alternative 4 provides the least. Of the action alternatives, Alternative 3 would likely result in the least impact on this MIS, specific to patch size alone.

The last factor in evaluating potential direct and indirect effects on this MIS is the amount of regenerating forest conditions provided under the respective alternatives (see Table 3.1.2-5).

Based on winter track observations, snowshoe hare probably reach their greatest density in habitat consisting of lowland conifer, spruce, and fir, and regenerating aspen-balsam fir forests because these areas provide essential winter browse and dense cover for protection against predators.

Among the action alternatives, those that produce the greatest amount of under-story vegetation would be best for the bobcat with

respect to conditions that maintain an abundant prey base.

In this regard, Alternative 4 would create the greatest amount of browse and under-story shrub development and would therefore be the most favorable, while Alternative 2 would be only slightly less favorable and Alternative 3 least (among the action alternatives) favorable.

Because bobcat typically have such large territories in this part of their range, and because they are regulated by WDNR hunter harvest and trapping quotas, both short and long term affects are best described by end-of-the-season harvest data. Since 1980, the statewide average for bobcat harvest is 176 animals per year (Dhuey et. al. in Wisconsin Wildlife Surveys, 2002, pp. 91-93).

Barred Owl

The barred owl was selected as an MIS representing large expanses of mostly mature mixed coniferous/deciduous forest habitat with an abundance of large cavity trees for both nesting and roosting.

Although according to forest-wide surveys barred owls are considered common across the forest, the comparison of alternatives addresses the maintenance of quality habitat.

Effects to Barred Owl under Alternatives 1-4

In comparison to the three action alternatives, the largest patches of interior forest habitat occur under Alternative 1 (see Table 3.2.3-2). Comparing potential effects among the three action alternatives, Alternative 4 would have the greatest impact on habitat because this alternative creates more early seral stage forest, and thins more acres of potential habitat that the other alternatives

Alternatives 2 and 3 would also reduce the amount of potential and existing large diameter cavity trees via timber harvest treatments, but at lesser amounts. Table 3.1.3.3-1, “Types of Harvest By Alternative” displays this comparison by alternative.

Indirectly, timber harvest such as selection treatments that create canopy gaps, would increase the amount of sunlight reaching the forest floor. This would have the benefit of regenerating mid-tolerant tree species (trees that require more light to grow as compared to shade tolerant species which require less) such as yellow birch, American basswood, and eastern hemlock, all key species in barred owl habitat.

Another advantage would be an increase in prey species, such as snowshoe hare, woodland mice, voles and shrews, which comprise the primary prey of barred owls.

For analysis of effects among alternatives, coniferous and deciduous habitat was considered suitable if it was at least 80 years old. According to research (Leder and Walters,1980), barred owl reproductive habitat in Washington was found to be dense > 80 year-old, second growth, mixed hardwood-conifer forest (Allen 1987, p.5).In the NWH Project Area, at least 10,485 acres would be considered suitable habitat (Table 3.1.2-5). Younger forests could also be suitable, if they contain adequate numbers of larger sized trees and cavity trees (Allen 1987, p.2).

Patch size is another indicator of quality habitat for this MIS, because of this species preference for large wooded areas, as opposed to small woodlots surrounded by non-forest conditions. In this regard, the entire northern portion of the Nicolet Forest provides suitable habitat because it is mostly forested.

Under Alternative 1, there would be no direct loss of habitat because no treatments would occur. Existing large diameter cavity trees would be left undisturbed and the patch size of existing interior forest habitat would not be reduced.

Under Alternatives 2-4, the thinning process, which includes shelterwood, removal, and selection harvest methods, would likely result in the loss of a greater number of potential nesting and roosting cavity trees as compared to no treatment at all.

With regard to the potential loss of large diameter cavity trees under the three action alternatives, Nicolet National Forest, Land and Resource Management Plan (LRMP) standards and guidelines for reserve tree

management contained in Nicolet Supplements 13 (p. 4) and 18 (pages 15-18) are utilized by timber marking crews in all treated units. These standards are incorporated into design feature 24 and 25 in section 2.6.

However, although timber crews may leave the recommended number of reserve trees, including snag trees, in a particular harvest unit, Occupational Safety and Health Administration (OSHA) requires that logging crews remove by felling all unsafe trees.

In some situations, quality cavity trees could be felled and thus become unavailable for use by this MIS. Similarly, snag trees could also be felled if they occur within two tree lengths of a tree marked for harvest.

In the short term, a few pairs of nesting barred owls could be impacted where timber harvest treatments occur in, mature hardwood or mixed hardwood forest. However, these treatments would have to coincide with the nesting season, namely March though mid July. Within the NWH project area, less than 200 acres of hardwood forest is proposed for treatment during this time period.

In the long term, no impacts to this MIS are expected because the treatments in this forest type are limited to thinnings, thus barred owl habitat would remain suitable following stand treatments. It is assumed that so long as ample cavity and den trees remain in the various stands, barred owls will continue to occupy these stands.

All stands proposed for thinnings, follow design features that maintain ample numbers of existing and potential future snag and den trees. Also, stand diversity is maintained and enhanced by ensuring that less common tree species are favored on the landscape. Typically, these species include eastern hemlock, yellow birch, basswood and red oak.

Ruffed Grouse

Ruffed grouse prefers aspen forest, but it is also known to use a variety of other forest types. A key habitat component in all habitat types, according to Barber et al (1989 p.15), is the presence of an adequate amount of dense woody cover.

Generally, alternatives that increase the amount of aspen forest and other early seral habitat conditions, such as those provided by road edge and wildlife openings, will improve habitat for ruffed grouse, while alternatives that decrease this type of habitat would be less favorable.

Effects to Ruffed grouse Under Alternatives 1-4

Under the three action alternatives, treatments are proposed that would result in the creation of regenerating forest conditions favorable for this MIS.

Among these, Alternative 4 provides the greatest amount of new habitat, 871 acres, while Alternative 3 provides the least, 96 acres, and Alternative 2 a moderate amount at 417 acres.

Under Alternative 1, the aspen forest type is not expanded, and older stands, about 20% of the total aspen forest type, would be expected to convert to other more shade tolerant species, such as balsam fir and maple.

Without harvest of these older stands, the youngest 0-10 year-old aspen class would gradually grow into the next age class leaving an age gap in the aspen structure over time.

In the short-term, grouse and grouse habitat would not be greatly affected because of the abundance of aspen present in the younger age classes (44% under 20 years old), in the long-term, habitat quality would deteriorate due to the gradual conversion to less favorable habitat types.

The analysis of alternatives for the NWH Project Area considers the total amount of aspen habitat available in addition to the age structure of the aspen.

For ruffed grouse, quality habitat would consist of aspen in five age classes ideally distributed in 10 year increments through age 40 with the last 20% of aspen forest in the “over 40” year age group and in small units of 10 to 20 acres each. Aspen forest managed in these age groupings provides

for a continuous supply of favorable habitat over time.

Table 3.1.2-5 displays the present acreage of forest types in the NWH Project Area, while Table 3.1.3.1-1 displays the existing and desired (based on the 1986 LRMP) age class structure of the aspen forest type specifically.

The discussion of "aspen" under sections 3.1.3.2, 3.1.3.3, and 3.1.3.4 provides a more detailed description of how the various alternatives affect aspen acreage. Overall, grouse densities would be expected to reach their highest potential under Alternative 4 and over time, their least density under Alternative 1. This analysis, however, only considers aspen management on federal lands, thus densities of grouse, as with other species could be positively or negatively impacted by management activities on non-federal lands.

Table 3.1.4-1 displays the estimated amount of aspen forest as well as other forest types, occurring on non-federal lands within the NWH Project Area.

The short term affects on grouse would vary depending on which alternative is selected, but generally, the population could decline locally if early successional habitat declines. Presently, about 8,370 acres of aspen habitat occurs in the project area (excluding acres of mixed aspen/balsam fir/spruce habitat). Most of this aspen (81%) is younger than 40 years, and thus will continue to provide habitat for grouse for some years into the future.
In the long term, numbers of grouse could slowly decline if the mature aspen converts to other forest types less favored by this MIS, but could also remain stable or increase slightly if these same stands are clearcut and maintained in aspen.

Depending on which alternative is selected, anywhere from 0 to about 777 acres of aspen habitat would be maintained, or created, as in the case of hardwood converted to aspen as described under Alternative 4. Assuming (very generally) about one adult grouse per 10 acres of habitat, Alternative 4 could provide the best opportunity for an increase in grouse numbers.

3.3.3.2 Effects on Fisheries and Aquatic Resource

The NWH project proposes to improve aquatic habitat by restoring woody structure in Steven's and Quartz Lakes. Namely semi-submerged or submerged trees along the shorelines, natural log crib structures at a slightly greater depth, and half-log structures also in shallow water (near shore) where the substrate is suitable are proposed under Alternatives 2-4. (reference sections 1.3).

The log crib structures would not exceed three feet in height, and mimic natural log cover as much as possible.

Minor issues were raised concerning the potential environmental effects resulting from implementing lake habitat improvement projects included the potential for "nutrient loading", and visual affects.

The direct effects of implementing the lake improvement projects under Alternatives 2-4 on the aquatic community would be improved spawning, hiding and foraging habitat for a suite of aquatic organisms.

Under Alternative 1, lakeshore habitat would not be altered. Potential "structure" trees growing along the lake edge would be left to grow, and in time some would naturally fall lake-ward, away from the lake, or deteriorate in place.

Trees eventually falling into the lake would provide aquatic structure, although the process could take many years. Those falling away from the lake or rotting in place would not provide a direct benefit to the lake community.

Also under Alternative 1, half-log and crib structures would not be placed, thus organisms such as fish, (especially fry), aquatic insects, crustaceans, and reptiles and amphibians would continue to utilize only whatever existing habitat is present.

Quartz Lake in particular is very infertile, and greatly lacks near shore structure. Steven's Lake is fertile, but still lacks near shore structure except for some aquatic plants.

Under action alternatives 2, 3 and 4, approximately 100 trees would be felled into Steven's and Quartz lakes in such a way as to provide as much structural complexity as possible. The trees to be felled would include a variety of species ranging from maple and birch to spruce and pine.

Large, super canopy red and white pine would not be cut, although some co-dominant red pine and low quality white pine could be since these have the necessary height to reach far out from the shoreline.

The direct effect would be a very slight visual change in the appearance of the shoreline, because green trees would be seen along the shore in the water. However, cut tree stumps would be angled such that they would not be visible from the lake.

In addition to providing nesting, hiding and foraging cover for the above listed organisms, the complex structure would also provide nesting, hiding, loafing and foraging cover for aquatic mammals and ducks, emergent substrate for aquatic insects, especially dragonflies, and perching sites for belted-kingfishers, eastern kingbirds, and many other songbirds that feed close to the water surface.

Indirect affects could include a loss of terrestrial habitat once the structure trees are felled in the lakes. Specifically, this would include a loss of some nesting sites for animals that utilize lake edge habitat, possibly wood ducks or hooded mergansers, but because these lakeshores are heavily wooded, nesting sites are not limiting.

The other structures, such as the proposed 30 half-logs and 60 shallow water cribs will provide spawning substrate and cover, and hiding cover for fry. The log materials are especially important in providing an anchoring substrate for numerous species of aquatic insects, and algae.

Combined, Steven's and Quartz Lakes total about 345 acres, thus placing a total of 190 structures along the shoreline or in the lakes would produce and average of about 0.5 structures per acre of water.

Potential aesthetical impacts would mostly be apparent with the "tree drops" since the other structures are underwater. Quartz Lake is a very clear water lake, so some of the log structures and half-logs could be seen from a canoe. The visual impact of the felled trees is not expected to be very noticeable to lake users because of the abundance of trees along the shore. Gaps would quickly fill in.

Nutrient loading can occur when water, typically lakes, receive an additional boost or steady accumulation of nutrients which may contribute to excessive vegetation growth. Potential long-term effects of excessive vegetation growth in a lake may lead to premature aging or lake eutrophication.

The potential effects of increasing the nutrient levels of the lakes by adding woody materials should not result in causing or increasing lake eutrophication any more than what would occur under natural processes.

Most lake studies have shown a lack of structure along lakes shores, which most likely resulted from turn-of-the-century (1880's-1900's) logging practices that allowed tree harvest along lake edges and even went so far as remove fallen trees from lakes.

Trees along the shorelines of these lakes are only now just getting to a height that if felled or blown over into the lakes will provide quality habitat.

3.3.3.3 CUMULATIVE EFFECTS ON MIS AND AQUATIC SPECIES

The discussion below describes the cumulative effects on aquatic resources, wildlife, and plants, other than federally listed species and RFSS. The cumulative effects on federally listed species and RFSS are addressed separately in their respective sections. The area of cumulative effects analysis varies by species and the affected habitat. For most species the analysis of effects focuses on the species mean territory size given in Table 3.3.2.1-1.

Past Actions
Generally, timber harvesting and occasional fires in the early 1900's removed a high proportion of the existing forest cover.

Management activities such as timber harvesting, site preparation, opening construction, opening improvement, prescribed fire, stream improvement, road closure and various levels of road construction and reconstruction have occurred within or near the project area in the recent past.

On nearby private land, past practices have included timber harvesting, land clearing for agricultural crop production, and the development of permanent and summer homes.

Disturbances caused by past practices could have resulted in cumulative effects on fish and wildlife resources and habitat.

Effects impacting wildlife and fisheries that can still be observed on the landscape include: stream and wetland sedimentation, loss of, or greatly diminished old growth habitat, introduction of exotic plants and animals, and introduction of non native diseases, as well as the loss of native plants and animals.

The effect of these impacts on wildlife and fish has resulted in the decline of some key habitat components that typically could have provided food, cover, or specific habitat niches.

Other effects of past management activities would include animal and plant populations existing today at disproportionate levels as compared to earlier times.

Typical examples of some of these changes include loss of American elm, and the introduction and spread of rusty crayfish, Eurasian water milfoil, spotted knapweed and other non-native animals and plants.

Various changes in forest wildlife can be seen in the extirpation then reintroductions of the American marten and fisher, and the presently reestablishing timber wolf.

Some of the impacts described above are not and have not been entirely associated with Forest Service management practices, and in fact, the Forest Service obtained most of the federal lands following the early logging era at which time most of the lands were already cut and burned over, with much of the resulting sedimentation damage already incurred.

Present Actions
Federally initiated actions ongoing within the NWH Project Area include implementation of the Elvoy-Brule Project and Red Pine Timber and Roads Project.

The Elvoy-Brule Project Environmental Assessment was approved on 6/18/02, and includes stream and watershed improvement work on both Elvoy and Brule Creeks. The project work should be completed over a five-year period and to date, the stream channelization work on Brule Creek is mostly complete, while work on the removal of a sill on Elvoy Creek has only been initiated.

The Red Pine Timber and Roads Project Environmental Assessment was signed 3/8/99, and work consists mostly of red pine plantation thinning, but also a small amount of road construction and reconstruction. Additional information on this project is described under section 3.1.4.

Major actions occurring on non-federal lands potentially affecting wildlife and the other resources would include private land management practices such as timber harvest, land development, and stream and road improvement projects.

These assumptions area based on presently ongoing and known planned activities within the boundaries of the project area. A map of known planned timber harvest on non-Forest Service lands is located in the project file.

Other ongoing actions include general maintenance of the existing trail and transportation system, as well as maintenance of selected wildlife openings (approved under past environmental decisions).

The cumulative effects on wildlife, plants, and aquatic resources under Alternative 1 would vary by species. Because timber

harvest on federal lands within the project area would cease upon completion of the existing timber sale contracts, habitat conditions would either improve or decline for a given species.

There would be no new early seral stage habitat created, thus at least until this area is reviewed again (estimated eight to ten years from present), conditions would remain as they are, that is slowly aging along seral pathways.

Species depending on regenerating forest conditions would over time find less suitable habitat, while species that prefer less disturbance and more mature forest conditions would benefit.

The impact of the stream improvement work would be largely confined to the immediate area surrounding the stream. The anticipated effect on primarily riparian wildlife would mostly include temporary habitat disturbance, possibly avoidance, or abandonment, during the time the projects are being implemented. The duration of disturbance affects, would generally not exceed 2-4 weeks, with some of the projects lasting only a few days. However, because of the nature of these stream improvement projects, in-stream habitat will be enhanced as will water quality.

Regarding ongoing maintenance projects, such as the road and trail work, wildlife populations have likely already adjusted to this periodic disturbance but plant populations sensitive to competing vegetation could continue to be negatively affected through the continuous spread or reintroduction of non-native invasive plant species.

Under Alternatives 2-4, additional harvest treatments, road construction and reconstruction, and wildlife opening maintenance actions would be implemented. New breaks in the forest canopy and new road corridors would be created, in addition to increasing the amount of early successional forest and edge conditions.

Disturbance across the project area would increase as compared to the existing condition, but these effects would vary by respective alternative.

Again, wildlife and plants and wildlife and plant habitat is likely to be improved or not depending on the given species.

Species tolerant of disturbance, and those that prefer edge habitat will experience improved habitat conditions while those that are less tolerant of disturbance and edge will experience less improved habitat.

Regardless of which alternative is implemented, including Alternative 1, populations of wildlife and plant species known to occur in the project area are expected to remain at viable numbers.

Future Actions

Potential future actions occurring on federal lands would most likely include activities similar to those that have occurred in the recent past (last 10-15 years). Typically these actions would include additional timber harvest, road construction, road reconstruction, and the continued maintenance of existing trails and wildlife openings.

These activities have continued over time, and the effects on wildlife populations, for the most part, appear to be minimal, that is, with the exception of the deer herd, wildlife populations seem to follow their normal cyclical patterns.

Probably one of the more noticeable highly cumulative impacts on the forest landscape that potentially could impact wildlife, plant, and aquatic resources is the steady escalation of private land development within both the forest and project area boundaries.

Development of private lands is beyond the scope of this project, but the affects on wildlife and plant habitat resulting from development are not. As private lands, most often smaller parcels subdivided from larger blocks, become developed, habitat is altered often to the point that it is no longer productive or suitable for wildlife/plant use. Cabins and houses take the place of forest, and ecologically complex shorelines often become sanitized, heavily fertilized grass monocultures.

As each parcel is developed, the number of miles of roads across the forest increases, and existing roads accessing the various parcels are typically improved, usually widened and graveled or paved. Usually the number of miles of road in federal ownership increase with development because access must often be provided across National Forest lands.

Private land development effects on area wildlife include the direct loss of potentially suitable habitat or a reduction in the quality of the habitat for some, but not all species. White-tailed deer, snowshoe hare, raccoons, red fox, red squirrel, and certain songbirds that favor edge have adapted well to these developed communities.

3.3.3.4 Effects, Including Cumulative Effects, on Endangered, Threatened, and Regional Forester's Sensitive Species

During initial scoping for the Northwest Howell project, the US Fish and Wildlife Service (FWS) was contacted, in a letter dated May 10, 2001, as required under 50 C.F.R 402.12(c) to determine if any federally listed species or critical habitat was present in the project area. Their response letter dated June 14, 2001, indicated that the following species bald eagle, Eastern timber wolf, and Canada lynx, or their critical habitats are present. The summary below provides a description of each species with respect to the project area.

Eastern timber wolves and bald eagles are the only federally listed species known to occur within the NWH Project Area. Bald eagles have a long history of forest use, while wolves are only now being reported more frequently.

Eastern Timber Wolf
Wolf tracking and howling surveys have been, and continue to be conducted across the forest, including the NWH area specifically, but to date, an established wolf pack has not been confirmed anywhere on the Nicolet portion of the Chequamegon-Nicolet National Forest.

Limiting factors for Eastern timber wolf include habitat free of, or with very minimal human disturbance, and an abundance of prey species, especially white-tailed deer.

Bald Eagle
Bald eagles are known to utilize portions of the NWH Project Area for both nesting and foraging. All or portions of three territories known to occur in the project area are occupied most years. Limiting factors for eagle include the availability large, usually super-canopy trees near lakes and large rivers, and lakes or rivers with adequate fish forage.

Canada Lynx
The Canada lynx is another species identified by the U.S. Fish and Wildlife Service as a species to consider in the project evaluation. Limiting factors for lynx include ample acreage of cool, moist, boreal forest, ample abundance of snowshoe hare and snow depths sufficient to provide lynx with an advantage over the less buoyant bobcat and coyote (Ruggiero, 1999).

Although some areas of the NWH Project Area may provide suitable vegetative habitat for lynx, snow depth conditions are not suitable most years.

Surveys conducted in both Michigan and Wisconsin during the fall in years 1999, 2000, and 2001 specifically for lynx determined no lynx to be present.

Summary of findings: Biological Assessment
A Biological Assessment (BA) considers effects and potential effects on federally endangered and threatened species. A BA will be completed for at the time the Final Environmental Impact Statement is completed and a final alternative is selected by the deciding official.

The BA will address impacts and potential impacts to federally listed species and their respective habitats specific only for the selected alternative. A summary of the results of the BA will be described in this section.

A tentative summary has been completed based on a District level analysis of similar actions in the past. This summary indicates a "No Affect" determination by the USFWS is likely, regardless of the selected alternative. With the exception of the Canada lynx which is not known to maintain a breeding population on the forest.

Project design features (Section 2.6) and mitigation measures (Appendix F) are already in place providing protection for the above listed animals or their respective critical habitats. Should the Canadian lynx be located at a later date, then the Forest would implement Federal lynx conservation strategy measures.

Regional Forester's Sensitive Species
Table 3.3.2.3-1 above identifies the Regional Forester's Sensitive Species (RFSS) that are known to occur in or near the project area or have potentially suitable habitat within the Northwest Howell Project Area. Field surveys were conducted within areas proposed for treatment during 1999, 2000, 2001, and 2002 for those RFSS in which habitat was determined to be suitable. See Appendices H and I for more complete information.

Some treatment areas were not surveyed for either animals or plants if the likelihood of occurrence was determined to be low, or if habitat for that particular species was not being affected. Conversely, areas considered to have a high likelihood of occurrence for selected species were surveyed multiple times, usually once early in the season then later.

For each alternative, considering direct, indirect, and potential cumulative effects, the results of the Biological Evaluation for the Northwest Howell Project has determined the findings for the species listed below.

"May impact individuals but not likely to cause a trend to federal listing or loss of viability":
American marten (*Martes ammericana*), northern goshawk (*Accipiter gentilis*), red-shouldered hawk (*Buteo lineatus*), Swainson's thrush (*Catharus ustulatus*), black-backed woodpecker (*Picoides arcticus*), West Virginia white butterfly (*Pieris virginiensis*), goblin fern (*B. mormo*), ginseng (*Panax quinquifolius*),

A finding of "No impact":
Has been determined for the remaining species identified in Appendix I

3.4 GEOLOGY AND SOILS

Issues
A concern was raised that timber harvesting operations have the potential to cause erosion and compaction of forest soils. These impacts could reduce forest productivity.

Introduction
Information used in the analysis effects of the proposed actions on the existing soil resource specific to this project area includes: the Soil Resource Assessment (completed for the Forest Plan revision, 1/98); the Forest's Ecological Classification and Inventory documents; the Natural Resource Conservation Service soil survey documents; and, the end of decade monitoring report for the Chequamegon-Nicolet National Forest.

Summary of Effects
There would be no short or long-term detrimental soil disturbance effects on project sites or adjacent areas for the alternatives analyzed within the Northwest Howell Project boundary. The majority of the stands proposed for treatment in this project are on flat to rolling, well drained, fine sandy loam or silt loam soils. Most soils pose a very low potential for soil erosion and displacement, compaction and rutting, and nutrient depletion.

The Adherence to Forest Plan standards and guidelines, site-specific design measures and timber sale contract provisions would eliminate or minimize potential adverse soil resource impacts from erosion, displacement, compaction, rutting, burning and nutrient removal. This is described in section 3.4.2.2.

Table 3.4.-1 illustrates the amount of harvesting and road activity across the range of alternatives for this project. It includes these activities that have potential to affect the soil resource.

Table 3.4.-1 Summary of Activities Relating to Potential Soil Impacts.

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Acres of Harvest	0	7740	5561	7979
Miles of Road Building	0	1.9	0	1.9
Miles of Road Re-Construction	0	25.9	18.0	25.9
Miles of Road Decommissioning	0	18.3	46.61	16.03
Acres of Prescribed Burn	0	47	47	47

3.4.1 EXISTING CONDITION

The glacial geology and soil resources of the Chequamegon-Nicolet NF are characterized within a hierarchical, ecological classification framework (Ecomap, 1993), which allows delineation of geographic areas with similar landform and association of soils. This system sets the context of the landforms, soil resources and potential natural vegetation of a project area, across land ownerships and within multiple scales.

The Northwest Howell project area is within three Landtype Associations (LTAs) on the Eagle River-Florence District. A map and full characterizations of the LTAs is available at the Eagle River-Florence (ERFL) Ranger District offices. At a landscape scale, LTAs are ecological units delineated based on similar patterns of glacial landforms, topography, soil complexes and associated patterns of vegetation and succession, within climatic regions.

The topography ranges from flat to undulating outwash plains flanked by drumlins to the northeast and southwest, with an area of hummocky outwash in the southwest corner. ELTs are generally productive silty or sandy loams (Stambaugh-Padus, Iron River, and Pence) with pockets of sandy areas (Vilas). Hardwoods dominate the Project Area, particularly on the loam soils, with interspersed blocks of aspen and pine.

LTAs are further subdivided into Ecological Landtypes (ELTs) to map and define similar ecological conditions relating to soil moisture, nutrients, drainage, slope, and other chemical and biological characteristics. ELT descriptions and maps are available at the Eagle River/Florence Ranger District offices. Appendix B displays ELTs by project timber stands.

Forest Habitat Types of Northern Wisconsin (Kotar et al. 2002) have been correlated to ecological units at the LTA, ELT and landtype phase levels of hierarchy, for the Chequamegon-Nicolet NF. Habitat types provide information on potential natural vegetation and successional pathways for forest plant communities, including ground flora and shrubs. Abbreviations are commonly used to indicate names of component species for a given habitat type. Acer-Tsuga/Maianthemum or ATM has the complete scientific name of Acer saccharum – Tsuga Canadensis/Mainthemun canadense and the common name of Sugar Maple- Hemlock/Wild Lily of the Valley.

3.4.1.1 EXISTING CONDITION OF ECOLOGICAL LAND TYPES (ELTS)

ELTs occurring within the project area and with treatments proposed on them are briefly described as follows:

Stambaugh-Padus ELT
This ELT occurs on about 60 percent of the project sites. The soil texture at these sites is fine sandy loam or silt loam to a depth of about 20 inches, over sand or gravelly sand. The soil is well drained with a dry-mesic to mesic moisture regime and a medium to rich nutrient status. Permeability is moderate in the surface and rapid in the subsoil. Forest Habitat Types may include, ATM, ATD, and AOCa.

Slopes range from 0-15 percent, with a few areas of short steep slopes greater than 15 percent. The equipment limitation is considered moderate and susceptibility to soil compaction and puddling is similar to the Iron River soils but are generally shorter in duration because of underlying sandy materials that provide better drainage).

Season of operation would be restricted during spring thaw and following significant rain events that saturate the soil surface. Potential for soil erosion is slight. Potential for soil compaction, rutting or displacement is moderate if operation occurs when surface is saturated. This ELT is well suited for upland hardwoods with and tends to be dominated by sugar maple.

Iron River ELT
This ELT occurs on approximately 35 percent of the project sites. The soil texture at these sites is fine sandy loam or silt loam in the surface 25 inches over gravelly sandy loam in the subsoil. The soil is moderately well drained (due to seasonally perched water above a dense pan), with a mesic moisture regime and a rich nutrient status. Permeability is moderate in the surface and moderately rapid in the subsoil, but slow in the fragipan, where present. Forest Habitat Types may include; ATD or AOCa.

Slopes range from 0-15 percent. Ratings for woodland equipment use are moderate. Potential for soil erosion is slight. Potential for soil compaction, rutting and displacement is moderate to severe if operation of rubber-tired equipment occurs when the surface soil is saturated. Therefore, season of operation would be during frozen or unsaturated conditions (dry summer and fall). Northern hardwoods are the major forest type with sugar maple, basswood, and yellow birch, and being the principal species within this ELT.

Pence ELT
This ELT occurs on about 4 percent of the project sites. The soil texture at these sites is sandy loam to a depth of about 20 inches over sand or gravelly sand. The soil is well drained with a dry-mesic moisture regime and a medium nutrient status. Permeability is moderate in the surface and rapid in the subsoil. Forest Habitat Types may include; PArVAa or ATM.

Slopes range from 0-15 percent, with a few areas of short steep slopes greater than 15 percent. Ratings for woodland equipment use on logging areas, skid trails, log landings, and haul roads are slight for these sites. Season of operation would not be restricted, other than during spring thaw when soils are saturated. Potential for soil erosion, compaction, rutting, or displacement is slight. This ELT is well suited for a mixed deciduous-conifer forest dominated by aspen, paper birch, red pine, and white pine.

Vilas ELT
This ELT occurs on about 1 percent of the project sites. The soil texture at these sites is loamy sand or sand in the surface 10-15 inches, over sand or gravelly sand. The soil is excessively well drained with a dry moisture regime and a poor nutrient status. Permeability is rapid. Forest Habitat Types may include; PArV or PArVAa.

Slopes range from 0-15 percent. Ratings for woodland equipment use are generally slight, with a moderate rating for haul roads and landings, because loose sand may interfere with the traction of wheeled equipment. Potential for soil erosion, compaction, rutting, and displacement are slight. Potential exists for excess nutrient removal from a site, if total tree harvest occurs, due to poor inherent nutrient status. Season of operation would be year round on these sites. This ELT is best suited for a mixed forest of red pine, jack pine, aspen, and oak.

3.4.1.2 Ecological Land Type Phases (ELTPs)

ELTs can be subdivided into phases, ELTPs, to further define soil characteristics at a site-specific scale (currently in development on the Nicolet National Forest). The environmental effects analysis utilizes all available ecological classification inventory and soil resource inventory information, current research, and professional judgment of resource specialists including the Forest Soil Scientist.

3.4.2 Direct and Indirect Effects

Soil Resource Analysis Area
The bounds of analysis for determining direct, indirect and cumulative effects of proposed activities on the soil resource are the portions of ecological Landtypes (LT) that occur within the project area. Potential effects to the soil resource are reasonably confined to the soil directly beneath where the activity that would take place, such as the operation of machinery to cut and remove trees. These effects may extend to adjacent Landtype phases for some activities, but not to an extent where the effect would transcend LT boundaries.

Heavy equipment causing soil compaction that reduces pore space for roots and water within a portion of one LT does not affect pore space on adjacent LTs.

Alternatives 2-4 propose timber harvest activities and related road on 13-18% of the FS lands in the project area. These would occur across the range of ELTs described in Section 3.2. This leaves between 72 to 87 percent of the federal lands in the project that with no planned activity.

3.4.2.1 METHODOLOGY

National and Regional soil quality standards set acceptable limits in order to identify detrimental soil disturbance (FSH 2509.18 - Soil Management Handbook, Chapter 2 - Soil Quality Monitoring).

Detrimental soil disturbance is defined as the condition where established acceptable limits to maintain soil properties are exceeded and result in a change in productivity.

To identify detrimental soil disturbance the effects of the alternatives were assessed on a site-specific basis to determine if the degree and extent of potential soil disturbance would cause appreciable change in soil properties. Alternatives 2-4 propose actions that have potential to change soil properties through compaction, rutting, erosion, displacement, burning, and nutrient removal.
The magnitude of potential direct, indirect, and cumulative effects on the soil resource is estimated based on:

- Applicable research.
- Technical information.
- Monitoring of past activities on similar soils.
- The professional experience and judgment of certified soil scientists and resource specialists.

The sale administrator monitors all project sites during implementation.

Interpretations and guidelines based on soil chemical, biological and physical properties have been developed by NRCS and the Forest Service and are specific to the ecological unit, soil type and land management activity. These guidelines are based on applicable research, monitoring of activities on similar soils and professional expertise.

Site-specific design criteria based on this information and on current and proposed Forest plan standards and guidelines are incorporated into this analysis to minimize or avoid effects to the soil resource. (Sec. 2.6)

3.4.2.2 DESIGN CRITERIA TO BE APPLIED TO ALL ACTION ALTERNATIVES (ALTERNATIVES 2-4)

Various practices, standards, and guidelines for elimination of effects to the soil and site productivity from management activities have been incorporated into the project design for all action alternatives (see section 2.6). The practices found in the references below have been successfully employed on similar past management activities on the CNNF, and have been shown to be effective. They include many standards used by private and commercial forest owners and are generally accepted practices:

- Forest Plan standards and guidelines for water and soil resource management (pg. 56-57).
- “Wisconsin’s Forestry Best Management Practices for Water Quality” issued by the State of WI Dept. of Natural Resources (WI-DNR 1995).
- Season of operation restrictions will be listed for each stand in Appendix E. Seasonal restrictions are based on ELTs and are listed under the ELT descriptions above. These restrictions will limit operations during periods when the soils are more susceptible to damage.
- The Forest Soils Scientist reviewed the Ecological Land Type Phase (ELTP) mapping for the project area to determine where additional design features may be needed on a site-specific basis. ELTPs can depict wetter inclusions, slope, and other conditions.

- Design features were also reviewed and revised by field-going personnel who are familiar with on-the-ground conditions in the project area.

Effectiveness of Design Features and Mitigation Measures
Research used in the development of the above references has demonstrated that when these standards, guidelines, handbook direction, and practices are followed, impacts to the soil resources are minimized or eliminated. All of these design criteria, as well as others outlined in Section 2.6 Design Features are part of Alternatives 2 – 4 and thus are part of the effects analysis displayed by alternative below.

Soil monitoring done on the ERFL district in May of 2000 by the Forest Soil Scientist found that mitigation measures were identified in the EA and properly employed during project implementation.

"The Eagle River-Florence Unit of the Chequamegon-Nicolet National Forest is incorporating current ecological unit/soil resource inventory information and interpretations into Environmental Assessments for project activities. Mitigation measures in the EA that are assigned to timber harvest activities for site specific soil conditions, have been written into timber sale contracts and along with standard soil protection contract clauses, have been enforced through contract administration on the ground (Hoppe, unpublished report, 2002)."

A winter only (frozen ground) operating restriction is commonly assigned to timber harvest units on drumlin and outwash landforms that have soils with a silt loam surface texture, to mitigate impacts to the soil resource (Hoppe, unpublished report, 2002).

3.4.2.3 Alternative 1 No Action

The potential for soil compaction, rutting, erosion, displacement, and productivity is very low since no new ground disturbing activities or heavy equipment operations are proposed in this alternative. There is no potential for soil impacts from prescribed burning in this alternative.

There would not be any project-related negative impacts to soil resources or carbon cycling, since management activities will not take place under this alternative. There are no known existing soil disturbance (e.g. erosion) problems that would require rehabilitation.

3.4.2.4 Alternative 2, 3 and 4

Compaction and Rutting
Of the ELTPs in the project area with proposed harvest treatments, soils with proposed harvest treatments in the Pence, Stambaugh-Padus and Vilas ELTs have a slight to moderate chance of compaction due to drainage and texture characteristics of these soils (see section 3.4.1.1).

Compaction and rutting can occur when finer textured soils become wet. If heavy equipment runs over such soils in this condition repeatedly, the soil particles compress, reducing the pore space between particles. Ruts can block the lateral movement of water through the soil. Compaction can lower the ability of plant roots to spread out into the soil. Both can result in lowered soil productivity.

The Iron River ELT has the highest potential (moderate to severe risk) for soil compaction, rutting, and displacement if operations occur when the soil is saturated (see section 3.4.1.1). The Iron River ELT represents approximately 35 percent of the area proposed for treatment in this project. This represents approximately 6 percent of the entire Northwest Howell Project area.

The season of operation for all ELTs would be restricted to unsaturated or frozen conditions to prevent excessive soil compaction and rutting from occurring throughout the project area. These are described in Design Features 1-6, Section 2.6. A listing of design features for each stand by alternative is found in Appendix E.

If these design features for season of operation and equipment restrictions are followed on these ELTs, compaction and rutting would be minimized (Mitigation and Design Features in Chapter 2). Based on observations from past harvesting practices on the district, the overall impacts to soils from these types of treatments would be minimal. Post harvest monitoring by Forest Soil Scientist found that,

"Operating tracked and rubber tired timber harvesting equipment on frozen ground is a very effective means to mitigate impacts to the soil resource. No detrimental, long-term effects to the soil resource were observed at these sites, based on soil quality indicators for compaction, displacement, erosion, puddling and nutrient cycling (Hoppe, 2002)".

Erosion and displacement

The potential for soil erosion and displacement is very low within proposed harvest areas. Surface erosion and displacement can occur when vegetative cover is removed exposing the soil to rain, wind, and other animal or human caused disturbances. They are most likely to occur on exposed soils where slopes are greater than ten percent. Sandy loose soils are also more susceptible than finer textured soils, which hold together well.

The ELTPs in the project area that have the greatest potential for erosion and displacement are those with C slopes (fifteen to thirty percent). Design Features plus season of operation restrictions described under the ELT descriptions above have been identified to prevent soil erosion and displacement from occurring.

Site-specific design features were identified to eliminate or further minimize potential for soil erosion and displacement within harvest units. Some of the features developed for the Northwest Howell Project (Section 2.6) include:

- Avoiding steep slope areas (>30%) within sale unit boundaries
- Approving the location of main skid trails and log landings or spurs
- Artificial seeding of exposed soil that does not re-vegetate naturally
- Use of water diversion structures to control potentially erosive runoff

Alternatives 2, 3 and 4 could have potential equipment use impacts to soil resources on the portions of the project area used for skidding, landing, and hauling wood products during harvesting activities (Table 3.4.-1). Although the potential for soil movement under any of the alternatives would be very minor when design features are followed.

Research has shown that the greatest potential for soil movement and stream sedimentation is associated with roads, road construction, and stream crossings. Alternatives 2 and 4 would have the same amount of road construction (1.9 miles) and reconstruction (25.9 miles). Though Alternative 4 has the most harvest acres (7979 acres) compared to Alternative 2 (7740). Therefore potential impacts from equipment use and sedimentation from roads would be higher in these two Alternatives that Alternative 3, which has the least amount of harvest acres and road construction and reconstruction (5561 acres, 0 miles, 18 miles respectively). In addition Alternative 3 would have the greatest amount of road decommissioning (46.61 miles) when compared with Alternatives 2 and 4 (18.3 and 16.03 respectively), which would allow the least potential for erosion and displacement.

Observations by Forest Service personnel of harvesting on similar ELTs and in the project area in the past have shown that there is very little likelihood of soil movement or stream sedimentation on these soils. Any disturbance that would occur would be very temporary and localized. Local studies conducted on the Chequamegon National Forest to analyze the effects of silvicultural practices on water quality in Northern Wisconsin support this conclusion. Conclusions from the study stated

"Logging debris and vegetation produced almost 100% groundcover early in the growing season. This provided a high degree of soil protection, which minimized soil erosion during the first growing season. Selection harvesting with rubber tire skidding had no impact on water quality during the first growing season after the harvest. Harvesting exposed a minimum of soil and the amount of vegetative cover did not change. It is doubtful that selection cutting increased soil erosion on the site during the first growing season (p.15, Spangenberg, N. Earl and McLennan, R., 1983)."

Site Productivity

The potential for activities in these alternatives to impact inherent soil productivity in the project area is low. The proposed activities in Alternatives 2-4 would

have no long-term direct or indirect detrimental effects to soil productivity.

Alternatives 2, 3 and 4 would not negatively impact soil microorganisms. Healthy populations of soil microorganisms such as bacteria and fungi can be maintained if adequate levels of soil organic matter are retained on the site. Cutting trees and removing the merchantable bole would remove some nutrients from treatment areas. The ratio and amount of nutrients in the bole and bark of trees varies by species, age, stocking and site quality, but is generally less than one half of nutrients found in the whole tree and accounts for a relatively small portion of total site nutrients.

A major portion of the nutrients taken up annually into the above-ground components of trees are returned to the soil in litter fall and canopy wash resulting in a long-term accumulation of nutrients in the surface of mineral soils under forests (Pritchett, 1979, p205). Within the treatment areas, generally, only the boles and large limbs would be removed, smaller tree branches, roots, bark, leaves and needles would remain on the site. Over time, organic matter and nutrients in the soil would likely increase in response to what would be left on the site.

A moderate intensity burn is proposed in two stands that together total 47 acres (2087-48 and 2087-55). This prescribed burn would be performed to facilitate the natural regeneration of jack pine. This prescribed burn would occur on Pence ELTs during spring or fall when the litter layer is moist. The intensity and duration of a forest fire determines the effects on the physical, chemical, and biological properties of the soil. These controlled fires would be relatively cool with no areas of heavy fuel buildup like slash piles or windrows of debris. A portion of the under story vegetation and forest floor debris would be burned. Prescribed fires seldom remove more than 50 percent of the surface organic layers and the soil organic fraction of the A horizon is not generally affected by light burns (Pritchett, 1979, p 420).

Effects to the soil resource from under burning these sites may include;

- An increase in available phosphorous, potassium, calcium and magnesium in the mineral soil for 1-5 years
- Minor amount of nitrogen loss through volatilization
- Temporary increase in nitrogen availability to trees
- Temporary increase in tree growth due to availability of nutrients
- Minimal increase in soil temperature during the burn due to moist, insulating humus layer
- Very minimal increase in soil temperature after the burn because the canopy shades the darkened ground surface
- Initial decrease in soil microbes/bacteria followed by sharp increases as soon as the first rainfall following the burn
- Soil animals such as arthropods (e.g. beetles, ants, centipedes, millipedes, springtails, spiders, ticks, mites) are more numerous after controlled burns
- Earthworm populations may be decreased due to initial post burn adverse moisture conditions and reduced food supply

The Vilas ELT can be susceptible to nutrient depletion if too much vegetation is removed from a nutrient poor site. The Vilas ELT represents approximately 1 percent of the area proposed for treatment in this project. Slash from the logging operations would be left at the stump or redistributed across the stand to allow for nutrients to decompose back into the soil. See Mitigation Measures and Design Features section (Design measure #19, Section 2.6).

3.4.2.5 TOTAL CUMULATIVE EFFECTS (ALL ALTERNATIVES)

The analysis boundary for cumulative effects was determined to be those portions of ELTs where treatment would take place. Since analysis has indicated negligible erosion potential, cumulative impacts to the soil resource in the project area would not affect surrounding landtypes on federal land or land in other ownerships.

The effects of implementing Alternatives 1 or any of the action Alternatives 2-4, when added to the effects of past, present, and reasonably foreseeable actions would not be expected to result in appreciable adverse

cumulative effects to the quality of the soil resource or to the total forest ecosystem carbon storage capacity.

Past Actions

Numerous historic, natural and human caused ground disturbing events, such as, windstorms, exploitive logging and associated fires, road and railroad building, have taken place in and around the area of cumulative effects analysis. While these events have influenced the existing condition of the soil resource, there are no known adverse residual impacts.

Recent activities, such as, timber harvesting and road building, have occurred over the past 15 years. This was implemented following Land and Resource Management Plan standards and guidelines, sites specific design features to mitigate soil resource impacts, and contract operating restrictions on Forest Service lands. Site specific field monitoring by resource specialists within the project area and on similar ELTs outside the project area has shown no short or long-term impairment to the soil resource from recent activities (End-of-Decade Monitoring Report Che-Nic NF 1986-1996, p65; Hoppe, 2002).

The Forest has also implemented Wisconsin Forestry Best Management Practices for Water Quality since 1995 and recent field monitoring indicates that 99% of the time there will be no adverse impacts to water quality from soil erosion/sedimentation when BMPs are applied correctly (WDNR, 1999, p62).

Current conditions indicate key soil properties affecting ecosystem health and sustainability such as porosity, organic matter content and nutrient availability are representative of the natural range of soil conditions inherent to the landscape of the Chequamegon-Nicolet NF (C-N NF General Assessment-Soils, 1998, p6).

Healthy populations of soil microorganisms such as bacteria and fungi exist in the favorable environment of the forest floor litter layer and soil surface organic matter (Pritchett, 1979, p72). Storage of soil and biomass carbon is increasing in the vegetation and soil.

No appreciable long-term effects to the soil resource or long-term productivity of the land from past activities have been identified in the project area.

Present Actions

There are no known actions presently taking place within this cumulative effects analysis area that would have any measurable effects on the soil resource. Alternative 1 does not propose any new actions.

Alternatives 2-4 do propose actions that would include potential ground-disturbing activities. Some of these proposed actions would occur over the same acres that have previously had similar treatments, such as a thinning harvest. Alternative 3 has less potential to impact the soil resource than the other action Alternatives, because fewer acres are proposed for harvesting, road building, and burning activities. Alternatives 2 and 4 are relatively similar in the types of activities and amount of acres they propose to treat and would potentially impact more of the soil resource than Alternative 3.

Assessment of potential direct and indirect impacts from activities in each action alternative indicates that no appreciable short or long-term detrimental soil disturbance would be expected. Monitoring indicates adherence to current and proposed Land and Resource Management Plan standards and guidelines, site-specific mitigation measures, and contract provisions would eliminate or minimize potential adverse impacts from erosion, displacement, compaction, rutting, burning, or nutrient removal. Storage of soil and biomass carbon is projected to increase in the vegetation and soil.

Future Actions

At this time there are no specific actions are known to be planned within the area of cumulative effects analysis for the soil resource. It is likely that timber harvesting and associated activities would be proposed to some degree, but it is not possible to foresee exactly where or when such actions would occur. All future proposed actions on federal lands would be subject to environmental effects analysis and any project implementation would follow site specific design criteria, applicable research, current Land and Resource Management

Plan direction, standards and guidelines, mitigation measures and best management practices to eliminate or minimize potential adverse soil resource impacts from erosion, displacement, compaction, rutting, burning or nutrient removal. Storage of soil and biomass carbon is projected to increase in the vegetation and soil.

3.5 WATER RESOURCES

3.5.1 Water Resources related issues

A minor issue was raised (section 2.3.1) in regard to the potential for adverse effects to water quality as a result of
Timber harvest and road activities.

The effects section determines that no detrimental erosion or sedimentation would be expected to occur from stand treatment, temporary road construction, and non-system road reconstruction on the project sites under any of the alternatives.

3.5.2 Water Resources Existing Condition

The Northwest Howell Project area is located within two major (5th level) watersheds. The northern half of the project occurs within the Brule River watershed and the southern half occurs within the Pine River watershed.

The Brule River forms the project boundary on the north and the North Branch of the Pine River and Lily Pad Creek form the southern boundary. A map depicting riparian areas within the Project Area is located in Appendix B, Map 16

The Brule River is a candidate study river for federal designation as a wild and scenic river. The Pine River has state designation as a wild and scenic river.

Monitoring has indicated that past management activities (after the logging era at the turn of the Century) including timber harvesting and road construction have not resulted in any long-term deleterious effects on the water quality in the area (WDNR, 1998).

3.5.2.1 LAKES

There are 11 lakes, 2 impoundments, and 4 springs within the project area (table 3.5.2.2-1 for detailed listing). The water quality of these lakes meets Clean Water Act standards.

Detailed information on the lakes within the project area can be obtained from the Wisconsin Department of Natural Resources Surface Water books for Forest and Florence Counties. Section 3.3.2.2 also contains some information on aquatic habitat existing condition.

Aquatic habitat existing condition is described under section 3.3.2.2.

Table 3.5.2.1-1 Water Bodies within Northwest Howell Project Area

Name	Acres	Maximum Depth (ft.)	Shoreline Ownership	Access
Alvin Creek Impoundment	39	4 (est)	Federal	Carry-in
Allen Creek Impoundment	90	7	Federal/Private	Carry-in
Chuks	9	2	Federal	Remote
Howell	177	15	Private	Carry-in
Kilborn	?	?	Federal	Remote
Lilypad	51	3	Federal/Private	Unimproved
Little Wapoose	17	10	Federal	Walk-in
Mainline	17	4	Federal/Private	Remote
May	19	11	Federal	Unimproved
Onimish	6	14	Federal	Walk-in
Quartz	47	13	Federal	Carry-in
Ramsdell	15	8	State	Remote
Stevens	295	10	Federal/Private	Improved

3.5.2.2 STREAMS

The Chequamegon-Nicolet National Forest has conducted an Aquatic Ecological Classification and Inventory for the streams within the forest boundary. The ecological units, called valley types, are based on stream bank full width, alkalinity, maximum water temperature, and aquatic biota.

There are approximately 113 miles of streams within the project area. Most of the streams are 0-50 feet wide, with moderate alkalinities, maximum water temperatures less than 26ºC, and cold-water aquatic species populations. The streams within the Northwest Howell project area are healthy resilient systems that meet Clean Water Act standards.

Table 3.5.2.2-1 Streams Within the Northwest Howell Project

Name	Class I	Class II	Class III	Warm water
Allen Creek		X		
Alvin Creek		X		
Brule River		X		
Chuks Creek		X		
Charlie Otto Creek		X		
Duck Creek	X			
Elvoy Creek	X			
Gaspardo Creek		X		
Howell Creek				X
Huff Creek	X		X	
Lilypad Creek				X
Mainline Creek				X
Meadowbrook Creek		X	X	
No. Branch Pine River		X		
Steven's Creek				X
West Allen Creek				X
Wilson Creek	X			

3.5.3. Direct and indirect effects on water resources

Additional analysis on the water resource is contained in the Water Resource Report contained in the project file

No detrimental erosion or sedimentation would be expected to occur from stand treatment, temporary road construction, and non-system road reconstruction on the project sites under any of the alternatives.

All treatments would follow Best Management Practices for water and wetland quality, as well as Forest Plan standards and guidelines for wildlife, fish, soil and water resources (See design features 7-11 Section 2.6). Treatments proposed in all alternatives that are adjacent to streams, lakes, riparian areas, wetlands, or floodplains would be conducted in ways that are sensitive to fish habitat, stream, and lake quality.

This water resource effects analysis utilized all available Aquatic Ecological Classification and Inventory, water resource inventory information, current research, and professional judgment of resource specialists.

The effects of the alternatives proposed for this project area were assessed on a site-specific basis and design features were

recommended to ensure the quality of the water resources within and adjacent to the analysis area are maintained.

Additionally, many stands were deferred early in the analysis due to a variety of reasons, one of which related to their location relative to various water resources. In many cases, stand boundaries were adjusted to exclude wetlands, streams, lakes, and ponds from the treatment area. Some stands were deferred because access would involve complicated wetland or stream crossings.

Each stand has been looked at on the ground. Lakes, streams, ponds, riparian areas, and wetlands within and adjacent to proposed treatment areas have been identified. A map depicting riparian areas within the Project Area is located in Appendix B, Map 16.

Section 208 of the 1977 Clean Water Act required states to develop plans and procedures to control non-point sources of pollution, including silvicultural sources, to the extent feasible. Additionally, Section 319 of the 1987 Clean Water Act requires each state to develop and implement a

program to reduce non-point source pollution to the "maximum extent practicable". The act requires that best management practices (BMPs) be used to control non-point sources of water pollution. All proposed activities would be in compliance with the Clean Water Act.

Most Forest Service policy regarding water quality is contained in Forest Service Manuals 2532 (Water Quality Management) and 2522 (Watershed Improvement).

The policy includes promoting and applying approved Best Management Practices to all management activities as the method for control of non-point sources of water pollution and for compliance with state and national water quality goals; establishing goals and objectives for managing the quality of the water resource in land and resource management plans; and producing water of a quality suitable for the beneficial uses identified in the land and resources management planning process.

The general effects of various management activities affecting water quality and wetlands are described in the Forest Plan FEIS, pages 4-104 and 105, and riparian area effects are described on pages 4-106.

3.5.3.1 Direct and Indirect Effects of Alternative 1 on water resources

This alternative proposes no new federal actions, therefore no measurable adverse effects, direct or indirect, would occur to lakes, streams, riparian areas, wetlands, or floodplains as a result of the project activities.

3.5.3.2 Direct and Indirect Effects of Alternatives 2, 3 and 4 on water resources

BMPs and Forest Plan standards and guides would be followed for Alternatives 2-4 (Design features 7-1, Section 2.6). All treatments would be in compliance with the Clean Water Act by following these measures.

The use and effectiveness of Best Management Practices (BMPs) across all land ownerships in Wisconsin, including the National Forest, was monitored by interdisciplinary and interagency teams, during the years of 1995 to 1997.

The field evaluations indicated that ninety-nine percent of the time no adverse impact to water quality occurred when a BMP was applied correctly where needed (WDNR 1995). The study also indicated that one percent of time there was a minor impact. Therefore, no long-term detrimental water quality effects are expected to occur when the design features are followed

The majority of the treatments proposed near streams in all of the action alternatives involve the promotion of long-lived, larger diameter tree species in the riparian area. At least 60 square feet of basal area would also be retained in within 100 feet of streams (in compliance with BMPs).

The result of such treatments would be increased shade and large woody debris inputs for years to come. Most of the treatments proposed near streams include thinning, individual tree selection, under-planting with no cut, or release.

In the few stands near streams where clear-cutting is proposed, a 100 foot no equipment buffer would be implemented that begins at the high water mark.

The Forest Plan standards and guidelines state that long-lived species should be maintained within 200 feet of Class 1 or 2 trout streams (Forest Plan, p.68) to discourage aspen regeneration in these areas which would minimize dam building by beaver. (Design feature #9)

Effects to aquatic species are described in section 3.3.3.2.

3.5.3.3 Total Cumulative Effects on water resources

The effects of the proposed activities, when added to the effects of past practices and events, current practices and reasonably foreseeable future proposed actions, would not be expected to result in any appreciable adverse cumulative effects to the quality of the water or wetland resources.

Design features are expected to minimize or eliminate potential effects to water resources under all alternatives. Because the effects would be so minimal, and because monitoring has shown the effects of past activities to be minimal (WDNR, 1995), cumulative effects are anticipated to be minimal also.

Other ownerships, past activities, planned activities, and reasonably foreseeable activities occurring adjacent to these streams or lakes within the project area were identified.

This information was used to analyze the potential for cumulative effects to occur as a result of Forest Service proposed activities.

Vegetative Management near water bodies

The highest sediment yields in Wisconsin occur in the hilly terrain with mixed forest and agriculture in the southwestern part of the state and the red clay region near Lake Superior.

The lowest yields occur in the forested areas of northern Wisconsin including the Chequamegon-Nicolet NF. These low yields occur for three reasons.

First, erosion and sediment yield from timber harvest areas is usually low because ground cover is often provided by residual vegetation, logging slash and rapid re-growth of vegetation (Verry 1972; Spangenberg and McLennan 1983).

Second, timber harvest and other forest management activities typically only impact a small portion of the area in any given year. For example, on the Chequamegon-Nicolet NF, timber harvest has occurred on 1.6 percent of the land each year over the last decade (U.S.D.A. Forest Service 1998).

Third, even when erosion does occur, it frequently is not delivered to streams because of the low relief and undulating terrain (Verry 1972).

Past activities on all ownerships within the analysis area have included timber harvest, road building, and agriculture. Disturbance caused by these past practices and events has influenced the existing condition of the water resources.

No appreciable long-term water quality disturbance effects have been identified on National Forest or privately owned land in the project area from timber harvest or agriculture. Long-term effects are those predicted to last more than one year after project completion.

Future actions planned on ownership other than the Forest Service that would occur within 200 feet of a water body are listed in table 3.5.3.3-1. The Forest Service gathered this information by contacting the largest non-federal landowner in the project area, the Board of Commissioners of Public Lands (State School Trust lands). They provided information on all projected sales through 2007.

Also, the Wisconsin DNR was queried for information on private landowners enrolled in the Managed Forest Law Program. Lands under this program receive a tax incentive and in return must be managed to DNR specifications. This information is located in the project file.

Table 3.5.3.3-1 Ownerships and activities adjacent to water bodies with proposed treatments.
Acres listed are total acres being treated in that area, not all fall within 200 feet of the water body.

Water Body	Future Action	Location	Remarks
Brule River	20 acres Northern Harwood Selection planned for 2003	T41N-R14E, Sec. 16 Private Landowner	Under Managed Forest Law, this action must comply with State guidelines for mgmt. Along Wild and Scenic River (at least 150' buffer)
Howell Lk.	63 acres Northern Hardwood Selection planned for 2003	T40N-R12E Sec. 13 Private Landowner	Land under Managed Forest Law program.
No. Branch Paint River	40 acres Northern Hardwood Selection Planned for 2005	T40N-R13E, Sec. 22 Private Landowner	Under Managed Forest Law, this action must comply with State guidelines for mgmt. Along Wild and Scenic River (at least 150' buffer)
Huff Creek	20 acres of Selection harvest planned for 2003	T40N-R14E, Sec. 1 Private Landowner	
No. Branch Pine River	Group Selection 160 acres planned for harvest in 2005	T40-R13E. Sec.22 State School Trust Lands (BCPL)	Under Managed Forest Law, this action must comply with State guidelines for mgmt. Along Wild and Scenic River (at least 150' buffer)
North Allen Creek	170 acres of shelterwood and 300 ac. of group selection to be harvested 2005-06	T41N-R14E Sec. 33-34 State School Trust Lands (BCPL)	
Brule Creek	Culvert replacement at crossing by Forest Road 2193, rechannelization of 4150 feet, and	T40 N-R13 E Sec.6, T41N-R13E Sec.31 Forest Service	A Decision Notice was signed for these projects in June 2002, some are currently being implemented
Elvoy Creek	Culvert replacements at crossings by Forest Road 2193 and Rock Dam Road, rechannelization of 1300 feet, and removal of a remnant sill from an old logging dam	T42N-R13E, Sec.20-22 Forest Service	A Decision Notice was signed for these projects in June 2002, some are currently being implemented

Stream Crossings
Three culverts (Elvoy Creek @ Fischel Road (FR 2193), Brule Creek @ Fischel Road, and Elvoy Creek @ Rock Dam Road) within the Northwest Howell Project Analysis Area will be replaced in the near future.

These culvert replacements were analyzed under the Elvoy/Brule Watershed Improvement EA, which was approved on June 18, 2002. These crossings presently allow sedimentation and restrict passage for aquatic organisms. All BMPs will be followed for these projects.

Similar management activities may be proposed in the foreseeable future, accompanied by the appropriate mitigation measures, road construction and reconstruction techniques, and harvesting procedures.

Because of this, future management activities would not be expected to have adverse long-term cumulative effects to the quality of the water resources.

Stream improvement work
Because of damage from logging at the turn of the century, Brule and Elvoy Creeks are warmer and shallower than they would be under natural conditions.

The Elvoy/Brule Watershed Improvement EA includes channel excavation work to narrow and deepen the channel, installing rocks and logs and removing a sill from an old logging dam on Elvoy Creek.

This will decrease sediment, moderate water temperature and increase stream habitat complexity. These projects were approved on June 18, 2002 and will be implemented over the next five years. The Elvoy/Brule Watershed Improvement Project is incorporated by reference.

In approximately the past 15 years there were a number of projects completed in

Forest County on the following streams: Allen, Elvoy and Brule Creeks. Most of these projects were completed on specific stream segments in cooperation with the Forest Service and WDNR on Forest Service property.

Two were completed on the Brule Creek by the WDNR staff adjacent to private lands. These projects involved the application of stream channel restoration measures by hand or with heavy equipment. Two spring ponds were dredged with a hydraulic dredge. Here is a brief history of methods applied and dates of these projects.

In 1996 and 1997 two projects were completed on the Allen Creek. One project involved the placement of trout cover logs in the stream channel by hand. The other was done with machinery.

To date there have been four channel renovation projects completed on the Elvoy Creek. Three of these projects have been completed with heavy machinery and the other by hand. The first project was completed in 1986 and the most current in 1998. The Elvoy Springs was dredged in 1988.

Four projects have also been completed on Brule Creek; two were completed by hand and two with machinery. The first project was in 1990 and the most current in 2001. The Brule Springs was dredged in 1993 and 1994 (WDNR, unpublished letter from Dave Brum Fisheries Technician).

3.6 RECREATION, VISUAL QUALITY AND WILD AND SCENIC RIVERS

3.6.1 Issues

Specific impacts of noise, visual impacts, and traffic associated with timber harvest were minor issues raised. Design Features 12-18 and 20 (Section 2.6) would be implemented to minimize impacts to recreational users. A further description of effects is included in the following sections.

3.6.2 Existing Condition for Recreation, Visual Quality and Wild and Scenic Rivers

Recreation

Many different recreational activities are pursued within the project area. These activities include: camping, snowmobiling, hunting, trapping, fishing, driving for pleasure, wildlife viewing and canoeing. Small, developed campgrounds are located at Stevens Lake, on the Brule River and the Windsor Dam campground on the North Branch of the Pine River. There are also many dispersed areas scattered throughout the project area where people camp. State snowmobile corridors number 6 and 10 run through the area for a total of nearly 33 miles of trail (including spurs and alternate routes) within the project area.

Fishing occurs in many lakes and streams within the project area such as: Stevens Lake, Howell Lake, Lilypad Lake, the Brule River, Elvoy Creek, Howell Creek, Brule Creek, North Branch of the Pine River, West Allen Creek, Gaspardo Creek, Huff Creek, Lilypad Creek and Allen Creek. There is also a parking area and a short trail to a platform overlooking the Allen Creek Impoundment where people can view the impoundment and the wildlife found there. This is a Watchable Wildlife site.

Visual Quality

The Northwest Howell project area is made up of many varying forest types. A breakdown of these types can be found in section 3.1.2. Approximately 90% of the national forest area and 82% of the non-national forestlands are forested (the rest is upland and lowland openings and water). The most common forest type in the project area is northern hardwood that is concentrated in several larger areas. Aspen, red pine and white spruce fill most of the area in between. State Highways 70 and 55 run through the area. The streams and lakes within the area are listed in the previous paragraph.

Using the Sensitivity Level and Variety Class determinations and recommendations from Appendix E of the Forest Plan, the Visual

Quality Objectives (VQOs) for this project area are listed in the following table.

Table 3.6.2-1 Visual Quality Objectives for the Project Area

VQO	Travel Routes/Water	
Retention	Highway 70 Forest Road 2176	North Branch of the Pine River, Brule River
Partial Retention	Highway 55, Highway A Forest roads: 2169, 2172, 2174, 2193, 2206, 2423, 2424, 2426, 2427, 2454, 2457, 2458, 2485	Stevens Lake, Howell Lake, Lilypad Lake, Allen Creek, Huff Creek Gaspardo Creek
Modification	All other roads	All other areas

Further discussion and descriptions of VQOs can be found in Chapter 4, pages 41 and 42 of the Nicolet Forest Plan and in Appendix E-1 to E-14. Retention is the most visually sensitive VQO and Modification is the least sensitive.

Wild and Scenic Rivers
Approximately 16 miles of the North Branch of the Pine River forms the southern boundary of the Project Area. This river has been designated by the State of Wisconsin as a Wild, and Scenic River. Because of this designation the Forest Service manages a ¼ mile wide strip on both sides of the river as a wild and scenic river corridor. This corridor falls under M.A. 9.2 in the Forest Plan (Forest Plan p. 152-155). A break down of forest types found in Management Area 9.2 can be found in table 3.1.2-5.

The emphasis for this management area is for the protection of the qualities that make it eligible for consideration in addition to the National Wild, Scenic, or Recreational River system. Management activities must be designed to enhance the scenic, recreational and wildlife resources in a roaded natural setting. No new roads are to be built and unneeded roads are to be closed.

3.6.3 Direct and Indirect Effects to Recreation, Visual Quality and Wild and Scenic Rivers

Summary of Effects to Recreation, Visual Quality and Wild and Scenic Rivers
All alternatives would meet the visual quality objectives of retention, partial retention, and modification. The use of site-specific design measures would help meet these visual quality objectives.

- The action alternatives are consistent with recreation opportunity spectrum objectives, and would have only very minimal or no effects on recreation access, settings, or opportunities.

- Under all action alternatives, the proposed planting and harvesting within the North Branch of the Pine River Corridor should restore long-lived species along the forested edge of the river. Over time these trees would provide seed to help establish trees closer to the rivers edge where it is currently open or alder is growing. The future long-term effects would be the development of uneven-aged structural diversity, increased species diversity, large tree development, and increased growth rates within the hardwood stands.

This table quantifies the potential impacts to recreational users from logging traffic and harvesting. The amount harvesting is broken down by Visual Quality Objectives (VQOs) for Retention and Partial retention because there are restrictions on the size of openings allowed for these VQOs.

3.6.3.1 ALTERNATIVE 1

Under this alternative, no vegetative management or any other new projects would occur (no action alternative). Without harvesting, no temporary conflicts would be encountered between snowmobilers and timber producers. There would be no change in recreational opportunities, the visual quality, or wild and scenic rivers in the project area. Maturing jack pine along the North Branch of the Pine River will continue to age and eventually die and fall over. Natural succession will replace it over time. There will be no visual impact of human disturbance on the forest, only natural processes over time.

Table 3.6.3-1 Comparison of Potential Impacts to Recreationists by Alternative

Recreation	Alt 2	Alt 3	Alt 4
Snowmobile/Logging truck dual use (would be mitigated by restricting hauling times or rerouting snowmobile traffic)	24 roads 10.5 miles	18 roads 7.5 miles	26 roads 11.1 miles
Road decommissioning (could limit access to some areas)	18 miles	46 miles	16 miles
Visual Quality			
Harvest within Retention VQO All treatments meet VQO guidelines	14 selection and thinnings	14 selection and thinnings	14 selection and thinnings
Harvest within Partial Retention VQO All treatments meet VQO guidelines	66 selection and thinnings	66 selection and thinnings	66 selection and thinnings
	9 shelterwood and removals	9 shelterwood and removals	8 shelterwood and removals
	6 clearcuts	1 clearcuts	11 clearcuts
Wild & Scenic River			
Amount of harvest in corridor	105 acres selection	105 acres selection	105 acres selection
	89 acres removal acres thin 175 acres planting	89 acres removal acres thin 175 acres planting	89 acres removal acres thin 175 acres planting

3.6.3.2 ALTERNATIVE 2 - RECREATION

There could be an effect on snowmobile use where the trail is located on a road also that may also be used by logging trucks. There are segments of 24 roads totaling 10.5 miles that would be needed for logging with this alternative that are also part of a snowmobile trail. This could create a situation where log trucks and snowmobiles would be using the same road segments at the same time if the logging occurs in the winter in those areas.

To minimize conflicts between logging trucks and snowmobiles, logging truck use would not be allowed on weekends and holidays during the snowmobile season on these roads (design measure #14).

Signs would be posted on these roads to warn recreationists of logging operations (design measure 12).

There are also two sections of snowmobile trail currently located on roads where the trail may need to be temporarily rerouted. There do exist trail segments that could be used to reroute the trail segments if necessary. This includes a total of 0.7 miles of trail, which would only need rerouting if the logging occurred during the snowmobiling season on these roads.

A complete list of the roads that may be affected and number of miles per road by alternative can be found in Appendix D. Impacts to access are discussed under section 3.7.3.2

Visual Quality

The roads with a VQO of Retention (Highway 70 and FR2176) would have the following types of timber harvests for various lengths along their routes: five hardwood stands with selection harvests, five white spruce stands with thinnings and four red pine stands with thinnings.

The slash created from these thinnings would be lopped to within two feet of the ground and scattered for the first 100 feet from these roads (design measure 15).

The selection and thinning treatment would not change the forested look of the affected stands but would open up the forest some and allow more sunlight to penetrate through the forest canopy. This effect would be reduced over time as the canopy expands and fills in.

The roads that have a VQO of Partial Retention are listed in table 3.6.2-1. A complete listing of the stands that border those roads that have harvests proposed with this alternative can be found in the project file.

There is much variation in the distance in which these stands border these roads. To summarize, the following is a list of the number of stands with harvests that have some portion of the stand area along a Partial
Retention road:

- Selection harvests – 47 stands
- Thinnings – 19 stands
- Removal harvests – 8 stands
- Clearcuts – 6 stands and
- One shelterwood stand.

The selection harvests and thinnings would have the same effect on visual quality as that mentioned above for the Retention stands. The effect on the nine stands with removal and shelterwood harvests would be a more open appearing, younger forest with more scattered overstory trees. Over time the younger trees would grow up and limit the view into the forest.

The six clearcuts (5 aspen, 1 jack pine) would have a more drastic effect on the appearance of the forest. Mature aspen and jack pine forest would be removed and replaced with an even-aged, young forest. Forest Plan guides for the Partial Retention VQO for temporary openings (clearcuts) calls for a maximum of 20 acres of seen area from the travelway (Forest Plan, page 49). The clearcuts within the Partial Retention VQO in this alternative comply with this guideline by ranging from 7 to 16 acres in size.

The logging slash from all of the above harvests (along the roads with a VQO of Partial Retention) would be lopped to two feet and scattered for 100 feet from the road to minimize the amount of slash seen from these roads (design measure 15).

The treatment proposed at the south end of Lilypad Lake is a selection harvest in a hardwood stand. There are two selection harvests; two shelterwood harvests, a red pine thinning and a clearcut are proposed along Allen Creek. The selection and thinning treatments would have little visual effect since only a small portion of the trees would be removed and a fully forested appearance would remain. The shelterwood treatments would create a more open appearance to the forests but would close as the understory grows up into the canopy. There would be no harvesting for the first 200 feet along the stream in the stand proposed for clearcutting along Allen Creek (design measure 9). This would limit the view of the harvest treatment from the creek. The aspen behind this strip would grow up quickly. There are also two removal harvests along Gaspardo Creek, also a Partial Retention zone. These harvests would remove much of the mature aspen and allow the spruce and fir to grow freely. This would reduce the height of the forest but maintain a forested view.

Where timber is harvested along snowmobile trails, slash would be lopped and scattered to lie within three feet of the ground for 50 feet from the trail (design measure 17). This will lessen the visual effect of the logging slash along the trail.

Wild and Scenic Rivers
There are no treatments proposed within the Brule River corridor so there would be no effect on that river corridor from this project.

The one-quarter mile wide corridor of the North Branch of the Pine River covers an area of approximately 2,500 acres. Part of the purpose of this project is to restore part of the “long lived species” component to both upland and lowland areas within the river corridor. The restoration of these species within the corridor is key to maintaining and restoring the health of the riparian area for a variety of wildlife species as well as for the health of the river.

Within this corridor there are a total of 200 acres would be affected by harvest treatments under this alternative. Of these acres, 105 acres are selection harvests in hardwood stands where the future objective and long-term effects would be the development of uneven-aged structural diversity, increased species diversity, large tree development, and increased growth rates.

The short-term effect would be to open the forest canopy, which would allow more sunlight to penetrate. The more open conditions would allow for the development of a denser understory layer of vegetation. Also, for the short term, some logging slash would be evident on the forest floor.

Species diversity would be enhanced in some of the hardwood stands within this river corridor with species such as hemlock, northern white northern white cedar and yellow birch planted under the hardwood trees in canopy gaps.

Another 84 acres are maturing jack pine plantations where removal type harvests are proposed to replace the short-lived jack pine with longer-lived species such as white pine, red pine, and red oak. The white pine and oak would be underplanted. The effect of these removal harvests would be a loss of a portion of the taller jack pine trees along the North Branch of the Pine River. Over time these trees would be replaced with the longer-lived species of white pine, red pine and oak (also balsam fir for a short time). In time these stands would become more diverse (than a monoculture of jack pine plantation) and would be more visually appealing than dying and fallen over jack pine as it matures. Slash from logging operations would be visible for a few short years.

The remaining acres include five acres of aspen with a removal harvest to release an established hardwood understory (replacing short-lived aspen with longer-lived hardwood) and six acres of thinning of red pine (develop big trees faster).

No harvest activities would occur within 150 feet of the river under any alternative (this would limit views into the stand), nor would there be any road construction within that corridor (design measure 20). The scenic remarkable features would be maintained along the river.

Under-planting species such as northern white northern white cedar, tamarack, spruce, white and red pine would be implemented in selected stands along the forested edge of the river. Over time these trees would provide seed to help establish trees closer to the rivers edge where it is currently open or alder is growing. The proposed planting and harvesting should restore long-lived species by

3.6.3.3 Alternative 3 - Recreation

There are segments of 18 roads totaling 7.5 miles that would be needed for logging with this alternative that are also part of a snowmobile trail. The same situation and discussion applies to this alternative as mentioned above in Alternative 2 but with less road segments and less distance involved.

Because of the emphasis on interior habitat with this alternative, more roads were decommissioned. A total of approximately 46 miles of road were identified for closing. This will limit motorized access more than in alternative 2. No road construction is suggested for this alternative.

Visual Quality
The visual effects of harvesting with this alternative in the areas with Retention and Partial Retention VQOs would be nearly the same as that described with Alternative 2 except that 5 out of 6 of the clearcut harvests would be dropped. The one remaining clearcut would be in a jack pine stand along FR2174. This alternative would have much less clearcutting in general for those who find clearcuts visually displeasing even in the modification VQO areas.

Wild and Scenic Rivers
The proposed treatments and effects would be the same as in Alternative 2. The treatments in this corridor do not vary by alternative.

3.6.3.4 Alternative 4 - Recreation

There are segments of 26 roads totaling 11.1 miles that would be needed for logging with this alternative that are also part of a snowmobile trail. The same situation and discussion applies to this alternative as mentioned above in Alternative 2 but with two more roads and 0.6 more miles involved.

Similar distances of roads were identified for decommissioning with this alternative (approximately 16 miles). A similar effect on roaded recreation opportunities can be expected. Comments were received during scoping expressing concern about the closure of specific roads that have traditionally provided access for hunting and fishing. These roads were left open under this Alternative. Also the same 1.9 miles of road construction is proposed as was in

alternative 2. This would create a very minor increase in access.

Visual Quality
The visual effects of harvesting with this alternative in the areas with Retention and Partial Retention VQOs would be nearly the same as that described with Alternative 2 except for the addition of four clearcuts for aspen regeneration and a removal harvest that would change to a clearcut treatment along roads with Partial Retention VQOs. All of these clearcut areas would comply with Forest Plan guidelines by being less than 20 acres. There would also be a clearcut in a Retention VQO along Highway 70, which would comply with Forest Plan guidelines, by being less than 10 acres.

Wild and Scenic Rivers
The proposed treatments and effects would be the same as in Alternative 2. The treatments in this corridor do not vary by alternative.

3.6.3.5 CUMULATIVE EFFECTS -RECREATION

Recent recreation use within the project area has been in harmony with past management practices. Recreation activities such as hunting, fishing, berry picking, camping, canoeing, fishing, and snowmobiling are fully compatible with timber and wildlife management practices and the associated design measures. It has been suggested that timber harvesting in an area would preclude recreational uses in that area. There has been no evidence of this assumption on the Eagle River-Florence District. Recreational use at developed campgrounds has been very stable over the past decade while at the same time, timber sales have been occurring across the district (district use records and personal communication with Jeff Herrett, Recreation Assistant Ranger.).

The action alternatives are consistent with recreation opportunity spectrum objectives, and would have only very minimal or no effects on recreation access, settings, or opportunities. It is anticipated that there would be additional project area timber harvesting activities in the reasonably foreseeable future (10-15 years). Also, some additional road construction or reconstruction might be necessary. Recreation access, settings, and area impacts would be expected to be similar to those described above with respect to timber harvesting. The combined effects of past actions, the proposed action and its alternatives, and actions in the reasonably foreseeable future are not expected to have cumulative impacts on recreation access, settings, or opportunities within the project area or on adjacent lands.

Visual Quality
There is occasional visual evidence of past harvesting activity along the main roads within the project area. Much of this disturbance was temporary and is no longer noticeable. Areas where even-aged management created temporary openings have longer lasting visual effects when long established forests are replaced with younger forests. A summary of past harvest activities is mentioned in Section 3.1.3.5 and can be found in the project file along with a map of where they have occurred. This section also mentions three red pine thinning timber sales that have units yet to be harvested. The visual effects of these harvests will be very minor and of short duration.

The additional effect on visual quality from this project will depend on which alternative is chosen and was described previously in this section.

Timber harvesting is expected to begin as early as 2003 and may last several years depending on the area. All alternatives would meet the visual quality objectives of retention, partial retention, and modification. The use of site-specific design measures would help meet these visual quality objectives. Any future harvest activities, related road work or wildlife opening projects within this project area, beyond this proposal would not likely be evaluated for at least 10 years.

WILD AND SCENIC RIVERS
The North Branch of the Pine River was used in the late 1800's to float logs downstream to mills (log drives). In order to do this, rocks and other obstructions such as large woody debris were removed from the streambed. Dams were built to help flush

the logs downstream. This caused the release of large quantities of water that caused extreme flooding. This flooding and the movement of logs caused stream channels to scour and resulted in the wide, shallow channels that exist today. Much sediment went into the river. Historical logging methods also resulted in the removal of most of the streamside vegetation that resulted in unstable banks.

Most of the area had been cut over in the late 1800's and early 1900's like the rest of Northern Wisconsin. Historic accounts of the Pine River before the logging era speak of a riparian vegetative component much different from what exists today. Lowland areas were forested, dominated by northern white northern white cedar while the upland was dominated by pine, particularly white and red.

Today the corridor looks much different; the lowland is dominated by alder shrub while the upland along the river is dominated by species shorter-lived species such as jack pine (planted by the Civilian Conservation Corps) and aspen. Although the Forest now emphasizes recruitment of long-lived species within the riparian area, vegetative manipulation from the past along with beaver activity has resulted in a relatively young riparian area. This shift in vegetative component has not only affected riparian dependant wildlife species but has affected the river particularly in the lack of recruitment of large woody debris. The upland area further from the river is forested in sugar maple dominated hardwood stands.

3.7 TRANSPORTATION

3.7.1 Methodology

The project area encompasses portions of four MAs: 1.1, 2.1, 4.1, 8.1, and 9.2 (Appendix B, Map 3). Refer to Appendix B, Maps 2-4 for a visual display of the existing transportation system.

The Forest Plan provides transportation management direction for each MA. Part of that direction is the targeted road density for each MA (Forest Plan pages IV-93, IV-101, IV-117, IV-142, and IV-152, 155).

Management Areas 1.1, 2.1, and 4.1 have an open road density objective of not to exceed 4 miles/mi.^{2}. The road management objective for MA 8.1 states that roads may be present or nearby but are often closed to protect the uniqueness of the area. MA 9.2 density objectives are to remain at current low levels or below. No new roads will be constructed in this management area, but major transportation routes and crossings will be maintained or improved as needed for public travel.

Road densities include only NFS lands and include all roads within those lands. The Nicolet Forest Plan recognizes all roads that the public is driving with at least a four wheel drive some portion of the year.

The mileages for the project are only those miles that lie on National Forest Land. The road densities are calculated by dividing the area of land, in square miles, into the mileages for each particular area. The areas are only considering the National Forest Land base, as are the mileages. (See Project File for analysis process and background information).

3.7.1.1 MEASUREMENT INDICATORS

Issue number 3, transportation system management was defined by conflicting views on the possibility of increasing access for illegal activities versus the need to maintain access for administrative and public use (see section 2.3.2.3).

Indicators that will be used to compare alternatives based on this issue are: miles of road constructed, reconstructed and decommissioned and open and closed road density.

3.7.2 Existing Condition

The Northwest Howell project area is accessed from State Highways 55(FH 2) and 70(FH 1). These highways run through the heart of the project and account for 15.99 miles of open road. These are paved asphalt highways under the jurisdiction of the state of Wisconsin. There is also a short, 0.21 mile, section of State Highway 139(FH 30) along the northeast boundary of the project, also under the jurisdiction of the

state of Wisconsin. County Highway A (FH 49) is a paved asphalt road, which runs through the northwest portion of the project for 0.50 miles, it is under the jurisdiction of Vilas County.

The remaining non-private roads are under federal ownership and jurisdiction or under joint jurisdiction with the towns in the project area, which consist of the towns of Hiles, Alvin, and Popple River, and the Forest Service.

There are 40.14 miles of existing collector system roads. These are double lane with gravel surfacing with exception of FR 2176, which is a double lane asphalt surfaced road. They are maintained on a regular basis to provide for public safety, and are open for all season use.

There are 44.25 miles of traffic services level C, local system roads. These are generally single lane with turnouts and constructed of improved pit run surface or native surface. They are only maintained periodically, either for high clearance vehicles or basic custodial care to minimize deterioration of the roadbed, reduce damage to the road surface, and provide for public safety. Of these, 41.96 miles are open to vehicle traffic and 2.29 miles are open to foot traffic only.

There are 61.57 miles of traffic service level D local system roads. These are generally single lane constructed of native surface. These roads are only maintained periodically, normally when resources activities occur. Of these, 43.64 miles are open to vehicle traffic and 17.93 miles are open to foot traffic only or administrative use

There are approximately 235.97 miles of unclassified local non-system roads. These are usually single lane with native surfacing. Of these, about 127.35 miles are currently open to vehicle traffic, and 108.62 miles are currently closed to vehicle traffic.

None of these are maintained since they are not part of the existing Forest Service road system unless environmental damage is occurring, and many roads are overgrown or otherwise no longer usable.

There is an unknown amount of non-system private roads (not included in the project record data tables), located on the approximately 21.3 square miles of private land within the Northwest Howell project area. The non-system private roads are used to access private camps or other resources and are not included in the road density figures presented below.

The current combined open road density of existing system roads and unclassified roads (non-system roads) is 3.95-miles/sq. mi. This figure includes all open system roads, and unclassified roads for a total of 269.79 miles of open roads on federal land within the project area.

This figure is provided for comparison purposes only. It is intended with this project, to reduce the overall road density on NFS lands and move toward an optimum road system to support land management activities as identified in the Forest Plan.

The Forest Service must find an appropriate balance between benefits of access to national forests and the costs of road-associated effects to ecosystem values. This is done through a roads analysis.

The objective of roads analysis in the Forest Service is to provide line officers with critical information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions.

The roads analysis assesses the extent and current condition of the road system on a national forest. Comparing the current condition to a desired condition identifies the need for change such as relocating, upgrading, or decommissioning existing roads.

This process was implemented for the Northwest Howell Project. The results of this analysis are located in the project file.

Summary of the Roads Analysis Process findings/recommendations include

➢

- 81.71 miles of roads that would be reconstructed or added to the classified road system.
- Most of these roads would only require reshaping, brushing, and some curve realignment. In some cases, culverts would be needed to protect riparian zones.
- 46.62 miles of roads were identified for decommissioning. Many of these roads are not needed for management purposes and have some potential detrimental effect on the forest.
- There are also 123.5 miles of roads within the project boundary that currently don't have any recommendation on them. Their values have not been determined so they have been place in storage.

When new information, on any of these roads, becomes available recommendations will be made on them.

Not all findings/recommendations from the roads analysis are being proposed during this project.

A breakdown of the road densities within the project area (by MA) is provided in Table 3.7.3-1.

3.7.3 Effects on Transportation Network

Based on the above projects and rationale, overall road densities within the project area and associated MAs are expected to move towards and /or meet Forest Plan Objectives under any of the action alternatives.

The bounds of analysis for transportation are the project area. This area was selected because the most immediate (within 5-7 years) direct and indirect changes to the transportation network would occur within the confines of project area and management activities proposed. The location of the road activities proposed in this project can be found on maps 10-15 in Appendix B.

The environmental consequences associated with construction and maintenance of local roads were described under Local Road Construction in the FEIS for the Forest Plan (pages IV-11 through IV-19) and as such have been incorporated by reference.

In the discussion that follows, all the action alternatives are contrasted against Alternative 1.

Table 3.7.3-1 Summary comparison of Table 1Alternatives in miles.

SYSTEM ROAD	ALT. 1	ALT. 2	ALT. 3	ALT. 4
Construction	0	1.90	0	1.90
Reconstruction	0	23.39	17.52	23.39
TOTAL SYSTEM ROADS				
Open	*142.44*	*162.85*	*155.30*	*163.02*
Closed	*20.22*	*29.07*	*26.38*	*30.74*
TOTAL	*162.66*	*191.92*	*181.68*	*193.76*
Proposed for Decommissioning	0	0.23	0.55	0.10
UNCLASSIFIED ROADS				
TOTAL UNCLASSIFIED ROADS				
Open	*127.35*	*99.71*	*86.42*	*100.00*
Closed	*108.62*	*90.59*	*83.59*	*90.44*
TOTAL	*235.97*	*190.30*	*170.01*	*190.44*
To be Decommissioned	0	18.08	46.07	15.93
Converted to System Roads	0	8.46	7.62	10.21
Reconstruction to System Rd	0	19.13	13.76	19.13

3.7.3.1 DIRECT AND INDIRECT EFFECTS ON THE TRANSPORTATION SYSTEM OF ALTERNATIVE 1

The existing transportation system would be used and routinely maintained. No construction, reconstruction, road closures, or improvements would occur. Existing unclassified roads would remain at their current closure status. All road densities would remain the same. See Appendix B for a display of the existing transportation system.

Table 3.7.3.1-1 Existing Project Transportation Mileages and Densities within project area.

EXISTING CONDITION													
MA	**A**	**B**	**C**	**C**	**D**	**D**	**Unclassified**	**Unclassified**	**Total**	**Total**	**Total**	**Sq Miles**	**Acres**
	Open	**Open**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**			
MA 1.1 mileage	3.80	8.49	10.92	0.00	18.78	5.72	33.34	24.67	75.33	30.39	105.72	19.65	12578.00
Density mi/mi^2	0.19	0.43	0.56	0.00	0.96	0.29	1.70	1.26	3.83	1.55	5.38		
MA 2.1 mileage	11.73	17.75	23.44	2.01	17.82	7.62	69.89	61.77	140.63	71.40	212.03	31.94	20440.00
Density mi/mi^2	0.37	0.56	0.73	0.06	0.56	0.24	2.19	1.93	4.40	2.24	6.64		
MA 4.1 mileage	1.36	7.11	5.57	0.00	6.46	4.36	15.32	9.93	35.82	14.29	50.11	10.35	6623.00
Density mi/mi^2	0.13	0.69	0.54	0.00	0.62	0.42	1.48	0.96	3.46	1.38	4.84		
MA 8.1 mileage	0.28	0.97	0.05	0.00	0.00	0.21	0.94	0.60	2.24	0.81	3.05	0.72	459.00
Density mi/mi^2	0.39	1.35	0.07	0.00	0.00	0.29	1.31	0.84	3.12	1.13	4.25		
MA 9.2 mileage	1.33	4.02	1.98	0.28	0.58	0.02	6.95	11.65	14.86	11.95	26.81	5.53	3540.00
Density mi/mi^2	0.24	0.73	0.36	0.05	0.10	0.00	1.26	2.11	2.69	2.16	4.85		
Total miles	18.50	38.34	41.96	2.29	43.64	17.93	126.44	108.62	269.79	128.84	398.63	68.19	43640.00
Density mi/mi^2	0.27	0.56	0.62	0.03	0.64	0.26	1.85	1.59	3.95	1.89	5.84		

3.7.3.2 DIRECT AND INDIRECT EFFECTS ON THE TRANSPORTATION SYSTEM OF ALTERNATIVE 2

This alternative was designed to meet the Purpose and Need for maintaining a road system that allows management of NFS lands and provides for public access while meeting other resource objectives. (See Purpose and Need section 1.3).

According to the Forest Plan, maximum skidding distance would be 1320' (0.25 miles), in Management Areas X.1, making it necessary to reconstruct or add to the classified road system.

Likewise, many roads that aren't needed for management activities would be decommissioned with this project.

Overall, the total road mileage would be reduced by 16.18 miles, of which 7.33 miles are open, further reducing the potential for illegal dumping or poaching.

23.39 miles of road would be reconstructed along with 8.46 miles of road that would be converted to system roads. These roads would be maintained or improved to allow for management activities.

They would not affect any change on the current road density for this project because all roads would be returned to their current closure status, open roads would remain open and closed roads would be closed after management activities occurred.

The maintenance or improvements that would occur on these roads would consist of reshaping the roadway, brushing and minimal tree removal in areas with poor curve alignment.

These minor improvements have the potential to increase access into areas but aren't very likely to. They are to be maintained for high clearance vehicles such as logging trucks or four wheel drive

vehicles and many are only passable in the frozen winter periods.

1.90 miles of newly constructed low standard roads would be needed for management activities. Of this, 1.7 miles are would be closed after management activities occurred.

0.2 miles would remain open because they do not provide additional access. These landings may have some increase effect on illegal dumping but would be minimal and would probably not increase the amount of dumping because of the abundance of other places to dump.

There are approximately 18 miles of road segments that are proposed for permanent closure and removal from the road system (decommissioning) with this alternative. This could affect motorized access by recreationists since these road segments would no longer be available. However, many of these road segments are short and other roads already access most areas.

A complete analysis of the road system of this project area was done in conjunction with the Northwest Howell EIS. This Northwest Howell Roads Analysis Process can be found in the project file.

The document contains a road-by-road list with recommendations for the future status of each road and rankings of high, medium or low for access needs for recreation, timber, and private land.

Roads included for closing (decommissioning) ranked lower for these needs. With the decommissioning of these roads, there will be less motorized access, though most of these roads are short segments and alternate access is available to these areas.

With this alternative, the following changes to the existing road network displayed in Alternative 1 would occur:

- 1.90 miles of new forest system roads would be constructed.
- 23.39 miles of roads would be reconstructed (19.13 mi. of unclassified roads and 4.26 of system roads).
- 8.46 miles of unclassified roads would be converted to system roads.
- 18.08 miles of unclassified roads would be decommissioned.
- 0.23 miles of classified roads would be decommissioned.

Table 3.7.3.2-1 Transportation Mileages and Densities of Alternative 2 within project area

	Alt2												
MA	**A**	**B**	**C**	**C**	**D**	**D**	**Unclassified**	**Unclassified**	**Total**	**Total**	**Total**	**Sq miles**	**Acres**
	Open	**Open**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**			
11 mileage	3.80	8.49	10.92	0.00	22.00	7.27	27.07	20.97	72.28	28.24	100.52	19.65	12578.00
Density mi/mi^2	0.19	0.43	0.56	0.00	1.12	0.37	1.38	1.07	3.68	1.44	5.11		
21 mileage	11.73	17.75	23.44	2.01	31.08	13.55	53.84	49.11	137.84	64.67	202.51	31.94	20440.00
Density mi/mi^2	0.37	0.56	0.73	0.06	0.97	0.42	1.69	1.54	4.32	2.02	6.34		
41 mileage	1.36	7.11	5.57	0.00	10.38	5.60	11.39	8.74	35.81	14.34	50.15	10.35	6623.00
Density mi/mi^2	0.13	0.69	0.54	0.00	1.00	0.54	1.10	0.84	3.46	1.39	4.85		
8.1 mileage	0.28	0.97	0.05	0.00	0.00	0.21	0.94	0.60	2.24	0.81	3.05	0.72	459.00
Density mi/mi^2	0.39	1.35	0.07	0.00	0.00	0.29	1.31	0.84	3.12	1.13	4.25		
92 mileage	1.33	4.02	1.98	0.28	0.59	0.15	6.47	11.17	14.39	11.60	25.99	5.53	3540.00
Density mi/mi^2	0.24	0.73	0.36	0.05	0.11	0.03	1.17	2.02	2.60	2.10	4.70		
Total miles	18.50	38.34	41.96	2.29	64.05	26.78	99.71	90.59	262.56	119.66	382.22	68.19	43640.00
Density mi/mi^2	0.27	0.56	0.62	0.03	0.94	0.39	1.46	1.33	3.85	1.75	5.61		

See Appendix B, Maps 10-11 for a display of the Alternative 2 transportation system.

3.7.3.3 Direct and Indirect Effects on the Transportation System of Alternative 3

The access management strategy for this alternative is eliminating any new construction and to reduce the amount of unneeded roads within the project area.

This alternative is tied to meeting the Purpose and Need for maintaining a road system that allows management of NFS lands and provides for public access while meeting other resource objectives (See Purpose and Need section 1.3).

The roads analysis has identified high priority roads that could be decommissioned. Not all unneeded roads would be decommissioned under this project because of limited field data and incomplete inventories, but the highest priority candidates (the highest priorities were ones that should be closed for TES, remote habitat or other wildlife needs as determined in the RAP process) have been designated and others will be evaluated in future projects.

About 46.6 miles of roads would be decommissioned under this alternative. This would help to reduce the amount of illegal ATV activity along with the potential to help reduce illegal dumping.

This would reduce some recreational use such as berry picking and hunting but the effect should be minimal because these roads currently have limited use.

About 17.52 miles of road would be reconstructed along with 7.62 miles of road that would be converted to system roads. These roads would be maintained or improved to allow for management activities. They would not affect any change on the current road density for this project because all roads would be returned to there current closure status, open roads would remain open and closed roads would be closed after management activities occurred.

The maintenance or improvements that would occur on these roads would consist of reshaping the roadway, brushing and minimal tree removal in areas with poor curve alignment.

These minor improvements have the potential to increase access into areas but aren't very likely to. They are to be maintained for high clearance vehicles such as logging trucks or four wheel drive vehicles and many are only passable in the frozen winter periods.

With this alternative, the following changes to the existing transportation system would occur:

- 17.52 miles of system roads would be reconstructed (13.76 mi. of unclassified roads and 3.76 of system roads).
- 7.62 miles of unclassified roads would be converted to system roads.
- 46.07 miles of unclassified roads would be decommissioned.
- 0.55 miles of classified roads would be decommissioned.

See Appendix B, Maps 12-13 for a display of the Alternative 3 transportation system.

Table 3.7.3.3-1 Transportation Mileages and Densities of Alternative 3 within project area

Alt 3													
MA	**A**	**B**	**C**	**C**	**D**	**D**	**Unclassified**	**Unclassified**	**Total**	**Total**	**Total**	**Sq Miles**	**Acres**
	Open	**Open**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**			
1.1 mileage	3.80	8.49	10.92	0.00	18.93	6.61	26.13	19.14	68.27	25.75	94.02	19.65	12578.00
Density mi/mi^2	0.19	0.43	0.56	0.00	0.96	0.34	1.33	0.97	3.47	1.31	4.78		
2.1 mileage	11.73	17.75	23.44	2.01	27.49	12.56	43.76	46.16	124.17	60.73	184.90	31.94	20440.00
Density mi/mi^2	0.37	0.56	0.73	0.06	0.86	0.39	1.37	1.45	3.89	1.90	5.79		
4.1 mileage	1.36	7.11	5.57	0.00	9.49	4.56	10.29	8.26	33.82	12.82	46.64	10.35	6623.00
Density mi/mi^2	0.13	0.69	0.54	0.00	0.92	0.44	0.99	0.80	3.27	1.24	4.51		
8.1 mileage	0.28	0.97	0.05	0.00	0.00	0.21	0.94	0.27	2.24	0.48	2.72	0.72	459.00
Density mi/mi^2	0.39	1.35	0.07	0.00	0.00	0.29	1.31	0.38	3.12	0.67	3.79		
9.2 mileage	1.33	4.02	1.98	0.28	0.59	0.15	5.30	9.76	13.22	10.19	23.41	5.53	3540.00
Density mi/mi^2	0.24	0.73	0.36	0.05	0.11	0.03	0.96	1.76	2.39	1.84	4.23		
Total miles	18.50	38.34	41.96	2.29	56.50	24.09	86.42	83.59	241.72	109.97	351.69	68.19	43640.00
Density mi/mi^2	0.27	0.56	0.62	0.03	0.83	0.35	1.27	1.23	3.54	1.61	5.16		

3.7.3.4 Direct and Indirect Effects on the Transportation System of Alternative 4

The access management strategy for this alternative is to maintain a road system that allows management of NFS lands and provides for public access while meeting other resource objectives. (See Purpose and Need section 1.3).

This alternative would address the concerns of individuals who identified specific roads as important for recreational purposes and traditional uses by the public. These roads were designated as unneeded by the Roads Analysis Process but, due to this new information and analysis, were retained under Alternative 4.

The transportation system for this alternative is the same as Alternative 2 except for 2.28 miles less of road decommissioning, would be implemented. Of this mileage, 2.14 miles are unclassified and 0.14 miles classified.

Table 3.7.3.4-1 Transportation Mileages and Densities of Alternative 4 within project area See Appendix B, Maps 14-15 for a display of the Alternative 4 transportation system.

Alt4													
MA	**A**	**B**	**C**	**C**	**D**	**D**	**Unclassified**	**Unclassified**	**Total**	**Total**	**Total**	**Sq Miles**	**Acres**
	Open	**Open**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**			
1.1 mileage	3.80	8.49	10.92	0.00	22.13	8.27	27.34	19.96	72.68	28.23	100.91	19.65	12578.00
Density mi/mi^2	0.19	0.43	0.56	0.00	1.13	0.42	1.39	1.02	3.70	1.44	5.13		
2.1 mileage	11.73	17.75	23.44	2.01	31.08	13.65	54.20	50.30	138.20	65.96	204.16	31.94	20440.00
Density mi/mi^2	0.37	0.56	0.73	0.06	0.97	0.43	1.70	1.57	4.33	2.07	6.39		
4.1 mileage	1.36	7.11	5.57	0.00	10.42	5.60	11.05	8.98	35.51	14.58	50.09	10.35	6623.00
Density mi/mi^2	0.13	0.69	0.54	0.00	1.01	0.54	1.07	0.87	3.43	1.41	4.84		
8.1 mileage	0.28	0.97	0.05	0.00	0.00	0.21	0.94	0.60	2.24	0.81	3.05	0.72	459.00
Density mi/mi^2	0.39	1.35	0.07	0.00	0.00	0.29	1.31	0.84	3.12	1.13	4.25		
9.2 mileage	1.33	4.02	1.98	0.28	0.59	0.72	6.47	10.60	14.39	11.60	25.99	5.53	3540.00
Density mi/mi^2	0.24	0.73	0.36	0.05	0.11	0.13	1.17	1.92	2.60	2.10	4.70		
Total miles	18.50	38.34	41.96	2.29	64.22	28.45	100.00	90.44	263.02	121.18	384.20	68.19	43640.00
Density mi/mi^2	0.27	0.56	0.62	0.03	0.94	0.42	1.47	1.33	3.86	1.78	5.63		

3.7.4 Cumulative Effects

The bounds of analysis for cumulative effects include the entire eastern half of the Chequamegon/Nicolet National Forest. The rationale for using this for the bounds of analysis is that they provide the best link to measure progress toward the projected road density objective for each MA and understanding transportation planning trends beyond the project area.

3.7.4.1 Past Activities

There was an extensive network of railroads developed for the logging of this project area during the late 1800's and early 1900's. This network was needed due to the lack of a river and stream network for the movement of logs
to area saw mills. Portions of this network are still visible today and include some of the unclassified roads within the project area. In addition, most of the collector, arterial and some local roads were developed during the CCC Era (1935-1942) resting on old railroad grades. Additional local roads were built in the late 1970's and 1980's. Some of the low standard local roads built in the late 1930's are now completely overgrown.

3.7.4.2 Present Activities

The road network for this project area consists of arterials, collector, and local roads. No new arterial or collector roads are planned for construction. Unclassified roads would be either decommissioned or added to the road system as open or closed (bermed) roadways or deferred until the next entry period.

Routine maintenance would occur on all arterials and collector roads within the project area into the foreseeable future.

There are currently 6 gravel pits within in the project area, which have been used for processed crushed aggregate source.

The Towns and Forest Service Maintenance Crews have used these sources in the past to maintain the existing arterial and collector roads to provide a safe drivable surface.

3.7.4.3 Future Activities

The road network for this project is, for the most part, in place. Very little construction would be needed to access new areas for management activities in the future. There are unclassified roads that would be added to the system network for future entries. There are also many unclassified roads that would be decommissioned in the future which would move the Forest closer to its plan levels.

Additional tables depicting road densities of the entire Forest are located in the Transportation report in the Project File. The effects on the road densities for all of the alternatives are small, 0.01 miles/mile^2 to 0.90 miles/mile ^{2}. There are currently 5113 miles of roads on the Nicolet over 1027 square miles so that any changes to a project area will appear small but are moving in the right direction.

Table 3.7.4.4-1 Existing Condition for Entire Eastern Zone (Nicolet) from 1/99 GIS Roads layer. Includes all management areas.

Existing Condition												
MA	**A**	**B**	**B**	**C**	**C**	**D**	**D**	**Total**	**Total**	**Total**	**Sq Miles**	**Acres**
	Open	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**	**Open**	**Closed**			
1.1 mileage	37.68	106.53	0.00	87.14	10.56	433.06	161.49	664.41	172.05	836.46	170.08	108851.00
Density mi/mi^2	0.22	0.63	0.00	0.51	0.06	2.55	0.95	3.91	1.01	4.92		
1.2 mileage	5.01	15.10	0.00	11.36	6.54	48.50	50.37	79.97	56.91	136.88	27.93	17876.00
Density mi/mi^2	0.18	0.54	0.00	0.41	0.23	1.74	1.80	2.86	2.04	4.90		
2.1 mileage	89.14	142.77	1.51	162.22	21.57	822.01	302.37	1216.14	325.45	1541.59	283.88	181686.00
Density mi/mi^2	0.31	0.50	0.01	0.57	0.08	2.90	1.07	4.28	1.15	5.43		
2.2 mileage	15.73	30.20	0.00	39.52	11.58	179.03	136.02	264.48	147.60	412.08	74.94	47964.00
Density mi/mi^2	0.21	0.07	0.00	0.53	0.15	2.39	1.81	3.20	1.97	5.50		
3.1 mileage	55.00	78.93	0.64	74.29	7.46	423.44	135.73	631.66	143.83	775.49	147.49	94396.00
Density mi/mi^2	0.37	0.54	0.00	0.50	0.05	2.87	0.92	4.28	0.98	5.26		
3.2 mileage	4.14	37.14	0.00	24.11	7.52	160.87	66.71	226.26	74.23	300.49	62.63	40084.00
Density mi/mi^2	0.07	0.12	0.00	0.38	0.12	2.57	1.07	3.14	1.19	4.80		
4.1 mileage	55.67	79.76	3.04	74.31	10.34	411.73	98.74	621.47	112.12	733.59	145.44	93079.00
Density mi/mi^2	0.38	0.55	0.02	0.51	0.07	2.83	0.68	4.27	0.77	5.04		
4.2 mileage	5.48	8.96	0.25	5.10	0.94	44.68	20.71	64.22	21.90	86.12	18.09	11579.00
Density mi/mi^2	0.30	0.10	0.01	0.28	0.05	2.47	1.14	3.16	1.21	4.76	855.55	
4.3 mileage	0.76	2.83	0.00	1.08	0.00	6.08	1.84	10.75	1.84	12.59	3.87	2479.00
Density mi/mi^2	0.20	0.73	0.00	0.28	0.00	1.57	0.48	2.78	0.48	3.25	689.34	
5.0 mileage	7.43	22.39	0.00	1.17	0.02	0.71	79.60	31.70	79.62	111.32	52.97	33902.00
Density mi/mi^2	0.14	0.20	0.00	0.02	0.00	0.01	1.50	0.38	1.50	2.10	714.38	
6.2 mileage	7.39	10.89	0.00	6.43	10.45	27.72	47.11	52.43	57.56	109.99	25.87	16556.00
Density mi/mi^2	0.29	0.42	0.00	0.25	0.40	1.07	1.82	2.03	2.23	4.25	456.37	
8.2 mileage	3.29	16.73	0.00	8.59	0.00	20.48	1.90	49.09	1.90	50.99	12.26	7844.00
Density mi/mi^2	0.27	1.37	0.00	0.70	0.00	1.67	0.16	4.01	0.16	4.16	321.13	
9.2 mileage	0.00	0.57	0.00	0.00	0.00	2.23	2.10	2.80	2.10	4.90	1.94	1239.00
Density mi/mi^2	0.00	0.29	0.00	0.00	0.00	1.15	1.08	1.45	1.08	2.53	260.43	
Total								3915.38	1197.11	5112.49	1027.40	657535.00
								3.81	1.17	4.98		

3.8 ECONOMICS

3.8.1 Existing Condition of the local area

The local area consists of small towns, unincorporated villages, some rural year-round and vacation homes, hunting camps, farms, and forestland. The main industries are logging, farming, forest products manufacturing (paper and lumber milling), and tourism.

The forest products industry plays a vital role to the economic well being of the local economy. National Forest timber harvests generate substantial economic benefits to the local economy. No specific figures are available at the local level, but in the northeastern Wisconsin region, wood-based sectors account for about 21% of the total economic output.

The 25% Funds are equal to 25% of the gross receipts of the Forest and are distributed by the Department of Agriculture. Both funds are used by local school districts and for the improvement of county and town roads. PILT funds are paid by the Department of the Agriculture to the state of Wisconsin that distributes them to the counties in which the Forest is located. Since PILT funds are distributed by the Department of Agriculture and none of the alternatives would affect that funding they are not considered in this analysis.

Forest County has approximately 344,030 acres (as of September, 1996) of NFS land within its boundaries. In FY 2000, $454,695 was distributed through the 25% Fund and $36,098 were distributed through PILT to Forest County. (25% Fund and Payment in Lieu of Taxes Information for Forest County, USDA Forest Service, February 2001).

3.8.2 Existing Condition of the Employment Situation

Unemployment has historically been high in Northeastern Wisconsin and it is presently above the state average. The harvest in FY 1998 (October 1, 1997 through September 30, 1998) of 147.9 MMBF from the Chequamegon-Nicolet National Forest supported approximately 2,093 timber-related jobs and $127 million in employment-related incomes.

In addition, about $19.1 million in federal income taxes was generated from this income. (Employment, income, and program level account for the Fiscal Year Ended September 30, 1998)

The 1998 TSPIRS Report for the Chequamegon-Nicolet National Forest estimates that approximately 14.14 jobs/ million board feet of timber are created or sustained.

These jobs are substitutional in nature when viewed from an area wide industry perspective. For example, individuals move from job to job as logging takes place.

Employment in the logging industry fluctuates based on market and weather conditions. Other jobs result from indirect and induced impacts from the timber sale program. Benefits to local industry and subsequently filtered through the economy have not been accounted for.

The effects analysis in the recreation section (see 3.6.3 and 3.6.3.5) determined that the action alternatives are consistent with recreation opportunity spectrum objectives, and would have only very minimal or no effects on recreation access, settings, or opportunities.

Therefore, economic impacts to recreation and tourism will not be analyzed under the economic analysis for this project. See also section 2.3.1

3.8.3 Effects on Economics

Introduction
For this portion of the economic analysis, the Quick Silver Forestry Investment Analysis program was used (Vasievich, 1998) to address economic efficiency by calculating the present value of costs, the present value of benefits, the present net value, and benefit/cost ratio of implementing each alternative.

By their nature, economic boundaries are difficult to define. However, for the purposes

of this analysis, it is assumed that the majority of the economic impact will be realized in Forest County. This is a convenient way to estimate impacts since much contextual economic information is gathered and reported at the county level.

Therefore, the impacts will be estimated for this area and put into the next larger context, the regional level. The timeframe associated with this economic impact analysis will be the present time through the completion of activities proposed in this analysis.

The Forest Service is limiting the of economic efficiency and impact analyses to those monetary values that are readily available and market-defined. This analysis is not intended to show every possible tradeoff, but, rather, to consistently and reasonably compare the costs, benefits, and efficiencies between the alternatives.

3.8.3.1 Direct and Indirect Effects on Economics of Alternative 1

Under this alternative, none of the proposed actions (or alternatives to them) would be implemented within the Northwest Howell project area. Traditional uses and maintenance activities, such as fire prevention, road maintenance, and recreational use would continue, however. There would be no short or long-term direct or indirect economic costs or benefits realized as a result of this alternative.

This alternative would not harvest any wood products. Thus, no jobs or raw materials for local industry would be provided from this project area.

This alternative would neither incur any costs nor yield any revenues. There would be no direct benefits to the local community from increased job availability.

Selection of Alternative 1 would mean a loss of wood supply for area mills and less revenue for the Federal Treasury as well as for local governments. When comparing dollars returned, this alternative would be fourth. There would not be as large of an increase in the growth and value of the stands in the project area, so future revenues would be less.

3.8.3.2 Direct and Indirect Effects on Economics of Alternatives 2, 3 and 4

Harvest of wood products would provide raw materials to local industry and create jobs related to harvesting and processing timber.

Growth and value of products from the residual stands would continue to increase as a result of improved vigor with this harvest entry. Timber harvest in the past, and anticipated timber harvest in the future has and would continue to be a stable employment and revenue source for local communities and governments.

Local industries have had
and would continue to receive raw timber products for processing.
Raw timber is a source of considerable income to the local economy. A multiplier of $1,009,065 / MMBF is being used in this analysis to estimate the expected income generated under each alternative. The source of this multiplier is the 1998 TSPIRS Report for the Chequamegon-Nicolet National Forest.

As noted above, the harvest of timber generates income in the local community. It logically follows that employment is also generated. Jobs are created through the harvest, hauling, processing, and manufacturing of wood products. Secondary jobs, such as transportation and service-related occupations, are also affected by the processing of wood.

The 1998 TSPIRS Report for the Chequamegon-Nicolet National Forest estimates that approximately 14.14 jobs/ million board feet of timber are created/sustained. This is the most recent available report as a source for an employment multiplier.

Through the duration of the timber sale contracts, Alternatives 2, 3 and 4 would help to maintain current employment levels, current sawlog and pulpwood supplies to area mills, and revenues to both federal and local governments.

Out of the action alternatives, Alternative 3 has the highest present net value and benefit cost ratio however produces less return to local incomes, generates less

commodities to local industries and creates fewer jobs. Although Alternate 3 produces less wood products than Alternative 2 and 4, it has fewer costs associated with site prep, road construction and reconstruction and sale preparation.

Payments to Counties

Twenty-five percent of gross receipts from timber sales on the Chequamegon-Nicolet National Forest are collected and paid to the State of Wisconsin. These monies are then distributed to each respective county of origin. Amount generated by alternative is displayed in Table 3.8.3.2-1.

Table 3.8.3.2-1 Comparison of effects on Economics by Alternative
This table summarizes the comparative economic efficiency and economic impacts that would be expected under each alternative.

	Alt 1	Alt 2	Alt 3	Alt 4
PV-Benefits	$0.00	$1,617,944	$1,224,695	$1,704,921
PV-Costs	$0.00	$1,519,518	$1,055,343	$1,564,735
Present Net Value	$0.00	$98,427	$169,352	$140,186
Benefit-Cost Ratio	0	1.06	1.16	1.09
Commodities Produced a breakdown by product and amount is located in the project file.	0	23 MMBF	16 MMBF	25 MMBF
Income generated	$0.00	$23,208,495	$16,145,040	$25,226,625
Jobs created	0	325	226	354
Payments to Counties	$0.00	$404,486	$306,173	$426,230

3.8.3.5 Cumulative Effects on Economics of All Alternatives

Past Effects
Harvesting dating back to the late 1800's supported several small towns in the area, including a large sawmill at Alvin, which relied on the pine and hardwood sawtimber from this project area.

Currently, sawtimber goes to mills in Long Lake, Tipler, Florence, Laona, Land O'Lakes and Prentice, Wisconsin. Pulpwood goes to mills in Wisconsin Rapids and Niagara, Wisconsin and also to Quinnesec and Sagola, Michigan.

Present / Future Effects
Employment in the logging industry fluctuates based on market and weather conditions. Selection of Alternative 1 would mean a loss of wood supply for area mills and less revenue for the Federal Treasury as well as local governments.

Through the duration of the sale contracts, the action alternatives would help (at varying levels by volume of action alternative) to maintain current employment levels, current sawlog and pulpwood supplies to area mills, and revenues to both Federal and local governments.

Over the long term, Silvicultural treatments included in the action alternatives would promote the project area's capacity to produce both a greater quantity and a better quality of wood products. The alternatives would vary in this by the number of acres treated. By acres treated the alternatives are ranked as follows: Alternative 1 – fourth;

Alternative 2 – second; Alternative 3 – third; Alternative 4 – first.

The average stumpage value on the Eagle River-Florence District has gone from $54 per MBF in FY1996 to $109 per MBF in FY2000. Generally, stumpage rates are expected to increase in the future.

The timber harvest, on the District in FY2001 was 21 MMBF. As of January 1, 2002, the District had 40 open timber sale contracts, with 20 different purchasers. Most of these purchasers were small businesses, which market their products to sawmills, wafer board mills, or pulp mills in northern Wisconsin and central Upper Michigan.

3.9 HERITAGE

3.9.1 Affected Environment

The NW Howell Project Area contains a wide variety of heritage or cultural resources, both pre-European and post-European contact, representing thousands of years of human use of the area.

Surveys were undertaken in the project area to determine if cultural resources would be affected by the activities proposed. The Forest Archaeological Technician completed a review of these findings. An executive summary as well as a complete listing of these sites and findings is documented in the Heritage Program Technical Report located in the Project File. Cultural resource locations are confidential and exempt from Freedom of Information Act disclosure so a map of site locations is not provided for review.

3.9.2 Direct and Indirect Effects

These findings determined that as long as the design features below are incorporated and followed, there would be no direct effects to the sites in the project area under any of the proposed alternatives

Design Features (See Measure 21 under Section 2.6) relating to heritage resources are listed below. These measures would be included during timber sale design and layout, included in the timber sale contract, and ensured during implementation by the Timber Sale Administrator

- All known and discovered cultural resource sites that are eligible and potentially eligible for the National Register of Historic Places would be protected.
- No timber harvesting, road construction, wildlife opening maintenance, or other project would be allowed within a cultural resource site and its required buffer zone, as determined by cultural resource professional and site protection plan, located in the project file.
- Existing roads through a site may be used, but no additional soil disturbance within the roadbed and beyond the edge of the existing road would be allowed
- No landings or storage of equipment or machinery may take place in these sites and their required buffer zone.
- Sites will be monitored during and after the project to ensure that no site damage has occurred to known and discovered cultural resource sites.

There are no anticipated direct or indirect effects to heritage resources because all sites would be avoided and protected. Therefore, there are no anticipated cumulative effects to this resource.

If during layout of the harvest units or implementation of the project it becomes evident that a site may be impacted, the State Historic Preservation Officer will be consulted.

UNAVOIDABLE ADVERSE EFFECTS

Implementation of any action alternative may result in some adverse environmental effects that cannot be effectively mitigated or avoided. The intensity and duration of these effects would depend on the alternative and design features applied to protect the resources. Most unavoidable effects are expected to be short-term, usually less than two to five years. In all cases, the effects would be managed to comply with established legal limits.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

The effects analyses identified no irreversible or irretrievable commitments of resources for any of the resources that were analyzed. See effects analyses in Chapter 3.

MONITORING

Monitoring would be implemented to determine if any Non Native Invasive Species are occurring based on harvest or road building activities (See Section 2.6).

The Sale Administrator will monitor cultural resource sites during and after timber harvest (See Section 2.6).

Throughout the timber harvest operations the sale administrator would monitor soil disturbance until the sale is completed. This includes road work and revegetation of disturbed areas (See Section 2.6).

Heritage resource sites would be monitored during and after the project to ensure that no site damage has occurred to known and discovered heritage resource sites.

CHAPTER 4
CONSULTATION AND COORDINATION

4.1 PREPARERS AND CONTRIBUTORS

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes, and non-Forest Service persons during the development of this environmental impact statement:

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Board of Commissioner of Public Lands
WI DNR Bureau of Forestry
WI DNR Bureau of Endangered Resources
Advisory Council of Historic Preservation
Natural Resources Conservation Service
Bureau of Land Management
US Navy—Environmental Protection Division
Naval Oceanography Division
US Department of Energy
US Environmental Protection Agency
US Department of the Interior
National Park Service
US Department of Transportation
US Coast Guard-Environmental Impact Branch

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Federal Highway Administration
Federal Railroad Administration
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Ruffed Grouse Society
Wisconsin Paper Council
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Richmond Belle Plains Hunting Club
Three Lakes Rod and Gun Club
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Sierra Development and Funding
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Ned Lake Timber Company
Pine River Lumber Company
Sunflower Consulting Company
Wisconsin ATV Association

In addition to those listed above, 449 local landowners and interested parties were contacted. A complete listing of individuals is available in the project file.

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GLOSSARY

affected environment- The natural environment that exists at the present time in an area being analyzed.

basal area- The area of the cross section of a tree trunk near its base, usually 4 and 1/2 feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

biological diversity- The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.

biomass- The total weight of all living organisms in a biological community.

board foot (bf)- A measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

browse- Twigs, leaves, and young shoots of trees and shrubs that animals eat. Browse is often used to refer to the shrubs eaten by big game, such as elk and deer.

buffer- A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a trail could block views that may be undesirable. Buffers may be set aside next to wildlife habitat to reduce abrupt change to the habitat.

canopy- The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be use to describe lower layers in a multi-storied forest.

canopy gap- A break in the uppermost layer of foliage large enough to allow sunlight to reach the forest floor. These gaps allow plant species to flourish that do not grow well in the shade.

cavity- A hole in a tree often used by wildlife species, usually birds, for nesting, roosting, and reproduction.

classified road- Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).

clear cut- A harvest in which all or almost all of the trees are removed in one cutting.

climax- The culminating stage in plant succession for a given site. Climax vegetation is stable, self-maintaining, and self-reproducing.

coarse woody debris Includes snags and down logs that provide structural diversity.

collector roads- These roads serve small land areas and are usually connected to a Forest System Road, a county road, or a state highway.

composition- What an ecosystem is composed of. Composition could include water, minerals, trees, snags, wildlife, soil, microorganisms, and certain plant species,

conifer- A tree that produces cones, such as a pine, spruce, or fir tree.

connectivity (of habitats)- The linkage of similar but separated vegetation stands by patches, corridors,or "stepping stones" of like vegetation. This term can also refer to the degree to which similar habitats are linked.

corridor- Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

cover- Any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders, or undercut streambanks. Animals use cover to escape from predators, rest, or feed.

cover type (forest cover type)- Stands of a particular vegetation type that are composed of similar species. The aspen cover type contains plants distinct from the jack pine cover type.

cultural resource- The remains of sites, structures, or objects used by people in the past; this can be historical or pre-historic.

cumulative effects - Effects on the environment that result from separate, individual actions that, collectively, become significant over time.

dbh (diameter at breast height)- The diameter of a tree 4 and 1/2 feet above the ground on the uphill side of the tree.

DEIS (Draft Environmental Impact Statement)- The draft version of the Environmental Impact Statement that is released to the public and other agencies for review and comment

desired future condition- Land or resource conditions that are expected to result if goals and objectives are fully achieved.

dispersed recreation- Recreation that does not occur in a developed recreation site, such as hunting, backpacking, and scenic driving.

disturbance- Any event, such as wind, forest fire, herbivory, or insect infestations that alter the structure, composition, or functions of an ecosystem.

ecology- The interrelationships of living things to one another and to their environment, or the study of these interrelationships.

ecosystem- An arrangement of living and non-living things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.

edge- The margin where two or more vegetation patches meet, such as a meadow opening next to a mature forest stand, or a ponderosa pine stand next to an aspen stand.

endangered species- A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

environmental assessment- A brief version of an Environmental Impact Statement. (See Environmental Impact Statement.)

Environmental Impact Statement- A statement of environmental effects of a proposed action and alternatives to it. The EIS is released to other agencies and the public for comment and review.

erosion- The wearing away of the land surface by wind or water.

Even-aged management- Timber management actions that result in the creation of stands of trees in which the trees are essentially the same age.

felling- Cutting down trees.

flora- The plant life of an area.

forage- All browse and non-woody plants that are eaten by wildife and livestock.

forb- A broadleaf plant that has little or no woody material in it.

forest cover type- See cover type.

Forest Roads and Trails- Roads and trails under the jurisdiction of the Forest Service.

fragmentation- The splitting or isolating of patches of similar habitat, typically forest cover, but including other types of habitat. Habitat can be fragmented naturally or from forest management activities, such as clearcut logging.

game species- Any species of wildlife or fish that is harvested according to prescribed limits and seasons.

GIS (geographic information systems)- GIS is both a database designed to handle geographic data as well as a set of computer operations that can be used to analyze the data. In a sense, GIS can be thought of as a higher order map.

habitat- The area where a plant or animal lives and grows under natural conditions.

habitat type- A way to classify land area . A habitat type can support certain climax vegetation, both tree and undergrowth species. Habitat typing can indicate the biological potential of a site.

hiding area/cover- Vegetation capable of hiding 90% of an adult elk or deer from human's view at a distance of 200 feet or less.

indicator species- A plant or animal species related to a particular kind of environment. Its presence indicates that specific habitat conditions are also present.

indigenous (species)- Any species of wildlife native to a given land or water area by natural occurrence.

individual tree selection- The removal of individual trees from certain size and age classes over an entire stand area. Regeneration is mainly natural, and an uneven aged stand is maintained.

interdisciplinary team- A team of individuals with skills from different disciplines that focuses on the same task or project.

intermediate cut- The removal of trees from a stand sometime between the beginning or formation of the stand and the regeneration cut. Types of intermediate cuts include thinning, release, and improvement cuttings.

intermittent stream- A stream that flows only at certain times of the year when it receives water from streams or from some surface source, such as melting snow.

irretrievable- One of the categories of impacts mentioned in the National Environmental Policy Act to be included in statements of environmental impacts. An irretrievable effect applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is irretrievably lost. If the ski area closes, timber production could resume; the loss of timber production during the time that the area was devoted to winter sports is irretrievable. However, the loss of timber production during that time is not irreversible, because it is possible for timber production to resume if the area is no longer used as a ski area.

irreversible- A category of impacts mentioned in statements of environmental impacts that applies to non-renewable resources, such as minerals and archaeological sites. Irreversible effects can also refer to effects of actions that can be renewed only after a very long period of time, such as the loss of soil productivity.

landing- Any place where cut timber is assembled for further transport from the timber sale area.

landscape- A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts. Landscapes are often used for coarse grain analysis.

landscape pattern The arrangement of species and communities in a natural setting.

logging residue (slash)- The residue left on the ground after timber cutting. It includes unutilized logs, uprooted stumps, broken branches, bark, and leaves. Certain amounts of slash provide important ecosystem roles, such as soil protection, nutrient cycling, and wildlife habitat.

M- Thousand. Five thousand board feet of timber can be expressed as 5M board feet.

management action- Any activity undertaken as part of the administration of the National Forest.

matrix- The least fragmented, most continuous pattern element of a landscape; the vegetation type that is most continuous over a landscape.

MBF- Thousand Board Feet (See board feet.)

MIS (management indicator species)- A wildlife species whose population will indicate the health of the ecosystem in which it lives and, consequently, the effects of forest management

activities to that ecosystem. MIS species are selected by land management agencies. (See "indicator species".)

mitigation- Actions taken to avoid, minimize, or rectify the impact of a land management practice.

MM- Million

MMBF- Million Board Feet (See board feet.)

monitoring and evaluation- The periodic evaluation of forest management activities to determine how well objectives were met and how management practices should be adjusted. See "adaptive management".

mortality- Trees that were merchantable and have died within a specified period of time. The term mortality can also refer to the rate of death of a species in a given population or community.

mosaic- Areas with a variety of plant communities over a landscape, such as areas with trees and areas without trees occurring over a landscape.

natural disturbance- See disturbance.

natural range of variability- See range of variability

natural resource- A feature of the natural environment that is of value in serving human needs.

NEPA (National Environmental Policy Act) - Congress passed NEPA in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public lands. Section 102 of NEPA requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

NFLRMP (National Forest Land and Resource Management Plan) - Also called the Forest Plan or just the Plan, this document guides the management of a particular National Forest and establishes management standards and guidelines for all lands of that National Forest.

NFMA (National Forest Management Act) - This law was passed in 1976 and requires the preparation of Regional Guides and Forest Plans.

NNIS (Non-Native Invasive Species) Plant species that are not native to the natural communities of the Northwest Howell area and are so aggressively invasive, that they pose a threat of harm to those natural communities and existing native species

no action alternative- The most likely condition expected to exist in the future if management practices continue unchanged.

notice of intent- A notice in the federal register of intent to prepare an environmental impact statement on a proposed action.

old growth- Old forests often containing several canopy layers, variety in tree sizes and species, decadent old trees, and standing and dead woody material.

overstory- The upper canopy layer; the plants below comprise the understory.

partial retention- A visual quality objective which, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

patch- An area of homogeneous vegetation, in structure and composition.

perennial stream- A stream that flows throughout the year and from source to mouth.

pole/sapling- The stage of forest succession in which trees are between 3 and 7 inches in diameter and are the dominant vegetation.

pole timber- Trees at least 5 inches in diameter, but smaller than the minimum size for sawtimber.

PNV- See present net value.

precommercial thinning- Removing some of the trees from a stand that are too small to be sold for lumber or house logs, so the remaining trees will grow faster.

prescribed fire- Fire set intentionally in wildland fuels under prescribed conditions and circumstances. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

prescription- Management practices selected to accomplish specific land and resource management objectives.

present net value (PNV), also called present net worth- The measure of the economic value of a project when costs and revenues occur in different time periods. Future revenues and costs are "discounted " to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable than dollars in the future. PNV is used to compare project alternatives that have different cost and revenue flows.

public involvement- The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making.

range of variability (Also called the historic range of variability or natural range of variation.)- The components of healthy ecosystems fluctuate over time. The range of sustainable conditions in an ecosystem is determined by time, processes (such as fire), native species, and the land itself. For instance, ecosystems that have a 10 year fire cycle have a narrower range of variation than ecosystems with 200-300 year fire cycle. Past management has placed some ecosystems outside their range of variability. Future management should move such ecosystems back toward their natural, sustainable range of variation.

Ranger District- The administrative sub-unit of a National Forest that is supervised by a District Ranger who reports directly to the Forest Supervisor.

raptor- A bird of prey, such as a eagle or hawk.

reforestation- The restocking of an area with forest trees, by either natural or artificial means, such as planting.

regeneration- The renewal of a tree crop by either natural or artificial means. The term is also used to refer to the young crop itself.

release cutting- Removal of competing vegetation to allow desired tree species to grow.

removal cut- The removal of the last seed bearers or shelter trees after regeneration is established.

residual stand- The trees remaining standing after an event such as selection cutting.

Responsible official- The Forest Service employee who has been delegated the authority to carry out a specific planning action.

riparian area- The area along a watercourse or around a lake or pond.

Record of Decision (ROD)- A official document in which a deciding official states the alternative that will be implemented from a prepared EIS.

Recreation Opportunity Spectrum (ROS)- The land classification system that categorizes land by its setting and the probable recreation experiences and activities it affords.

road.- A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1).

road construction - Activity that results in the addition of forest classified or temporary road miles (36 CFR 212.1).

road decommissioning - Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1), (FSM 7703).

road maintenance - The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective (FSM 7712.3).

road reconstruction- Activity that results in improvement or realignment of an existing classified road.

road improvement.- Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.

road realignment- Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway (36 CFR 212.1).

rotation- The number of years required to establish and grow timber crops to a specified condition of maturity.

run-off- The portion of precipitation that flows over the land surface or in open channels.

sapling- A loose term for a young tree more than a few feet tall and an inch or so in diameter that is typically growing vigorously.

sawtimber- Trees that are 9 inches in diameter at breast height or larger that can be made into lumber.

scale- In ecosystem management, it refers to the degree of resolution at which ecosystems are observed and measured.

scoping- The ongoing process to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process. It may involve public meetings, telephone conversations, or letters.

sensitive species- Plant or animal species which are susceptible to habitat changes or impacts from activities. The official designation is made by the USDA Forest Service at the Regional level and is not part of the designation of Threatened or Endangered Species made by the US Fish and Wildlife Service.

shelterwood- A cutting method used in a more or less mature stand, designed to establish a new crop under the protection of the old.

silvicultural system- The cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

silviculture- The art and science that promotes the growth of single trees and the forest as a biological unit.

single tree selection- See individual tree selection.

site preparation- The general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation. Naturally occurring wildfire, as well as prescribed fire can prepare a site for natural regeneration.

size class- One of the three intervals of tree stem diameters used to classify timber in the Forest Plan data base. The size classes are: Seedling/Sapling (less than 5 inches in diameter); Pole Timber (5 to 7 inches in diameter); Sawtimber (greater than 7 inches in diameter)

skidding- Hauling logs by sliding, not on wheels, from stump to a collection point.

Slash (logging residue)- The residue left on the ground after timber cutting or left after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

snag- A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

soil compaction- The reduction of soil volume. For instance, the weight of heavy equipment on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

soil productivity- The capacity of a soil to produce a specific crop. Productivity depends on adequate moisture and soil nutrients, as well as favorable climate.

stand- A group of trees that occupies a specific area and is similar in species, age, and condition.

standards and guidelines- Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

stocking level- The number of tree in an area as compared to the desirable number of trees for best results, such as maximum wood production.

structure- How the parts of ecosystems are arranged, both horizontally and vertically. Structure might reveal a pattern, or mosaic, or total randomness of vegetation.

sustainability- The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

sustainable- The yield of a natural resource that can be produced continually at a given intensity of management is said to be sustainable.

thinning- A cutting made in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees.

threatened species- Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Traffic service level. Describes the significant characteristics and operating conditions of a road (FSH 7709.56, ch.4).

TSI (Timber Stand Improvement)- Actions to improve growing conditions for trees in a stand, such as thinning, pruning, prescribed fire, or release cutting.

type conversion- The conversion of the dominant vegetation in an area from forested to non-forested or from one species to another.

unclassified roads- Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).

underburn- A burn by a surface fire that can consume ground vegetation and "ladder" fuels.

understory- The trees and woody shrubs growing beneath the overstory in a stand of trees.

uneven-aged management - Actions that maintain a forest or stand of trees composed of intermingling trees that differ markedly in age. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

vegetation management- Activities designed primarily to promote the health of forest vegetation for multiple-use purposes.

visual quality objective- A set of measurable goals for the management of forest visual resources.

visual resource- A part of the landscape important for its scenic quality. It may include a composite of terrain, geologic features, or vegetation

watershed- The entire region drained by a waterway (or into a lake or reservoir. More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at that point.

water table- The upper surface of groundwater. Below it, the soil is saturated with water.

wetlands- Areas that are permanently wet or are intermittently covered with water.

wildfire- Any wildland fire that is not a prescribed fire.

windthrow- Trees uprooted by wind.