Chapter 1: Purpose and Need

1.1 Introduction

The purpose of the Windy Project is to implement the 2004 Superior National Forest Land and Resource Management Plan (Forest Plan). The project's proposed activities are designed to move the vegetation in the project area from its existing condition toward the desired conditions described in the Forest Plan.

The key objectives of the Windy Project are to promote diverse, productive, and healthy native vegetation communities; improve moose habitat; improve riparian function; reduce hazardous fuels; provide sustainable forest products; and improve forest health and productivity. Other objectives are described further in this document.

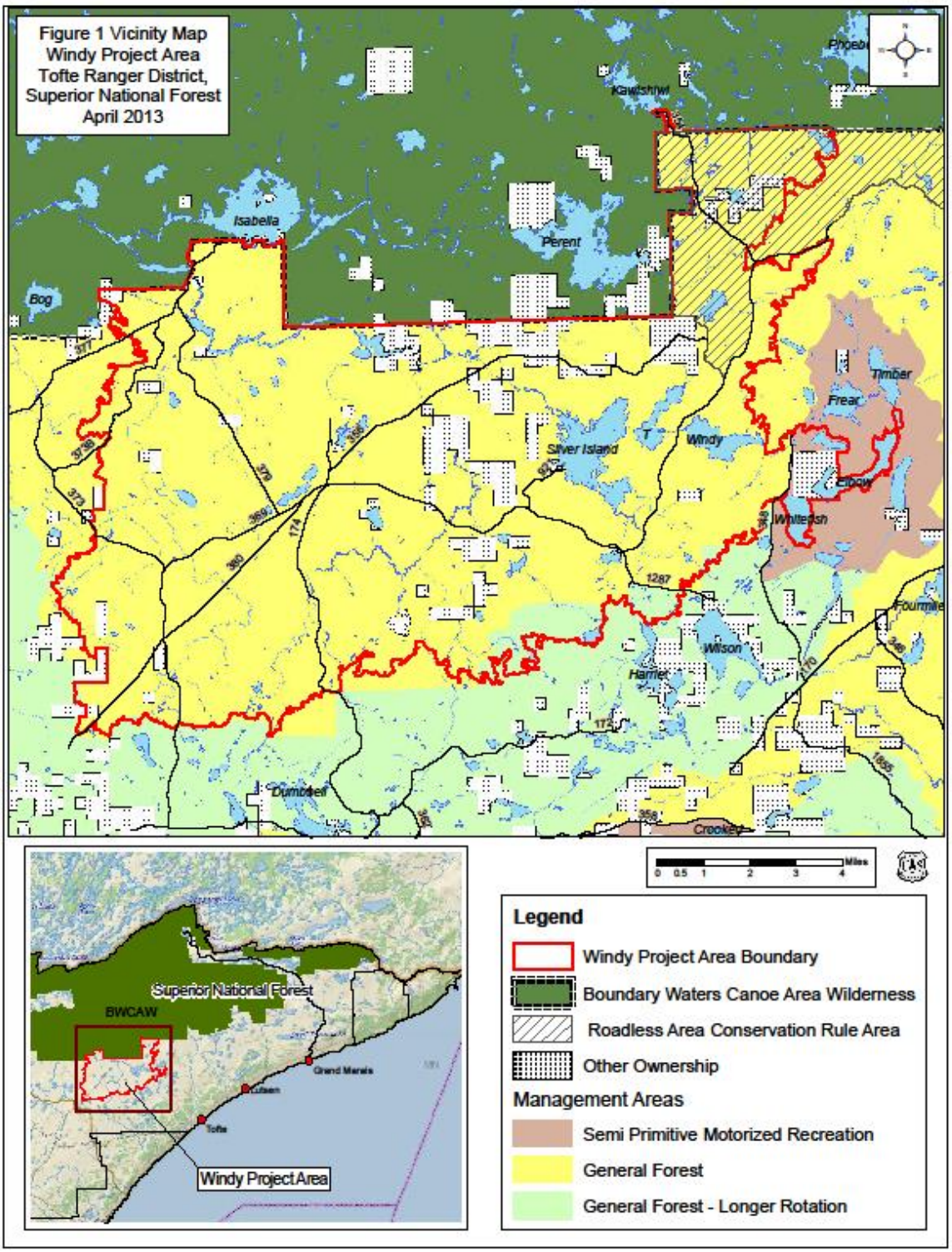
Activities proposed to accomplish these objectives include harvesting (such as clearcut with reserves or thinning), reforestation activities, prescribed burning, and understory fuel reduction. Additional proposed actions include constructing and obliterating temporary roads to access units and decommissioning roads no longer needed.

The Windy Project Area is located in Lake County, Minnesota. The Vicinity Map (Figure 1.1) shows the general location of the Windy Project Area. Townships included in the project area, from west to east, are: Township (T) 61 North (N) Range (R) 8 West (W), R7W, R6W; T60N, R8W, R7W, R6W. The Windy Project Area encompasses approximately 81,100 acres of which, about 70,600 acres are National Forest System land.

This environmental assessment was prepared to provide the decision-maker (Tofte District Ranger) and the public with information about the potential effects of proposed vegetation management activities and connected road actions in the project area. An interdisciplinary team of resource specialists prepared this document.

Forest in Windy Project Area

Figure 1.1: Windy Project Area Vicinity Map.



1.2 Organization of the Environmental Assessment

This environmental assessment (EA) is organized into four chapters with appendices and follows the format established by the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) for implementing the National Environmental Policy Act (NEPA). The major sections of the EA are as follows:

- **Chapter 1: Purpose and Need.** This chapter provides introductory material that explains the purpose and need for the proposed action, provides background information about the project area, presents the pertinent laws and regulations, and describes the issues to be addressed.

- **Chapter 2: Alternatives.** This section describes the No Action Alternative and the action alternatives, all of which are analyzed in detail in Chapter 3. Chapter 2 also includes mitigation measures and monitoring procedures that would be used in implementing the action alternative. A summary comparison of the environmental effects for each alternative is also provided.

- **Chapter 3: Affected Environment and Environmental Effects.** This chapter describes the affected environment and the direct, indirect, and cumulative effects likely to occur with the implementation of each alternative.

- **Chapter 4: References.** This chapter provides names of the preparers and contributors to this environmental assessment, a distribution list, and literature cited.

An important consideration in the preparation of this EA was the reduction of paperwork as specified in 40 CFR 1500.4. The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental effects of the alternatives and how any adverse effects can be mitigated or avoided. Additional supporting information is in the Windy Project Record and is available at the Tofte Ranger District, Tofte, Minnesota, or upon request.

This environmental assessment is tiered to the Forest Plan Revision Final Environmental Impact Statement (FEIS). Relevant analysis from the Forest Plan Revision FEIS was incorporated by reference rather than repeating the information.

1.3 Forest Plan Direction for the Windy Project Area

The Forest Plan divides the Superior National Forest outside the Boundary Waters Canoe Area Wilderness (BWCAW) into ten management areas. Chapter 3 of the Forest Plan (FP) includes the desired conditions, objectives, standards, and guidelines for each management area. The Windy Project Area overlaps three Forest Plan Management Areas (MA): General Forest (FP, pp. 3-5 to 3-8), General Forest-Longer Rotation (FP, pp. 3-10 to 3-11), and Semi-primitive Motorized Recreation (FP, pp. 3-24 to 3-26). The Windy Project Area Vicinity Map (Figure 1.1) displays these three management areas.

The interdisciplinary team used management area direction to guide development of the purpose and need and the proposed action. The following is a brief summary of the desired vegetation for each management area.

In the General Forest Management Area, the desired condition is that the forest is a variety of stand sizes, shapes, crown closures, and age structures. Natural disturbances to the landscape are mimicked through management activities such as timber harvest and management-ignited fires. A full range of silvicultural practices are used when managing the vegetation.

Also in the General Forest Management Area, larger patch sizes are emphasized, especially those patches associated with young, even-aged vegetative conditions. Vegetation would be managed to generally represent young to mature (0 to 150 year old) vegetative growth stages, with more even- aged management than in the General Forest – Long Rotation Management Area. Areas disturbed through management activities are generally quickly revegetated with some recently harvested areas retaining a partial canopy of older trees.

In the General Forest-Longer Rotation Management Area, the desired condition for the forest is a variety of stand sizes, shapes, crown closures, and age structures. A full range of silvicultural practices is used when managing the vegetation. In the General Forest-Long Rotation Management Area, vegetation will be managed to represent young to old (0 to 250 year old) vegetative growth stages. Some larger patch sizes would occur within this area, although those associated with young, even-aged, vegetative conditions would be less frequent than in the General Forest Management Area.

Landscape Ecosystem Objectives

Landscape Ecosystems (LE) are ecological areas characterized by their dominant vegetation communities and patterns that are a product of local climate, glacial topography, dominant soils, and natural processes such as succession, fire, wind, insects, and disease (FP, p. 2-55). The Forest Plan uses landscape ecosystems to outline management objectives for forest vegetation composition, age class, tree species diversity, and Management Indicator Habitats (MIH). Management in each landscape ecosystem would maintain or restore the forest to conditions more representative of native plant communities and landscape scale patterns.

Management Indicator Habitats represent the habitats used by a wide variety of native plants and animals, including management indicator species and sensitive species. MIH provide a means of monitoring and evaluating the effects of actions on biotic resources including specific species, communities, habitats, and interrelationships among organisms. Managing for MIH objectives is a key component of providing for the full diversity of desired wildlife habitats.

The Windy Project Area is predominately in the Jack Pine-Black Spruce and the Lowland Conifer A Landscape Ecosystems (Table 1.1). The Windy Project Area represents 16 percent of the Jack Pine-Black Spruce Landscape Ecosystem forest-wide and about 18 percent of the Lowland Conifer A Landscape Ecosystems Landscape. Forest Plan objectives are applicable to an entire landscape ecosystem and, therefore, are not directly applicable to smaller project areas. However, management actions in project areas, such as the Windy Project Area, contribute to meeting forest-wide objectives based on opportunities in the specific area. Opportunities to move the existing condition of the

Windy Project Area closer to the desired condition were used to develop the Purpose and Need.

Table 1.1: Windy Project Area Summarized by Landscape Ecosystems

Landscape Ecosystem	Acres	% of Area
Jack Pine-Black Spruce	44,727	63
Lowland Conifer A-JPBS-DMRWP	18,027	26
Lowland Non-Forest	6,771	10
Cedar[1]	689	1
Other Landscape Ecosystems	427	<1
TOTAL:	**70,642**	**100**

Data Source: Windy Mid-level Report. These acres include only National Forest System land. Total may be slightly off due to rounding.
[1] Includes both lowland and upland cedar.

Table 1.2 compares vegetation composition of the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area with forest-wide existing conditions in 2011 and forest-wide predicted conditions in 2024. There is less jack pine and more red pine in the Windy Project Area compared to the landscape ecosystem forest-wide. Table 1.3 compares age classes in the Jack Pine-Black Spruce Landscape Ecosystem for the Windy Project Area with forest-wide existing conditions in 2014 and forest-wide projected conditions in 2024.

Table 1.2: Vegetation Composition of the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area and Forest-wide.

Forest Type	Windy Project Area 2014		Forest-wide 2014	Forest Plan Objectives Decade 2 (2024)
	Acres	%	%	%
Jack Pine	3,011	7	30	32
Red Pine	7,449	17	10	10
White Pine[1]	752	2	4	3
Spruce-Fir	10,094	23	6	16
Aspen	20,525	46	45	35
Paper Birch	2,622	6	4	4
TOTAL:	44,452[2]	100	100	100

Data Source: JPSB LE Nov 2014 WindyAgeClass, Windy Silviculture Mid-level Report, and Forest Plan. Total may be slightly off due to rounding.
[1]Forest type 30 (Mixed Pines) was combined with White Pine.
[2]Total does not match age class tables because misclassified lowlands were removed from the calculations.

Table 1.3: Age Class Distribution of the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area and Forest-wide.

Age Class	Windy Project Area 2014		Forest-wide 2014	Forest Plan Objectives Decade 2 (2024)
	Acres	%	%	%
0-9	4,195	9	6	14
10-49	14,120	31	38	44
50-79	19,628	44	22	18
80-109	3,842	9	25	17
110-179	3,150	7	9	7
180+	15	0	0	0
TOTAL:	44,950	100	100	100

Data Source: Nov. 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, and Forest Plan. Total may be slightly off due to rounding.

1.4 Purpose of and Need for Action

An interdisciplinary team of natural resource specialists compared the existing condition of the Windy Project Area with desired conditions and objectives in the Forest Plan. This analysis, called the Windy Mid-level Assessment, considered all resources (vegetation, recreation, wildlife, watershed, etc.) and recommended possible opportunities to move the project area toward desired conditions. The District Ranger chose to address forest vegetation management as the primary purpose and need for this project.

1.4.1 Promote Diverse, Productive, Healthy, and Resilient Native Vegetation Communities by Moving Towards Landscape Ecosystem and Management Indicator Habitat Objectives

D-VG-1 Native vegetation communities are diverse, productive, healthy and resilient.

O-VG-1 Move vegetation conditions from Year 2003 conditions [base year of Forest Plan] towards the long-term desired composition, structure, age, spatial patterns, and with-in stand diversity.

Disturbance is a natural and vital part of the Jack Pine-Black Spruce Landscape Ecosystem, the dominant upland landscape ecosystem in the Windy Project Area. Historically this landscape ecosystem was heavily influenced by fire; large stand-replacing fires were a primary method of regenerating the forest and influenced the composition of trees species in the forest, favoring early successional species. Jack pine and black spruce require heat from fire or exposure to sunlight after disturbance to open their serotinous or semi-serotinoous cones and disperse seeds. Birch and aspen also regenerate vigorously after fire/disturbance, taking advantage of the increased sunlight. Young forest, or young age class, provides habitat needs for wildlife species including moose and deer (young aspen/birch) and snowshoe hare (young conifer). The young age class created through disturbance contributes to a healthy, diverse forest.

Continuing to provide a component of young age class is desired according to Forest Plan objectives. The young age class (0 to 9 years) objectives for the Jack Pine-Black Spruce Landscape Ecosystems is 14 percent Forest-wide (FP, p. 2-61 corrected). Additionally, Management Indicator Habitat (MIH) objectives are to increase young age class in Aspen-Birch (MIH 4), Upland Conifer (MIH 5), and Jack Pine (MIH 8) (FP. 2-63).

Figure 1.2: An Example of Young Aspen-Birch Forest. Young age class provides valuable habitat for some wildlife species.

Another Forest Plan desired condition for the Jack Pine-Black Spruce Landscape Ecosystem is a forest dominated by jack pine (32%), aspen (35%) and spruce fir (16%), with a lesser amount of red pine (10%), birch (4%), and white pine (3%). Within-stand structural and species diversity is desired, with increasing amounts of paper birch, white spruce, white cedar, jack pine, red pine, white pine, and tamarack.

These desired conditions for age class, composition, and diversity would begin to bring the ecosystem closer to the range of natural variability and increasing resiliency of the forest. The assumption being that a forest closer to natural conditions will likely be sustainable in an ecological sense, ensuring the long term persistence of all components of the ecosystem and functioning relationships among the components (Minnesota Forest Resource Council Northeast Landscape Management Plan, 2003).

<u>Current conditions and need for change</u>

In 2011, the Pagami Creek Fire burned over 90,000 acres including non-vegetated areas such as lakes and roads. Although the fire occurred predominantly in the Boundary Waters Canoe Area Wilderness (BWCAW) almost 9,000 acres (including non-vegetated areas) burned outside of the BWCAW in the Windy Project Area. The fire burned hot enough in more than 4,500 acres in the Windy Project Area to replace the stand and create a young age class. Due to the Pagami Creek Fire, 10 percent of the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area is young age class.

Even though the Pagami Creek Fire created young age class, there is still a need to create additional young age class. Currently, there is less young age class in the Windy Project Area (10%) and the landscape ecosystem forest-wide (11%) than necessary to meet Forest Plan landscape ecosystem objectives (14%). In addition, all of the current acres of young age class will grow out of the young age class within 10 years. Outside of the wilderness, fire is not allowed to burn uncontrolled as it did historically and therefore fire is limited as a stand renewing disturbance agent. Actions are needed to create young age class that would provide wildlife habitat and a diverse functioning ecosystem.

Figure 1.3: Jack Pine Forest Succeeding to Spruce-fir. The overstory jack pine is dying and being replaced by the balsam fir in the understory

Management actions are also needed to maintain the desired composition of early successional species of jack pine, aspen, and birch. In the Jack Pine-Black Spruce Landscape Ecosystem, jack pine forest type is underrepresented in the Windy Project Area (7%) and across the landscape ecosystem forest-wide (24%) when compared to the desired level (32%). Without disturbance mature jack pine and other early successional species, such as birch and aspen, succeed to spruce-fir forest types.

In 10 years, the young forest component of the ecosystem will grow out of the young age class. Over time, there would be a corresponding loss of early successional forest species such as jack pine, birch, and aspen and loss of early successional wildlife habitat. There is a need for vegetation management activities to create young age class and maintain diverse, healthy native vegetation communities.

1.4.2 Improve Moose Habitat

D-WL-2 Aquatic and terrestrial wildlife habitats on NFS land contribute to ecosystem sustainability and biological diversity of northern Minnesota and, for wide-ranging species, larger landscape scales. Habitats contribute to supporting populations of wildlife that address peoples' current and future need for, and interest in, the many aesthetic, commercial, subsistence, recreational, cultural, wildlife watching, hunting, fishing, trapping, and scientific uses and values of wildlife.

Natural resource managers in Minnesota have been concerned by the declining moose population and high mortality rates in the Northeastern Minnesota moose population for the last 10 years. Causes for the decline have been attributed to disease, parasites, warming temperatures, higher deer densities, and changes in habitat; however, causes are still being investigated. The Minnesota Department of Natural Resources developed the Moose Research and Management Plan in 2011 to address these concerns. This plan makes habitat management recommendations including: increasing stand complexity, following natural disturbance patterns, encouraging browse species, and protecting and enhancing summer thermal cover. While this plan was developed for the Minnesota Department of Natural Resources, it contains the most recent and best scientific information available on moose habitat management and is therefore relevant to the Superior National Forest and Windy Project.

Figure 1.4: Moose Foraging in Young Aspen Stand.

Aerial surveys have identified an area between Wilson and Windy Lakes as having relatively high moose numbers compared to the surrounding landscape. Additionally, calf production has been high in the vicinity of Wilson and Fourmile Lake. Vegetation management activities are needed to improve moose foraging and thermal cover habitat in this area. Most of the forest in the Windy Project Area is between 40-70 years old. Regeneration, through harvest, of some of these mature stands is needed to stimulate new growth of young trees and shrubs which would provide browse for moose. Increased conifer in these stands is needed to increase stand complexity and provide long-term thermal cover for moose. Locating treatment units adjacent to (buffered) small wetlands, lowland black spruce, and riparian forests would provide thermal cover adjacent to new browse.

1.4.3 Improve Riparian Area Function

D-WS-10 Riparian areas serve as landscape connectors. Riparian areas, habitats, and associated vegetative communities are diverse in composition and structure and support native and desired non-native wildlife and plant species appropriate to site, soil, and hydrologic characteristics.

O-WS-3 Within "near-bank" riparian management zones, as part of all actions involving vegetation management, favor management for long-lived tree species (such as white pine, red pine, black spruce, tamarack, etc.) suitable for the site, at stand densities suitable for the site.

Natural regeneration of long-lived species such as white pine, white cedar, and white spruce in riparian areas has been hindered by a thick understory of brush or balsam fir. While balsam fir in riparian areas provides shade for aquatic species and ecosystems and thermal cover for wildlife, it is a short-lived species and, along with shrubs, will impede regeneration of long-lived species. Long-lived species such as red and white pine contribute coarse woody debris to streams and lakes as well as provide nest sites for eagles over the long term. There is a need to restore these long-lived species to improve the function of riparian areas, thereby increasing watershed health.

Figure 1.5: Example of Balsam Fir as the Primary Regeneration in a Riparian Area. Balsam fir and shrubs often inhibit regeneration of long-lived conifer species.

1.4.4 Reduce Hazardous Fuels

D-ID-4 Accumulations of natural and activity fuels are treated to enhance ecosystem resiliency and to maintain desired fuel levels.
D-ID-5 Fire is present on the landscape, restoring or maintaining desirable attributes, processes, and functions of natural communities.
O-ID-3 Treat areas of highest fire risk (based on Fire Regime and Condition Class) to minimize effects of unwanted wildland fire.

The Lake County Community Wildfire Protection Plan (CWPP) was developed by local, state, and federal government agencies and local communities to cooperatively plan for fire prevention and protection. Wildland Urban Interface areas (areas where flammable wildland fuels are adjacent to homes and communities) were identified in the Lake County CWPP. The majority of the Windy Project Area lies within the North Wildland Urban Interface area. The southern portion of the Windy Project Area is part of the Isabella, South, and Ninemile Wildland Urban Interface areas from west to east. The northern portion of the Ninemile Wildland Urban Interface area has been identified by the Lake County CWPP as an area in need of fuel reduction treatment for fire prevention and fuel reduction activity would be focused in this area.

The area of highest concern from a fuel hazard and fire risk perspective is the area northwest of Wilson Lake along Lake County Road 7 and the Two Moose Trail. Values at risk include structures on private property, pine and spruce plantations, and old growth white and red pine. Additionally, Two Moose Trail is the only access and egress from developed private properties located along the eastern side of Wilson Lake.

Fuel hazards are the amount of dead and down material in an area that contribute to the ignition and spread of a fire.

Fire risk is the probability of a fire occurring in an area and the risk posed to values such as structures, recreation sites, and sensitive species. Where high risk coincides with fuel hazard, the probability of fire with undesirable effects is more likely.

Fuel hazards within the Windy Project Area are primarily associated with older stands of aspen and birch as well as with mid to old-aged pine and spruce stands. In old aspen and birch stands, canopy trees are dying and collapsing with thick, regenerating balsam fir increasing the fuel volume under the canopy. Balsam fir is a fuel hazard concern due to its high flammability and ladder-fuel position in the understory. The combination of understory and overstory fuel loading creates a continuous fuel path for fire to spread from the ground to the canopy, creating high intensity crown fires. In the mid- to old-aged pine and spruce stands regenerating balsam fir, accumulations of dead and down fuel, and continuous conifer tree crowns contribute to the high fuel hazard resulting in extreme fire behavior. High intensity fires decrease firefighter effectiveness to suppress fires and can also reduce ecosystem health and resiliency.

There is a need to reduce hazardous fuels within and adjacent to the Wildland Urban Interface in the Windy Project Area. Potential for extreme fire behavior is lessened by breaking up continuity and reducing concentrations of hazardous fuels. This creates more defensible space around private property or other values at risk in the event of a wildland fire.

1.4.5 Provide Sustainable Forest Products

D-TM-1 The amount of commercial timber sales available for purchase is at a level that is sustainable over time. Mills operating in northern Minnesota can depend on a consistent level of timber harvest on the National Forest.

O-TM-1 Provide commercial wood for mills in northern Minnesota. Harvest material to supply sawmills, veneer mills, paper mills, and mills constructing engineered wood products (hardboard, particleboard, oriented strand board, etc.). Also provide posts, poles, and logs for log home construction.

Vegetation management in the Windy Project Area has the opportunity to provide wood products for businesses and mills in northern Minnesota. Treatments to meet the other project objectives could be accomplished through the sale of marketable wood products, including tops of trees for biomass. More than 3,000 acres of forest within the Windy Project Area have been identified as needing some type of treatment to create young age class, improve wildlife habitat, reduce hazardous fuels, and improve stand health and enhance growth. Some of these acres are suitable for commercial timber harvest at this time based on the age and basal area. Timber harvesting on suitable forestland in the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

Figure 1.6: Timber Products from Previous Timber Sale.

1.4.6 Improve Forest Health and Productivity

O-ID-1 Increase the amount of forest restored to or maintained in a healthy condition to reduce risk of and damage from fires, insects, and diseases.

Of the 8,100 acres of red pine forest type in the Windy Project Area, more than 6,200 acres are 40-70 years old. Most of these stands were established through planting. At the time these plantations were established, the practice was to heavily scarify the site and plant with one (or occasionally two) species. As the trees have grown, they have become more tightly spaced with little growing room for the planted trees or light for any other forbs, shrubs or other tree species. There is a need to reduce stand density, thereby increasing growing space for the residual trees to maintain a higher growth rate. Stand vigor increases with a higher growth rate reducing susceptibility to insect and disease outbreaks.

Figure 1.7: Example of Densely Stocked Red Pine Stand.

1.5 Proposed Action

The interdisciplinary team identified potential actions to accomplish the purpose and need for the Windy Project. The team developed the Proposed Action based on field reconnaissance by foresters, biologists, fuels and engineering technicians, and other resource specialists using corporate data related to vegetation, soils and other resource conditions. The team focused on developing actions that would meet multiple objectives which best meet the purpose and need.

While developing the Proposed Action, the interdisciplinary team consulted with tribal representatives from 1854 Authority and Grand Portage, Fond du Lac and Bois Fort Bands of the Lake Superior Chippewa. The interdisciplinary team also consulted with, and reviewed data from, Minnesota Department of Natural Resources (MN DNR) personnel. The focus of the discussions was to coordinate forest management activities that would occur across ownership boundaries and share data.

A scoping report that described the Proposed Action was distributed to the public in April 2013 and the public was invited to submit comments. The interdisciplinary team modified the Proposed Action based on review of comments received from public scoping and further evaluation of the existing condition. The intent of the Proposed Action remained intact with some modifications. The primary modifications are:

1. The interdisciplinary team added 774 acres of clearcut harvesting followed by natural regeneration. Table 1.4 includes the 22 units added to the proposed action between Scoping and the EA (all units were added to both Alternative 2 and 3).

2. Upon further review by interdisciplinary team members, prescription details related to harvest method or reforestation of a unit or mitigation measures were changed to more accurately reflect site conditions, to ensure forest type objectives would be met and/or to respond to public comments.

3. Unit boundaries were updated from more recent field reconnaissance in the project area resulting in a more accurate accounting of stand unit acres and, in some cases, forest types.

A detailed listing of the changes in the Proposed Action is in the Windy Project Record (WindyChangesScopetoEA). The Proposed Action as presented in the Windy Scoping Report, was considered briefly and eliminated from further study (see Section 2.3 for the rationale for not analyzing further). The Windy Project EA analyzes the Modified Proposed Action (Alternative 2) as described below.

A summary of the acres proposed of each treatment and reforestation type are shown in Tables 1.4, 1.5, and 1.6. The acreages listed below are estimated based on stand acres. Actual treatment acres would be reduced because of reserve areas, legacy patches, sensitive soils, inoperable areas, and other limiting factors.

Table 1.4: Summary of Proposed Action by Primary Treatments

Treatment Description	Acres
Creating young forest through even-aged harvest treatments	
Clearcut with Reserves	3,443
Patch Clearcut	28
Improving stand conditions through intermediate harvest treatments	
Thinning	487
Restoring stands through a variety of non-harvest activities	
Underplant	27
Understory Fuels Reduction	390
Mechanical Site Preparation	334
Total of all Treatment Types	**4,709**

Table 1.5: Summary of Proposed Secondary Treatments

Treatment Description	Acres
Secondary Treatment	
Mechanical Site Preparation	482
Site Preparation Burn	202
Underplant	199
Underburn	163
Pile Burn	82
Broadcast Burn	40
Hand Scalp	28
Understory Fuel Reduction	7

Table 1.6: Summary of Proposed Reforestation

Regeneration Description	Acres
Harvest Regeneration Method	
Natural Regeneration	3,105
Natural Regeneration with Interplanting	195
Planting	72
Seeding	99
Non-Harvest Regeneration Method	
Natural Regeneration	2
Natural Regeneration with Interplanting	260
Underplant	53

Road Management: Approximately 7.8 miles of temporary roads would be constructed to access some of the proposed treatment units. All temporary roads would be decommissioned and effectively closed to motorized traffic as soon as access use is complete. Approximately 0.25 mile of an Operational Maintenance Level (OML) 2 road would be relocated to restore wetland integrity. Also approximately 2.1 miles of road that is no longer needed would be decommissioned.

Operational Standards and Guidelines: Operational Standards and Guidelines, based on the Forest Plan and Minnesota Forest Resource Council Guidelines, are an integral part of the proposal and designed to minimize adverse effects. Personnel would adhere to these practices while designing treatment boundaries, administering contracts, and implementing activities. Additional specific mitigation measures may be developed based on public comment or further effects analysis. Operational Standards and Guidelines would be implemented with the Proposed Actions and found in Appendix D.

1.6 Decision to be Made

Based on the purpose and need identified for the Windy Project, the scope of the project is limited to decisions concerning vegetation and related transportation system activities.

The Tofte District Ranger will decide whether or not to implement any of the proposed management activities. If the District Ranger decides to conduct management activities, he will then decide on the following:

- The amount and type of vegetation treatment activities, including reforestation.
- Relevant mitigation measures and monitoring actions.

The District Ranger will also decide if the proposed management activities would have a significant impact that would trigger the need to prepare an environmental impact statement.

1.7 Public Involvement and Issues with the Proposed Action

Public, community and agency involvement has occurred throughout the development of the proposed action, issues and alternatives.

When developing the proposed action, interdisciplinary team members consulted with biologists from 1854 Treaty Authority, Bois Forte Band, Fond du Lac Band, Grand Portage Band, and Minnesota Department of Natural Resources specialists. Biologists and specialists shared data on wildlife habitat, rare species in the area, and ecology of the area and forest management actions each agency was considering.

The interdisciplinary team participated in a Wilson Lake homeowners group meeting (November 26, 2012) to provide an overview of the Proposed Action and how it relates to a Wildland Urban Interface. The purpose of the meeting was to inform homeowners about the risk of fire in a Wildland Urban Interface and discuss proposed units for fuels reduction treatments. Data gathered at the meeting was used to help identify stands to mitigate the potential impact of wildfire in the area. About 10 people attended the meeting.

The interdisciplinary team utilized several methods to inform the public about the scoping comment period for the Windy Project. In April 2013, a scoping package requesting comments was mailed to almost 150 individuals, groups, and agencies who either own land within the project area or who have expressed an interest in these types of projects. The scoping package was also available online at

www.usda.fs.gov/goto/superior/projects. The Windy Project was listed in the Superior Quarterly (a Schedule of Proposed Actions for the Superior National Forest) starting in July 1, 2013.

The purpose of public scoping is to identify significant environmental issues deserving of further study and to de-emphasize the insignificant issues in the environmental effects analysis (40 CFR 1500.4g). Issues are points of disagreement, debate, or dispute about potential effects of a proposed activity and are based on some anticipated outcome.

Four responses were received from individuals, groups, and agencies. All comments received on the Windy Project were reviewed by the interdisciplinary team and District Ranger. The following explains how public comments were categorized and addressed. Categories of comments include:

1. **Issues analyzed in the Environmental Assessment (EA):** An issue is a point of debate with a proposed action based on some anticipated effect(s). Issues may drive alternatives based on extent of geographic distribution of effects, duration of effects, and intensity of interest or conflict generated.
2. **Alternatives, including mitigation measures:** Alternatives are other reasonable courses of action or mitigation measures not included in the proposed action (CEQ 1508.25 (b)). Alternatives may be based on key issues or may be suggested by the public during scoping. The EA describes which alternative will be analyzed in detail or analyzed briefly and eliminated from further study.
3. **Non-issue comments and questions:** Non-issues are comments that do not debate possible effects of the proposed activities. They may be questions, asking for more clarification of the proposed action.
4. **Comments noted:** Some comments are statements of opinion or preference about the proposed actions. These are considered by the interdisciplinary team and provide information on individual and group values and preferences relating to this project. However, the scoping process is not a vote and comments are not used in that manner.

Appendix A, Response to Scoping Comments lists all comments received and how they were categorized.

Through the analysis of public comments, the interdisciplinary team identified issues that need to be analyzed in the Environmental Assessment. Issues identified and analyzed in the Environmental Assessment include effects to lynx and impacts from temporary roads. The interdisciplinary team did not identify any issues where the extent of geographic distribution of effects, duration of effects or intensity of interest warranted development of another alternative considered in detail. To the extent possible, the interdisciplinary team resolved issues through modification of the proposed action. The public suggested three alternatives to the proposed action. These alternatives are described and analyzed in Chapter 2.

Administrative Objections

The Windy Project decision is subject to objections following Forest Service regulations at 36 CFR 218, Subparts A and B because the Windy Project is an activity implementing

a land management plan and is not authorized under the Healthy Forest Restoration Act. Only individuals or organizations who submit timely and specific written comments (as defined at 36 CFR 218.2) about this project during the scoping period or the comment period on the Environmental Assessment are eligible to file an objection to the Windy Project. The opportunity to object will be provided when a draft decision on the project is published, after public comment on this Environmental Assessment is considered.

Chapter 2: Comparison of Alternatives

2.1 Introduction

This chapter is the heart of the environmental assessment. It describes how an adequate range of alternatives was developed for the Windy Project. It describes each of the alternatives analyzed in detail and also briefly describes the alternatives eliminated from further study and the reasons why they were eliminated. This chapter presents the environmental effects of the proposed action and alternatives in a comparative form. The comparison of alternatives is by resource and how each alternative would accomplish the purpose and need, providing a clear basis for choice among alternatives. The environmental effects presented here are a summary of the analysis from Chapter 3.

2.2 How a Range of Alternatives was Developed

The implementation guidelines (40 CFR 1500) developed by the Council on Environmental Quality (CEQ) require that an environmental analysis must "...rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated (Sec. 1502.14 (a))." This direction does not mean every conceivable alternative must be considered or analyzed in detail, but the selection and discussion of alternatives must permit a reasoned choice and foster informed public participation and decision-making. The range of alternatives is defined by the purpose and need for action since all alternatives must in some way meet the purpose and need. A range of alternatives includes all reasonable alternatives analyzed in detail as well as those analyzed briefly. (CEQ 1981, Forty Most Asked Questions, Question 1a).

The interdisciplinary team considered all scoping comments to determine if there were any unresolved issues about effects. No issues were raised for the Windy Project from scoping that would necessitate the development of an alternative to analyze in detail. However, scoping comments did suggest other alternatives and these alternatives were analyzed in detail or briefly. Rationale for why some alternatives were not analyzed in detail is discussed in Section 2.4.

In accordance with CEQ regulations, a No Action Alternative (Alternative 1) is included in this analysis. This alternative is intended to serve as a control showing the environmental and social effects of taking no action, as well as to provide the deciding official the option of taking no action at this time.

The Windy Project Environmental Assessment analyzes the effects of four alternatives briefly and discloses detailed analyses on three alternatives. The amount of analysis of each alternative is appropriate because there is adequate disclosure of the trade-offs between resources, the effects of the alternatives, and how each meets the purpose and need. These seven alternatives are an adequate range of alternatives.

2.3 Alternatives Analyzed in Detail

Alternative 1 – No Action

In this alternative, the proposed action would not take place, and there would be no new vegetation management actions in the project area. There would be no additional site preparation, planting, or harvesting activities. Existing management actions such as road maintenance would continue. Natural succession processes would take place; in the long term, early successional species such as aspen or birch would succeed to later successional species of spruce-fir (or brush where there is inadequate tree regeneration). Selection of this alternative would not preclude future management actions in the project area.

Alternative 2 – Modified Proposed Action

The proposed action, included in the April 2013 Scoping Report, was developed by the interdisciplinary team to meet the purpose and need for the Windy Project. The team made minor modifications to the proposed action (sent to the public during scoping) based on additional field reviews, new information, and public comments. A summary of the modifications made to the proposed action is described in Chapter 1, Section 1.5.

Alternative 2-Modified Proposed Action creates young age class, an important component of the Jack Pine-Black Spruce Landscape Ecosystem. This alternative would create young age class through harvesting. To the extent possible, the harvests would create large (more than 100 acres) young patches. Regeneration, through harvest, of some of these mature stands is needed to stimulate new growth of young trees and shrubs which would provide browse for moose. The large young patches in the long term would become large mature patches. Some existing mature patches would not be treated under Alternative 2 and they would maintain forest connectivity and corridors for species like the Canada lynx.

Under Alternative 2 red pine plantations would be thinned, providing space for remaining trees to grow in size as well as for additional species to increase in size or area. Variable thinning and/or underplanting would occur in some plantations to improve structural or species diversity, moving plantations towards the diversity more typical in native vegetation communities.

Alternative 2 would reduce hazardous fuels, through harvest and slash disposal, underburning, and through mechanical understory fuels reduction. Most fuel reduction activities would occur in the Wilson Lake and Two Moose Trail area, which falls within a Wildland Urban Interface.

Summary of Actions

The summary of acres in Table 2.1 is by primary treatment type and in Table 2.2 by secondary treatment type. Unit acres listed are based on the acres in our vegetation database for each stand proposed for treatment. Treatment acres are an estimate of what would actually be implemented after refinement of unit boundaries and operable areas during implementation.

More detailed information on Alternative 2 can be found in the appendices. Reviewing all of the information will provide a more complete picture of the alternative.

- Figure 2.1, Alternative 2 Modified Proposed Action Treatment Map displays the locations of the proposed treatments.
- Appendix B lists the specific treatments and mitigation measures for each unit.
- Appendix C describes the treatment types and mitigation measures.
- Appendix D lists the Operational Standards and Guidelines that apply to all units. Operational Standards and Guidelines, based on the Forest Plan and Minnesota Forest Resource Council Guidelines, are an integral part of the proposal and are designed to minimize adverse effects.

Table 2.1: Summary of Proposed Action by Primary Treatment Type for Alternative 2.

Primary Treatment Description	Unit Acres	Treatment Acres
Creating young forest through even-aged treatments		
Clearcut with Reserves	3,443	2,252
Patch Clearcut	28	5
Improving stand conditions through intermediate harvest treatments		
Thinning	487	310
Restoring stands through a variety of non-harvest activities		
Underplant	27	4
Understory Fuels Reduction	390	83
Mechanical Site Preparation	262	162
Hand Scalp and Plant	72	6
Total of all Treatment Types	**4,709**	**2,822**

Table 2.2: Summary of Secondary Treatments and Reforestation Activities for Alternative 2.

Treatment Description	Unit Acres[1]
Secondary Treatment	
Mechanical Site Preparation	482
Site Preparation Burn	202
Underplant	199
Underburn	163
Pile Burn	82
Broadcast Burn	40
Hand Scalp and Plant	28
Understory Fuel Reduction	7
Regeneration Method Following Harvest	
Natural Regeneration	3,105
Natural Regeneration with Interplanting	195
Planting	72
Seeding	99
Regeneration Method Following Non-harvest Treatments	
Natural Regeneration	2
Natural Regeneration with Interplanting	188
Underplant	84

[1] Acres are for the total unit; treatment acres would be less.

Table 2.3 shows the acres of different planting and seeding combinations. These include interplanting, underplanting, and seeding after any primary or secondary treatment and in some cases are in addition to natural regeneration.

Table 2.3 Acres of Tree Species Planting and Seeding Combinations for Alternative 2.

Tree Species	Unit Acres
Jack pine	41
Jack pine and black spruce	235
Tamarack	230
White pine and red pine	102
White pine, red pine, and jack pine	84
White spruce	228

Alternative 3

Alternative 3 was developed to partially address a comment requesting analysis of an alternative that creates more young age class and that improves the marketability of the timber sales that would be used to create the young age class. Alternative 3 is similar to Alternative 2 except that it includes harvest of an additional large young patch. Proposed management of the large patch (approximately 800 acres) includes harvesting upland areas to create young age class, retention of small upland legacy (uncut) areas, retention of lowland conifer areas and the use of prescribed fire to stimulate jack pine and red pine regeneration and other plant diversity. The resulting patch would be a mosaic of large areas of young forest, interspersed with areas of older forest, such as would occur under historical fire disturbances. All other actions and treatments proposed in Alternative 2 are included in Alternative 3.

Summary of Actions

The summary of acres in Table 2.4 is by primary treatment type and in Table 2.5 the summary is by secondary treatment type. Unit acres listed are based on the acres in our vegetation database for each stand proposed for treatment. Treatment acres are an estimate of what would actually be implemented because of further refinement of unit boundaries and operable areas during implementation.

More detailed information on Alternative 3 can be found in the appendices. Reviewing all of the information will provide a more complete picture of the alternative.

- Figure 2.2, Alternative 3 Proposed Treatment Map displays the locations of the proposed treatments.
- Appendix B lists the specific treatments and mitigation measures for each unit.
- Appendix C describes each of the treatment types and mitigation measures.
- Appendix D lists the Operational Standards and Guidelines that apply to all units. Operational Standards and Guidelines, based on the Forest Plan and Minnesota Forest Resource Council Guidelines, are an integral part of the proposal and are designed to minimize adverse effects.

Table 2.4: Summary of Proposed Action by Primary Treatment Type for Alternative 3.

Primary Treatment Description	Unit Acres	Treatment Acres
Creating young forest through even-aged treatments		
Clearcut with Reserves	4,228	2,668
Patch Clearcut	28	5
Improving stand conditions through intermediate harvest treatments		
Thinning	487	310
Restoring stands through a variety of non-harvest activities		
Underplant	27	4
Understory Fuels Reduction	390	83
Mechanical Site Preparation	262	162
Hand Scalp and Plant	72	6
Burn Inclusion	309	309
Total of all Treatment Types	**5,802**	**3,547**

Table 2.5: Summary of Proposed Secondary Treatment and Reforestation Activities for Alternative 3.

Treatment Description	Unit Acres[1]
Secondary Treatment	
Mechanical Site Preparation	482
Site Preparation Burn	674
Underplant	199
Underburn	163
Pile Burn	82
Broadcast Burn	40
Hand Scalp and Plant	28
Understory Fuel Reduction	7
Harvest Regeneration Method	
Natural Regeneration	3,752
Natural Regeneration with Interplanting	195
Planting	72
Seeding	236
Non-Harvest Regeneration Method	
Natural Regeneration	2
Natural Regeneration with Interplanting	188
Underplant	84

[1] Acres are for the total unit; treatment acres would be less.

Table 2.6 shows the acres of different planting and seeding combinations. These include interplanting, underplanting, and seeding after any primary or secondary treatment and in some cases are in addition to natural regeneration.

Table 2.6 Acres of Tree Species Planting and Seeding Combinations for Alternative 3.

Tree Species	Unit Acres
Jack pine	41
Jack pine and black spruce	235
Jack pine and red pine	137
Tamarack	230
White pine and red pine	102
White pine, red pine, and jack pine	84
White spruce	228

Actions Common to Alternative 2 and 3

When developing the optimal prescriptions for each unit, the interdisciplinary team balanced the impacts to different resources with trying to meet the objectives of the project. A portion of the units proposed for site preparation or fuel reduction (slash disposal) are on low nutrient soils where Forest Plan guidelines call for retaining slash and woody debris (G-WS-8, FP, p. 2-16). Where site preparation or fuel reduction is a high priority, the treatment is proposed and this part of the soil guideline would not be followed. A list of these units is in the Windy Project Record. The proposed site preparation is needed to reduce the competition from brush and hardwoods, allowing restoration of conifer. The fuel reduction is needed in urban interface areas (structures or cabins) that may be at risk from wildfire. Chapter 3 describes the effects of removing slash on these sites.

Biomass removal could occur on harvest units with secondary treatments of slash disposal or site preparation and on non-harvest units with primary treatments of understory fuel reduction or site preparation. Biomass removal would not occur on units where soil mitigations call for retaining slash. Biomass removal would include tops and limbs (from harvest operations), brush and non-merchantable stems. It would not include stumps or existing coarse woody debris. Biomass removal would follow Operational Standards and Guidelines (Appendix D).

Road Management Activities

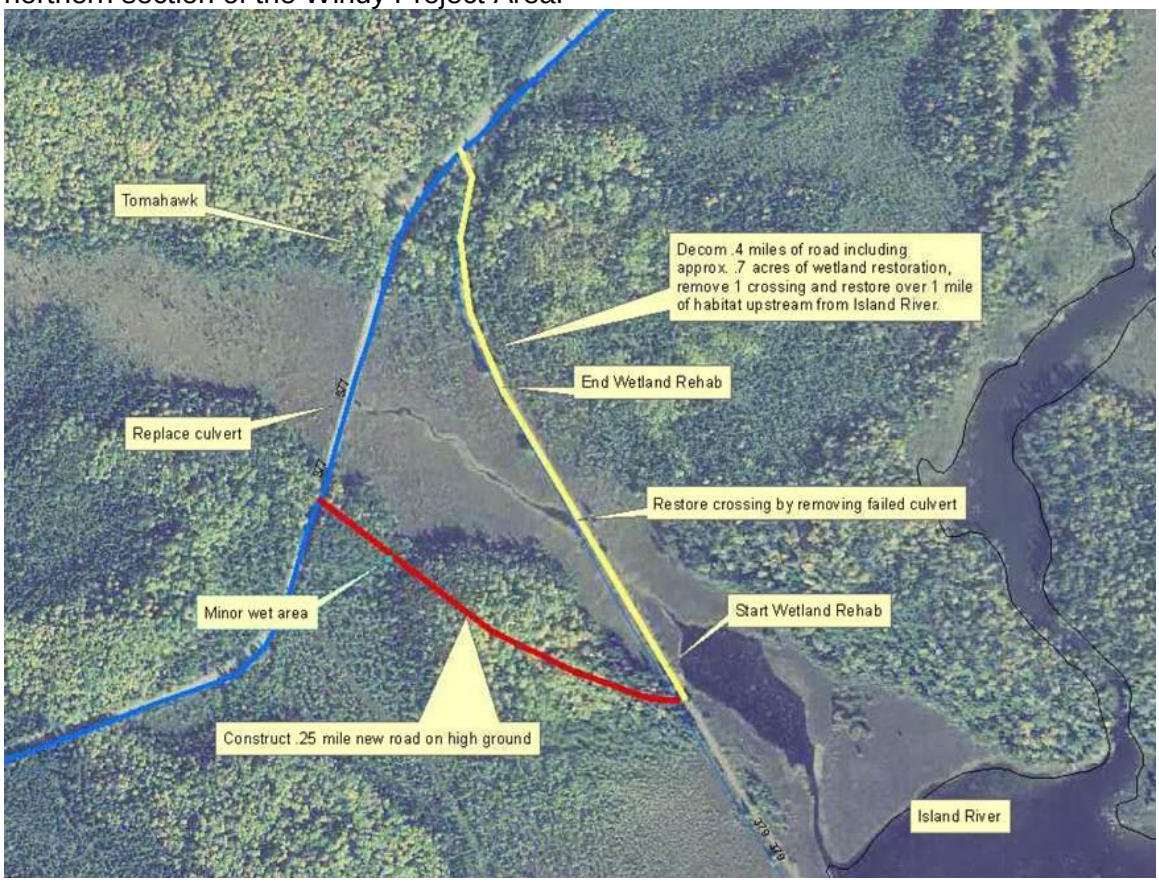
Road access would be needed to harvest units in Alternative 2 and 3. As shown in Table 2.7, Alternative 2 and 3 would relocate a small section of an OML 2 road, and all temporary roads would be decommissioned after implementation of the proposed activities using the actions listed in G-TS-16 and LG-TS-2 (Appendix D: Operational Standards and Guidelines). The three roads within the Windy Project Area proposed for decommissioning are: a section of Forest Road (FR) 379, a spur coming off of FR 173S, and a spur coming off of FR 354.

Table 2.7: Proposed Transportation Management Activities.

Transportation Activity	Alt. 2 Miles	Alt. 3 Miles
Construction of temporary roads	7.8	9.0
Decommission existing roads	2.1	2.1
Relocation of OML 2 roads	0.25	0.25

A 0.4 mile section of FR 379 is proposed for decommissioning because the road traverses a large wetland and has a culvert in need of replacement. More than half of the proposed section for decommissioning occurs in the wetland and would be restored to improve the natural ecological function. Forest Road 379 would be relocated to the south in an upland area and would require 0.25 miles new construction (Figure 2.3).

Figure 2.3: Location of road decommissioning and relocation of Forest Road 379 in northern section of the Windy Project Area.



Monitoring Activities

Two types of monitoring are conducted on the Superior National Forest: 1) Effectiveness monitoring and 2) Implementation monitoring. Effectiveness monitoring addresses how well management actions achieve desired outcomes or objectives that are identified in the Forest Plan. This kind of monitoring is conducted over the entire Forest on a periodic basis and monitoring results are used in future projects. Forest Plan monitoring results can be found in the Annual Forest Plan Monitoring Report, available at the Superior National Forest Supervisor's Office in Duluth, Minnesota.

Implementation monitoring is tied to specific projects and assesses whether the project was implemented as designed and whether implementation complies with the decision made on the project. Table 2.9 describes the implementation monitoring that would occur under Alternative 2 or Alternative 3 for the Windy Project.

If monitoring indicates implementation is not occurring as planned, measures would be taken immediately to correct the actions. For example, if timber sale layout does not correctly meet Operational Standards and Guidelines for a resource area or mitigations have not been met, changes would be made prior to the sale being sold. Likewise, if a sale contractor was non-compliant during contract administration, operations would cease until compliance can be assured.

Table 2.8: Description of Monitoring Activities.

Harvest and Site Preparation Areas	
Objective	Ensure that the mitigation measures and provisions in contracts are implemented, with emphasis on soil compaction.
Methods	Visual inspection of treatment stands.
Frequency	Treatment areas would be visited on a regular basis during the length of the contract.
Responsibility	Timber Management Assistant, Silviculturist
Non-Native Invasive Plants	
Objective	Avoid or minimize an increase in the extent of non-native plant infestation in the project area.
Methods	Monitor a sample of harvest units and newly constructed roads after harvest, site preparation, or construction to determine if invasive plants have colonized areas where management activities have occurred.
Frequency	Between year one and year three, following the sale.
Responsibility	Forest Plant Ecologist
Temporary Roads	
Objective	Ensure that temporary roads are constructed properly and obliterated after completion of treatment activities.
Methods	Inspect temporary road locations as they are being built, during treatments, between treatments, and after they are closed to determine if additional protection/rehabilitation efforts are needed.
Frequency	Inspect all temporary road locations that are more than ¼ mile in length.
Responsibility	Timber Management Assistant, Zone Engineer
Forest Composition/Regeneration	
Objective	Ensure that minimum stocking standards (S-TM-4, Forest Plan p 2-20) are met in each forest type for artificial and natural regeneration treatments including the interplanting of white pine.
Methods	Natural and artificial regeneration areas would be surveyed for the number of acceptable trees per acre using Regional Guidelines; stands planted to red and white pine would be checked for pruning and release need.
Frequency	Stocking surveys would be conducted after the 1st and 3rd growing season following reforestation treatment; stands not expected to reach stocking standards after the 5th growing season would be evaluated for a replant. Release and pruning needs would be evaluated at the time of stocking surveys, every other year for 10 years, and after 10 years every 5 years until the branches are 9 feet off the ground.
Responsibility	District Silviculturist

2.4 Alternatives Analyzed Briefly

Four alternatives, including the Proposed Action from the Scoping Report, are analyzed briefly. The analysis, although not detailed, provides valuable information that will be considered when deciding which actions to take in the Windy Project Area.

Alternative 4 – Proposed Action from Scoping Report

In April 2013, a Scoping Report was distributed to the public informing them of the Windy Project. The Scoping Report included a "Proposed Action" which outlined the management activities the interdisciplinary team had determined at the time would best accomplish the Purpose and Need for Action as described in the report.

This April 2013 Proposed Action was not carried forward for detailed analysis primarily because the interdisciplinary team conducted further field reconnaissance and analysis and made modifications that would better meet project objectives (the purpose and need).

The interdisciplinary team incorporated updated data and information on specific stands. Stand boundaries were updated from field reconnaissance resulting in a more accurate accounting of stand acres and, in some cases, forest types. Units where treatments were deemed not feasible were eliminated from the proposed action. The Modified Proposed Action, which is also called Alternative 2, is analyzed in Chapter 3.

Alternative 5- No Hazardous Fuel Reduction

Alternative 5 was developed to respond to comments concerning the effectiveness of reducing the risk of wildfire to Wildland Urban Interface (WUI) areas through commercial timber sales and other vegetation treatments within the Windy Project Area. Specifically, the commenter requested an alternative be analyzed in detail that implements Dr. Cohen's fire risk reduction methods.

"A Cohen alternative would propose to spend earmarked fire funding to:

- educate the public by providing each homeowner in the WUI written material that summarizes Dr. Cohen's findings.
- educate the public using USFS organized public meetings to answer questions about the types of fine fuels that Dr. Cohen recommends should be removed.
- and most importantly offer USFS labor to help elderly and disabled people living in the WUI (with their written permission) to remove the fine fuels near their home as Dr. Cohen suggests."

"Dr. Cohen… does not recommend logging merchantable trees near the WUI as is being proposed with this commercial timber sale (a.k.a. a fuels reduction project) to reduce the risk of fire damage to the citizens living in the WUI… Dr. Cohen states: "It may not be necessary or effective to treat fuels in adjacent areas in order to suppress fires before they reach homes; rather, it is the treatment of the fuels immediately proximate to the residences, and the degree to which the residential structures themselves can ignite that determine if the residences are vulnerable." (D. Artley Scoping Comment, 2013)"

The interdisciplinary team noted Dr. Cohen did not provide any comments to confirm that this alternative as Mr. Artley defines it would be an alternative he (Dr. Cohen) promotes.

The interdisciplinary team developed an alternative based on these comments. In addition to the public education, the alternative would drop all fuel reduction treatments in the area along Lake County Road 7 and Two Moose Trail. This would remove over 500 acres of fuel reduction treatment within the project area focused in the area directly adjacent to the Wildland Urban Interface. All other treatment units in the proposed action would remain, as they do not have a primary fuel reduction objective.

Education and active implementation of fuel reduction principles and practices within the Home Ignition Zone would continue through the Lake County Community Wildfire Protection Plan and FIREWISE programs under Alternative 5. Since 2011, the Superior National Forest, along with its Community Wildfire Protection Plan (CWPP) committee partners, has been actively engaging with property owners in the Wildland Urban Interface adjacent to the southeast corner of the Windy Project Area. Together the Forest Service and committee partners have conducted three educational and informational public meetings, led dozens of field visits to private properties with individual land owners, and recently assisted with attaining FIREWISE community status for this specific community. Since 2011 approximately 200 acres of private land has been treated to reduce hazardous fuels in the home ignition zone and beyond in the area adjacent to the Windy Project boundary. These treatments were funded by State and Private Grant funding in their entirety. Under Alternative 5, the Superior National Forest and its CWPP partners would remain engaged with educating and assisting communities, covering topics such as how to maintain fuel reduction treatments over time and become responsible land stewards within the Wildland Urban Interface.

These educational activities and the implementation of FIREWISE activities on private land would occur under all other alternatives in the Windy Project, including the No Action Alternative. There would be no difference in actions or effects between alternatives in regards to these activities.

Under Alternative 5, units 212-14, 15, 18, 20, 24, 29, 30, 31, 32, 33, 34, 42, 45, 21; 244-18, 13, 17, 38, 2, 41, 40, 11, and 213-01, 03, 04, 14, 11, 50 would not be treated, leaving current conditions to persist. Existing fuel hazards near the Wildland Urban Interface would persist and likely worsen over time as surface fuels accumulate and ladder fuels increase. If a fire were to occur in any of these areas, subsequent negative impacts to values such as private property, forest products, wildlife habitat, and recreation resources could occur.

Additionally, the fuel reduction units proposed in Alternative 2 and 3 were strategically placed north-northwest of the Wildland Urban Interface near Harriet and Wilson Lakes. The conglomeration of units would create a landscape scale treatment aimed to hinder extreme fire behavior and rapid fire growth from the north and west into the Wildland Urban Interface. Eliminating these units would reduce the ability of fire managers to manage wildfire as a low to moderate intensity fire adjacent to the Wildland Urban

Interface. Also, eliminating these units would reduce the ability for private land owners to safely exit the area in the event that a wildfire would move into the Wildland Urban Interface.

Conclusion
Alternative 5 will not be considered further because it would not meet all components of the purpose and need for the Windy Project. Alternative 5 would not decrease hazardous fuels within and adjacent to the Wildland Urban Interface in the Windy Project Area, would not break up the continuity of hazardous fuels nor reduce concentrations of hazardous fuels, and would not create defensible space around private property or other values at risk in the event of a wildland fire.

Alternative 6- More Young Age Class

Alternative 6 was developed to respond to comments concerning the amount of young age class that would be created through harvesting in the Proposed Action. Specifically, a commenter requested an alternative be analyzed that would create more young age class and improve the marketability of the timber sales that would be used to create the young age class.

"The project area contains more than 60,000 acres of forest land. The Forest Plan objectives state that young forests in the 1-10 age class should comprise as much as 14 percent of the area in certain landscape ecosystems… MFI recommends that an alternative be developed that would meet the young forest age-class objectives outlined in the forest plan. This alternative should identify timber management options that meet young forest goals by the year 2023."

"MFI recommends that the Forest Service identify stands to be harvested within the project area that reduce the haul distance from woods to the mill... that the Forest Service identify stands that have a large amount of sound timber volume, and limit offering stands that show a large amount of decay. A surrogate to high quality timber is stand age. Aspen, for example, would have higher quality timber at age 40-50 compared with an aspen stand that is 70+ years of age. …that the Forest Service develop a proposal that would increase the amount of summer chance timber offer… that the Forest Service propose larger harvest units to improve logger economies of scale. Larger harvest unit (>200 acres) would additionally benefit moose populations in the region." (Minnesota Forest Industries Scoping Comment, 2013)

The interdisciplinary team developed Alternative 6 based on these comments. The objective of this alternative is to create 14 percent young age class in 2023 in the Jack Pine Black Spruce Landscape Ecosystem in the Windy Project Area. Approximately 6,300 acres would need to be harvested to reach this percentage within the Jack Pine Black Spruce Landscape Ecosystem in the Windy Project Area which is 44,950 acres. Other treatments in the proposed action such as thinning and understory fuel reduction would also occur in this alternative.

The portion of the Windy Project Area in the Jack Pine Black Spruce Landscape Ecosystem was chosen because the young age class objective for this landscape

ecosystem is 14 percent (as mentioned in the comment). The 60,000 acres mentioned in the comment includes other landscape ecosystems which do not have objectives for 14 percent in the young age class. For example, 18,000 acres of the Windy Project Area are in a lowland landscape ecosystem where the young age class objective is 4 percent.

Alternative 6 was not analyzed in detail for the following reasons.

1. Concern for more young class is addressed through Alternative 3, just not to the same degree. Alternative 3, which is analyzed in detail, creates an additional large 800-acre patch (compared to Alternative 2 which also includes 744 more acres of harvest than the proposed action from scoping). In addition to creating more young forest, this large harvest block incorporates some of the recommendations proposed by the commenter. The large unit is in the southern portion of the project area and somewhat closer to mills than harvest units on the north side of the project area. Also, the large unit condenses harvest areas in one area and is younger, with less decadent wood than the older forest. While Alternative 3 does not create as much young age class as Alternative 6, it does create more young age class than Alternative 2 and partially addresses the comment. There is a range of alternatives analyzed in detail in Alternative 3 relative to the amount of young age class created, which the Deciding Officer can select from.

2. Most of the acres currently in the 0-9 age class were burned in the Pagami Creek Fire and their year of origin is 2011. When the acres of young created under Alternative 6 are added to the acres created by Pagami Creek Fire, there is 22 percent in the young age class which exceeds young age class objectives in the project area. This high amount of young age class would remain until 2021 when the acres from Pagami Creek Fire would move out of the age class. See Table 2.9.

Table 2.9: Acres of young age class under each alternative in 2017 and 2023 in the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area.

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 6	
	Acres	%	Acres	%	Acres	%	Acres	%
2017[1]	3522	8	6,955	15	7,740	17	9,815	22
2023	0	0	3,432	8	4,218	9	6,293	14

[1] One year after the year the model estimates young age class would be created from Windy Project.

Both Alternative 2 and 3 meet Forest Plan objectives throughout most of the decade. Project areas will cumulatively move towards the Forest-wide objective, with some projects creating a lower amount of young while some projects create a higher amount of young age class.

3. We could not identify 6,300 acres available for harvest in the Windy Project Area that met the recommendations given (by the commenter) for marketable timber sales for the following reasons:

- Some of the mature forest in the Windy Project Area is on lands not suitable for timber harvest. For example, harvest is not allowed in Shipstead Newton Nolan Areas or in Roadless Area Conservation Rule Areas.

- Some stands suitable for harvest are on low nutrient or lowland soils that require winter logging and would not meet the recommendation for more summer wood.
- Many of the mature stands suitable for harvest are not in the younger, more productive age classes recommended for higher quality volume.
- Some mature stands suitable for harvest are isolated, small (<100 acres) and may have difficult access. It may not be feasible to harvest some stands because of steep slopes and poor operability.
- Some stands are better suited for different kinds of treatment such as thinning (ie, red pine and white spruce plantations) and shelterwood (white pine) versus creating young age class through a clearcut with reserves.

When developing Alternatives 2 and 3, the interdisciplinary team proposed areas where timber harvest would be most cost effective and desirable for multiple resource benefits.

Conclusion

Harvesting 6,300 acres would address the proposal to create 14 percent in the young age class in 2023 but it would not meet the other recommendations for the alternative. Many of the acres that would be included would have low volume, poor operability, and be further from mills. Alternatives 2 and 3 already proposed some of the more economical units for harvest. While this alternative would reach forest-wide age class landscape ecosystem objectives for 0-9 age class more quickly, the forest is already progressing towards meeting the objectives; therefore this is not a compelling reason to pursue the age class more aggressively. Twenty-two percent in the young age class (which would occur throughout most of the decade) is a substantially higher percentage than typically occurs in other project areas on the Tofte District and is considerably higher than the decade two objective of 14 percent. Alternative 3 creates more young age class in a larger, economical patch and therefore addresses some of the issues raised in Alternative 6. With Alternative 3 there is a range of alternatives relative to the amount of young class created for the Deciding Officer to select from. For these reasons, Alternative 6 will not be analyzed further.

Alternative 7- More Pine Thinning

Alternative 7 was developed to respond to comments concerning the amount of thinning to improve forest productivity. Specifically, a commenter requested an alternative be analyzed that would thin more red pine.

"The scoping document identifies more than 6,200 acres of red pine between the ages of 40-70. It also recognizes the need to thin these stands to improve forest productivity. The proposed project only recommends thinning of 485 acres, however. MFI recommends that the Forest Service identify additional thinning opportunities in red pine cover type. An active sawmill is near the project area that would utilize this resource." (Minnesota Forest Industries Scoping Comment, 2013)

This alternative was not analyzed further because the interdisciplinary team did not identify any additional opportunities for thinning red pine stands in the project area. The District Silviculturalist, Timber Management Assistant Ranger, and other interdisciplinary team members reviewed all red pine stands when they developed the

proposed action to determine if stand conditions indicated a need for thinning, i.e. dense growing conditions. The team also accessed the operability of the stands relative to terrain and access. Red pine stands they deemed had sufficient stocking, where thinning would be beneficial and feasible to operate in, were included in the proposed action. No new information was presented during scoping that identified other opportunities for thinning.

The Windy Proposed Action includes 485 acres of thinning. In addition, 718 acres of red pine in the Windy Project Area will be thinned under the 2011 Windy Red Pine Thinning and Pagami Fire Salvage/Restoration Decision Memo. Thinning of red pine stands in the area has also occurred from other past projects such as Eastside Thinning (2006), Red Pine and White Spruce Thinning EA (2002) Silver Island (2002).

2.5 Comparison of Alternatives Considered in Detail

2.5.1 Comparison of Acres of Proposed Treatments

The following tables allow for a comparison of acres proposed for treatment in the three alternatives. Table 2.10 shows the acres of the proposed primary treatments, Table 2.11 shows secondary treatments, and Table 2.12 shows proposed transportation management activities.

Table 2.10. Comparison of Primary Treatments and Acres Proposed Under Each Alternative, Acres[1] by Forest Type and Alternative for the Windy Project Area.

Primary Treatments	Forest Type	Alt 1	Alt 2	Alt 3
Clearcut with Reserves	Aspen-White Spruce/Balsam Fir	0	1,680	1,866
	Balsam Fir-Aspen/Paper Birch	0	48	48
	Cedar[2]/Aspen/Paper Birch	0	0	30
	Jack Pine	0	491	567
	Paper Birch	0	0	2
	Quaking Aspen	0	636	830
	Red Pine	0	0	258
	Upland Black Spruce / Jack Pine	0	587	626
	TOTAL:	**0**	**3,443**	**4,228**
Patch Clearcut	White Spruce-Balsam Fir	0	28	28
	TOTAL:	**0**	**28**	**28**
Thinning	Jack Pine	0	43	43
	Mixed Pine	0	7	7
	Red Pine	0	438	438
	TOTAL:	**0**	**487**	**487**
TOTAL HARVEST ACRES:		**0**	**3,092**	**1,948**
Mechanical Site Preparation	Aspen-White Spruce/Balsam Fir	0	110	110
	Balsam Fir-Aspen/Paper Birch	0	80	80
	Paper Birch	0	71	71
	TOTAL:	**0**	**262**	**262**

Table 2.10. Comparison of Primary Treatments and Acres Proposed Under Each Alternative, Acres[1] by Forest Type and Alternative for the Windy Project Area.

Primary Treatments	Forest Type	Alt 1	Alt 2	Alt 3
Underplant	Aspen-White spruce-Balsam Fir	0	17	17
	Mixed Pine	0	11	11
	TOTAL:	**0**	**27**	**27**
Hand Scalp and Plant	Red Pine	0	72	72
	TOTAL:	**0**	**72**	**72**
Understory Fuels Reduction	Aspen-White Spruce/Balsam Fir	0	106	106
	Black Spruce - Lowland	0	28	28
	Jack Pine	0	2	2
	Mixed Pines	0	19	19
	Red Pine	0	208	208
	Upland Black Spruce or Black Spruce and Jack Pine (BS/JP)	0	18	18
	White spruce	0	9	9
	TOTAL:	**0**	**390**	**390**
Burn Inclusion	Balsam Fir-Aspen/Paper Birch	0	0	15
	Black Spruce - Lowland	0	0	50
	Cedar/Aspen/Paper Birch	0	0	19
	Jack Pine	0	0	19
	Open (not forested)	0	0	171
	Red Pine	0	0	2
	Upland Black Spruce or (BS/JP)	0	0	34
	TOTAL:	**0**	**0**	**309**

[1]All acres shown are estimates based on stand acres. Actual treated acres could be less due to legacy patches, reserve islands, operational standards and guidelines, and other factors.
[2]No cedar will be harvested in the Cedar/Aspen/Paper Birch forest type.

Table 2.11: Summary of Secondary Treatments and Reforestation Activities all Alternatives.

Treatment Description	Alt. 1	Alt. 2[1]	Alt. 3
Secondary Treatment			
Mechanical Site Preparation	0	482	482
Site Preparation Burn	0	202	674
Underplant	0	199	199
Underburn	0	163	163
Pile Burn	0	82	82
Broadcast Burn	0	40	40
Hand Scalp and Plant	0	28	28
Understory Fuel Reduction	0	7	7
Regeneration Method Following Harvest			
Natural Regeneration	0	3,105	3,752
Natural Regeneration with Interplanting	0	195	195
Planting	0	72	72
Seeding	0	99	236

Table 2.11: Summary of Secondary Treatments and Reforestation Activities all Alternatives.

Treatment Description	Alt. 1	Alt. 2[1]	Alt. 3
Regeneration Method Following Non-harvest Treatments			
Natural Regeneration	0	2	2
Natural Regeneration with Interplanting	0	188	188
Underplant	0	84	84

[1] Acres are for the total unit; treatment acres would be less.
[2]Monitoring the amount of competing vegetation and browse on planted regeneration would determine necessary actions to protect the seedlings. This could include releasing the seedlings from competing vegetation or applying deer repellant.

Table 2.12: Transportation Management Activities for the Windy Project Area

Transportation System	Alt. 1	Alt. 2	Alt. 3
Miles of temporary road construction	0	7.8	9.0
Miles of decommissioning roads	0	2.1	2.1
Miles of OML 2 road relocation	0	0.25	0.25

2.5.2 Comparison of Effects of Alternatives by Resource

This section summarizes and compares the effects of the two alternatives analyzed in detail. The salient indicators and conclusions of each resource analyzed in Chapter 3 or appendices are summarized here. For the detailed analysis, including analysis methods, data, cumulative effects, etc., see Chapter 3 and relevant appendices.

Treaty Rights

The amount of young aspen-birch and mixed aspen conifer forest, referred to as Management Indicator Habitat (MIH) 4, provides foraging habitat for game species, thereby providing hunting opportunities in the project area. After ten years under Alternative 1, all of the current 1,942 acres of young forest in MIH 4 would move into the next age class and zero acres of young forest would be creating, reducing hunting opportunities. The proposed harvest treatments in Alternative 2 would increase the young forest in MIH 4 to 2,228 acres as compared to Alternative 3 which would increase the amount of young MIH 4 to 2,610 acres by the year 2023. Alternative 3 would also provide more acres of young in MIH 4 (1,913 acres) within ¼ mile of existing roads than Alternative 2 (1,660 acres). Alternative 3 would provide the most foraging habitat for game species such as moose and grouse and increase opportunities for hunting.

Vegetation

In 2023 (ten years), there would be zero acres in the young age class the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area under Alternative 1. There would be a total of 3,432 acres in the young age class under Alternative 2 and 4,218 acres under Alternative 3.

Forest composition would be similar under all alternatives, except Alternative 2 and 3 would increase jack pine forest type by 25 acres, increase mixed pine by 20 acres and decrease aspen by 45 acres. Alternative 2 and 3 would increase within-stand diversity on

834 acres with increasing amounts of paper birch, white spruce, white cedar, jack pine, red pine, white pine, and tamarack as a component in stands.

Threatened and Endangered Species
Forest conditions would continue to provide for lynx denning, foraging, and movement across the analysis area under all three alternatives. Alternative 1 would have no effect on Canada lynx, nor would it adversely modify critical habitat. Alternative 2 or Alternative 3 may affect, but are not likely to adversely affect lynx or modify critical habitat and effects are expected to be beneficial, insignificant, or discountable.

Neither Alternative 1, Alternative 2, or Alternative 3 are likely to jeopardize the existence of the northern long-eared bat. Alternative 2 or Alternative 3 may adversely affect this species. Under all alternatives, forest conditions would continue to provide for bat roosting and hibernating habitat across the analysis area, but under Alternatives 2 and 3 some summer roosting habitat may be reduced and individual bats may be harmed.

Regional Forester Sensitive Species/Management Indicator Species
Aquatic species: Alternative 1 would not impact the aquatic Regional Forester Sensitive Species. Alternative 2 or Alternative 3 may impact individuals or the habitat of the northern brook lamprey, creek heelsplitter and black sandshell mussels, Quebec emerald dragonfly, ebony boghaunter dragonfly, and headwaters chilostigman caddisfly; but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Terrestrial Wildlife: Alternative 1 would result in the least amount of disturbance to Regional Forester's Sensitive Species (RFSS) and generally results in a finding of *no impact*. For Alternatives 2 and 3, the proposed activities would have no impact on Freija's grizzled skipper or wood turtle. For Alternative 2 and 3, the proposed activities may impact individuals but are not likely to cause a trend to federal listing or loss of viability for gray wolf, little brown myotis, tri-colored bat, heather vole, bald eagle, northern goshawk, bay-breasted warbler, Connecticut warbler, olive-sided flycatcher, American three-toed woodpecker, great gray owl, boreal owl, Taiga alpine butterfly or Nabokov's blue butterfly.

Plant Species: Alternative 1 may impact five RFSS plant species. However, this impact is not likely to cause a trend toward federally listing these species or loss in their population viability; none of the remaining RFSS plants would be directly, indirectly, or cumulatively impacted by Alternative 1. Alternative 2 and 3 may impact 34 and 39 RFSS plant species respectively. However, this impact is not likely to cause a trend toward federally listing these species or loss in their population viability; none of the remaining RFSS plants would be directly, indirectly, or cumulatively impacted by Alternative 2.

Soil Productivity and Wetlands
Alternative 1 would have no direct effects on soil productivity because no soil disturbing activities would take place as a result of this alternative. Impacts to soil productivity would be minimal under Alternatives 2 or 3 because appropriate mitigation measures and

Operational Standards and Guidelines would be followed during implementation to reduce effects to soil resources.

Table 2.13. Summary of Soil Productivity and Wetlands Indicators

Indicator	Alt. 1	Alt. 2	Alt. 3
Acres of landings and skid trails	0	159	189
Acres of slash disposal, site preparation, and prescribed burning on low nutrient Ecological Landtypes	0	950	1,134
Acres of wetland within mechanical treatment units	0	373	690

Non-Native Invasive Plants (NNIP)

When direct, indirect, and cumulative effects are considered together, Alternative 1 emerges as the alternative with the lowest risk of weed spread and subsequent negative impacts because there would be no ground disturbance with this alternative. Alternative 2 would construct 2.4 miles of upland temporary road, 0.25 miles of upland OML 2 road relocation, and there would be 994 acres of upland treatment units within 50 feet of non-native invasive plant occurrence. Alternative 3 would construct 3.0 miles of upland temporary road, 0.25 miles of upland OML 2 road relocation, and there would be 1,158 acres of upland treatment units within 50 feet of non-native invasive plant occurrence. The risk of NNIP impacts is highest for Alternative 3, and somewhat less for Alternative 2. The overall magnitude of NNIP impacts for Alternatives 2 or 3 would be relatively low because of Operational Standards and Guidelines designed to minimize the impacts of weed spread.

Water Quality

Alternative 1 would have no direct, indirect or cumulative effects to water quality because there would be no increase in road miles or increase in the percentage of watersheds in a young or open condition. Impacts to water quality would be minimal under Alternative 2 and Alternative 3 because Operational Standards and Guidelines and site specific mitigation measures would be followed during implementation. Also 2.1 miles of roads would be decommissioned reducing potential sediment sources and improving the water quality.

Table 2.14. Summary of Water Quality Indicators

Indicator	Alt. 1	Alt. 2	Alt. 3
Miles of temporary roads crossing lowlands	0	0.16	0.19
Number of new temporary water crossings	0	1	1
Percentage of upland open and upland young forest within each sixth level watershed	2-59	0.84-59	0.84-59

Boundary Waters Canoe Area Wilderness

Alternative 1 would have no impacts to the Boundary Waters Canoe Area Wilderness. Alternatives 2 and 3 would create short term impacts to BWCAW visitors in the way of sound from mechanical operations that may be heard on the periphery of the Wilderness. These impacts would be limited in scope and duration and would likely be experienced by very few wilderness users.

2.5.3 Comparison of How Alternatives Meet Purpose and Need

This section explains how each alternative would meet the objectives of the purpose and need (see Section 1.4 for the Purpose and Need).

Promote Diverse, Productive, Healthy, and Resilient Native Vegetation Communities by Moving Towards Landscape Ecosystem and Management Indicator Habitat Objectives

Disturbance is a natural and vital part of the Jack Pine-Black Spruce Landscape Ecosystem. Alternative 1 would not provide any man-made disturbance to encourage jack pine, birch, or aspen regeneration, and late successional species (spruce and fir) would dominate in more stands. Alternative 1 would also not create any young forest. Alternative 2 would create 3,442 acres of young forest and Alternative 3 would create 4,218 acres of young forest.

Within-stand structural and species diversity is desired, with increasing amounts of paper birch, white spruce, white cedar, jack pine, red pine, white pine, and tamarack as a component in stands. Under Alternative 1, within stand diversity would increase with many stands recruiting spruce and fir over time without any disturbance. However, Alternatives 2 and 3 would increase within stand diversity on 834 acres by the following treatments:

- Planting red and white pine in a mature red pine and a mature mixed aspen stands.
- Planting jack pine and black spruce in openings created by harvest, where about 10% of the stand would be removed.
- Planting white pine, red pine, jack pine or black spruce and tamarack after understory fuels reduction in a mature stand.
- Planting white pine, red pine, or jack pine after site preparation (without prior harvest).
- Interplanting black spruce and jack pine or white spruce site preparation (without prior harvest).
- Interplanting white spruce, jack pine, or tamarack after harvest.

Other efforts to maintain and increase pine are from two conversion projects in Alternatives 2 and 3. In these alternatives, 25 acres of mixed aspen would be converted to jack pine and 20 acres of mixed aspen would be converted to red and white pine forest type. Alternative 1, however, would not convert these acres.

Under Alternative 1, the existing acreage of white pine would not be expected to change in the next decade with no management action. Natural regeneration of white pine would be limited because without fire there is increased tree and shrub competition. Alternatives 2 and 3 would increase mixed pine forest type, where red and white pine dominate. Both alternatives would also contribute to increasing the white pine component. Several wildlife species could eventually benefit from white pine, including bald eagle, pileated woodpecker, boreal owl, red squirrel, and black bear.

Improve Moose Habitat

Alternative 1 proposes no management activities; therefore it would do less than the other alternatives to create forage for moose. Approximately nine percent of the existing

landscape is young forest, primarily as a result of the Pagami Creek Fire in 2011. Without management actions or natural disturbance events, foraging habitat is expected to decrease over the next decade. Model results without these disturbances show no young forest (<10 years old) on National Forest System lands by 2023 (Table 2.15). Natural disturbance events and management activities on non-federal lands will continue to provide some foraging opportunities across the landscape.

Alternative 2 and Alternative 3 would create young upland forest and increase the available forage for moose. Moose tend to favor early successional browse species such as quaking aspen, paper birch, mountain ash, willow, red-osier dogwood, and beaked hazel, which would regenerate following harvest. Additionally, red maple is browsed when available and balsam fir may be consumed during winter. Shrub and tree regeneration following management activities with either alternative would provide another 10 to 20 years of forage.

There would be slightly more foraging habitat created with Alternative 3 (17%) than with Alternative 2 (15%) as a result of more timber harvesting (Table 2.15). Alternative 1 proposes no management activities and young upland forest acres would make up eight percent of the landscape in 2017. By 2023, the young forest created during the Pagami Creek Fire will be in an older age class resulting in a decrease in this indicator in all alternatives (Table 2.15).

Alternatives 2 and 3 propose the same treatments in the vicinity of Windy, Wilson, and Four Mile Lakes – the areas the interdisciplinary team focused on for moose habitat management. Natural tree regeneration is planned for approximately 3,700 acres in Alternative 3 and for 3,100 acres in Alternative 2. Regeneration would be dominated primarily by aspen, but would also include birch, jack pine, black spruce, and balsam fir. Underplanting and interplanting of conifer is planned in both Alternative 2 and 3 to improve tree species diversity.

Thermal cover would continue to be available to moose under all of the alternatives. Over 30 percent of the upland forest in Windy Project Area is typed as upland conifer, which is projected to increase over the next decade (Table 2.16, project record MIH results). In addition to upland conifer, there is over 17,000 acres of lowland conifer forest in Windy Project Area. No management activities are proposed in lowland conifer stands so this habitat does not change by alternative. Riparian habitats, wetlands, and lakes are protected using operational standards and guidelines.

Table 2.15: Acres and percent of young upland forest <10 years old within the Windy Project Area

Year	Alt 1		Alt 2		Alt 3	
	Acres	%	Acres	%	Acres	%
2014	4,190	9	4,190	9	4,190	9
2017	3,517	8	6,950	15	7,704	17
2023	0	0	3,432	8	4,187	9

Data Source: Windy Project Area MIH 1 results. Other Footnotes: percentages include all upland forest on federal lands within the Jack Pine Black Spruce portion of the project area. Numbers may vary slightly due to rounding.

Table 2.16: Acres and percent of upland conifer forest (spruce and pine) >9 years old within the Windy Project Area

Year	Alt 1		Alt 2		Alt 3	
	Acres	%	Acres	%	Acres	%
2014	14,241	32	14,241	32	14,241	32
2017	15,595	35	14,412	32	14,039	32
2023	17,400	39	16,180	36	15,807	36

Data Source: Windy Project Area MIH 5 results. Other Footnotes: percentages include all upland forest on federal lands within the Jack Pine Black Spruce portion of the project area. Lowland forest also provides thermal cover. Numbers may vary slightly due to rounding.

Improve Riparian Area Function

Alternative 1 would not actively plant long-lived tree species within the riparian areas. Without any disturbance, balsam fir would begin to dominate these areas. Alternative 2 and Alternative 3 would manage for conifers in the riparian area. Approximately 4 acres, as primary treatment, and 21 acres, as secondary treatment, would be underplanted with northern white cedar, red pine, white pine or white spruce in the riparian area of the stand. (The units with underplanting as the primary treatments encompass 27 acres and with secondary treatments encompass 283 acres; however only a portion of each unit would be underplanted.) Conifers would eventually grow into overstory trees creating shade for aquatic and wetland ecosystems, thermal cover for wildlife, and nest sites for riparian associated species, such as eagles and osprey, as well as inputs of coarse wood and fine litter to provide in-stream and lake structure and nutrients to the aquatic system (MFRC Guidelines - Riparian, p. 6; D-WS-10, FP, p. 2-11).

Figure 2.4: Underplanting in Riparian Area

Reduce hazardous fuels

Alternative 1 would not reduce existing fuel hazards near Wildland Urban Interface areas. Existing fuel volumes would increase throughout most forest land within the project area. This is due to dead, dying, and/or wind thrown trees and successional trends toward spruce-fir forest types. Increasing fuel loads can result in intense wildfires with severe effects. Subsequently, values at risk, such as private property, recreation resources, and natural resources, could be negatively impacted in the event of wildfire within the project area. Further, changes in the climate that increase temperatures and/or decrease moisture may further alter fire regimes in the future and exacerbate the potential for large wildfires exhibiting severe effects.

Table 2.17 describes how different types of fuel reduction treatments target the different fuel types to reduce overall fuel loadings in an area. Fuel reduction treatments including surface, ladder, and crown fuels were targeted for the Windy Project Area. Figure 2.5 illustrates the effects of the understory fuel reduction treatment.

Table 2.17: Comparison of Acres and Type of Fuel Reduction Activities by Alternative.

Description of Primary Treatment	Alt. 1	Alt. 2	Alt. 3
Understory Fuel Reduction: Mechanically reduces surface and ladder fuels.	0	390	390
Harvest: Removes crown fuels and crushes ladder fuels through harvest activity.	0	325*	793*
Mechanical Site Preparation: Crushes and displaces surface and ladder fuels with heavy equipment.	0	71*	71*
TOTAL	**0**	**786**	**1,254**
Description of Secondary Treatment			
Underburning: Low intensity prescribed fire used in the understory of pine stands to reduce surface and ladder fuels.	0	163	163
Broadcast Burning: Variable intensity prescribed fire used to reduce surface and ladder fuels.	0	40	40
Site Preparation Burning: Variable intensity prescribed fire used to reduce surface fuels created from harvest activity and promote regeneration.	0	202	674
Understory Fuel Reduction: Mechanically reduces surface and ladder fuels.	0	7	7
Mechanical Site Preparation: Crushes and displaces surface and ladder fuels with heavy equipment.	0	20*	20*
Pile Burn: Reduces surface fuel loading created during harvest and site preparation activities through piling and burning or mechanically crushing the surface fuels.	0	82	82
TOTAL	**0**	**514**	**986**

*Includes only acres of treatment where fuel reduction would occur.

Figure 2.5. Illustration of Reduction in Surface and Ladder Fuels with Understory Fuel Reduction.

Before understory fuel reduction

After understory fuel reduction

The 786 acres of fuel reduction treatments proposed in Alternative 2 would be primarily located near private land and/or roadways providing access/egress to private properties

near Wilson Lake in the southeastern portion of the project area. The 1,254 acres of fuel reduction treatments proposed in Alternative 3 would be located in the Wilson Lake area and 2.5 miles north of private property on Dumbbell Lake in the southwestern portion of the project area. The landscape scale treatment north of Dumbbell Lake would provide an additional area of defensible space for private properties on Dumbbell and Tanner Lakes in Alternative 3.

Defensible space would be increased by treating these areas. Defensible space is the area between a fire and values at risk where firefighters are able to more safely conduct suppression actions. Additionally, removing hazardous fuels near high travel corridors would improve the safety of travel for forest visitors and local residents exiting the area during a wildfire. All fuel reduction treatments in Alternatives 2 and 3 would reduce hazardous fuels to a level where behavior from a wildfire would be decreased. However, approximately 468 more acres of defensible space would be created in Alternative 3 compared to Alternative 2. Combining the increase in defensible space and decreasing fire behavior would likely allow fire suppression activities to minimize impacts to values at risk and improve public and firefighter safety during a wildfire event.

Several prescribed burns are proposed in Alternatives 2 and 3. These secondary treatments would reduce surface and ladder fuels, thereby decreasing the potential for extreme fire behavior in the Wilson Lake and Dumbbell Lake areas. Additionally, these treatments would accomplish the objective to restore native vegetation communities by restoring the historical fire regime to pine stands.

Provide Sustainable Timber Products

Alternative 1 would not provide timber products from this area at this time. It would not preclude providing timber products in the future, however. Alternative 2 and 3 would provide approximately 32.32 and 33.76 million board feet. Harvesting the timber stands proposed in Alternative 2 offers immediate economic returns to federal and local governments and to the timber industry. Harvesting in Alternative 2 would be a continuation of the economic returns from harvest similar to the return in the past 10 years.

Improve Forest Health and Productivity

As the forest grows it becomes more tightly spaced, reducing tree growth and minimizing light to reach forbs, shrubs, or understory trees. Reducing stand density with thinning increases growing space for residual trees and maintains a high rate of growth. Alternative 1 would not thin any stands. However, Alternatives 2 and 3 would thin the same amount of red pine plantations, mixed jack pine and red pine plantations, and mixed red and white pine stands. Thinning would increase growth rates and make trees more resistant to insects and diseases.

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Chapter 3: Environmental Consequences

3.1 Introduction

This chapter presents the scientific and analytic basis for the comparison of alternatives. The chapter is organized by resource area and for each resource includes a discussion of Affected Environment and Environmental Effects. The "Affected Environment" describes the current condition of the resource indicators and trends relative to their status. The "Environmental Effects" describes the direct, indirect and cumulative effects of the alternatives:

- **Direct effects** are impacts that occur at the same time and place as the initial action.
- **Indirect effects** are impacts that occur as a result of the initial action but are either later in time or are spatially removed from the action.
- **Cumulative effects** result from the incremental impacts of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such further action. These potential cumulative actions are described in Appendix F.

The interdisciplinary team (IDT) examined and analyzed data to estimate the effects of each alternative. The data and level of analysis were proportionate with the importance of the possible impacts (40 CFR 1502.15). The effects are quantified where possible, although qualitative discussions may also be included.

The vegetation analysis used data from the Forest Service Spatial database. The database includes information such as forest type, age, basal area and site index. It is continually being updated based on field reconnaissance and past forest altering activities. Data used for the Windy analysis was extracted from FS Spatial in 2014. Acreage figures in FS Spatial are estimates; acreages may change slightly during implementation based on more extensive field verification.

Road and trail data used in the analysis is from the INFRA tabular database in conjunction with the GIS Travel Routes spatial database. These databases are continually updated. Editing generally involves correcting errors between the INFRA and GIS Travel Routes such as inconsistent lengths or locations and inventorying unclassified roads.

The interdisciplinary team considered the possible inaccuracies and limitations of the vegetation and road/trail data. The team concluded it is the best available information and is adequate for the analysis conducted and for drawing conclusions. The basic data and central relationships are sufficiently well-established in the respective sciences that additional data, increasing accuracy, is unlikely to reverse or nullify understood relationships. Thus, additional data would be welcomed and add precision but it is not essential to provide adequate information for the decision-maker to make a reasoned choice among alternatives.

3.2 Treaty Rights

3.2.1 Introduction

Tribes are considered to be sovereign nations; the United States government and its departments have a responsibility to recognize this status. The federal relationship with each tribe was established by, and has been addressed through, the Constitution of the United States, treaties, executive orders, statutes, and court decisions. Government-to-government consultation between the federal government and federally recognized American Indian tribal governments acknowledges the sovereign status of these tribes. This consultation supports Executive Order 13175 (November 6, 2000), which recognizes the sovereignty of federally recognized American Indian tribes and the special government-to-government relationship.

Beginning in the mid-nineteenth century, the government of the United States made treaties with the Ojibwe that ceded areas of land in northern Minnesota to the federal government. In return, specific reservations were created for the tribes' use and other considerations specified. The treaties also preserved the right of the Ojibwe bands to hunt, fish, and gather off the reservations within the treaty area. Tribal interests and uses on National Forest lands are protected through various statutes. The federal trust doctrine requires that federal agencies manage the lands under their stewardship with full consideration of tribal rights and interests, particularly reserved rights, where they exist.

The Superior National Forest has a role in maintaining these rights, because it is an office of the federal government responsible for natural resource management on lands subject to these treaties. The Superior National Forest is located on lands ceded by the Ojibwe to the United States in 1854 and 1866. Three bands - Grand Portage, Fond du Lac, and Bois Forte (Nett, Lake) – live in proximity to the Forest and are directly affected by the treaties. The tribes consider many areas in the Superior National Forest important to them for cultural, historic, traditional, and spiritual reasons.

Article 11 of the 1854 Treaty states that Ojibwe within the treaty area would continue to have the right to hunt and fish on lands they ceded. A court decision (*Fond du Lac Band of Chippewa v. Carlson*, 1995) has confirmed this right to hunt, fish, and gather without regulation by the State of Minnesota.

When developing the proposed action, interdisciplinary team members consulted with the 1854 Treaty Authority, Bois Forte Band, Fond du Lac Band, and Grand Portage Band. Biologists and specialists shared data on wildlife habitat and ecology of the area.

Through inter-governmental discussions on this project and past projects, they have expressed concerned about habitat for game species such as deer, moose and ruffed grouse and access to the National Forest System land for hunting and gathering opportunities. The Windy Project proposes to change the vegetation age class distributions and species composition which could result in a change to available habitats for game species. This analysis addresses these concerns.

3.2.2 Indicators

Indicator 1: Acres of young Management Indicator Habitat (MIH) 4.
The change in the amount of young (0 to 9 years) aspen-birch and mixed aspen-conifer forests (Management Indicator Habitat 4) in the Windy Project Area is used as an indicator of effects on particular game species, such as grouse, moose, and deer. MIH 4 provides important foraging opportunities for these species.

Indicator 2: Acres of young MIH 4 within one quarter mile of existing roads.
The difference in acres of young in Management Indicator Habitat (MIH) 4 that would occur within one quarter mile of existing roads in the Windy Project Area is used as an indicator. These acres are used as an indicator because one quarter mile is a reasonable distance to walk when participating in hunting opportunities.

3.2.3 Analysis Parameters

The geographic boundary of the Windy Project Area was used for analyzing the direct and indirect effects for game species. A ten year period was used to analyze effects of proposed treatment units, including access roads to treatment. This timeframe provides a reasonable estimate of when the majority of the actions would be completed.

3.2.4 Affected Environment

Game species use different habitats throughout the year to meet their life history requirements. Grouse, for example, will use mature aspen forest during the winter but younger stands for brood cover in the summer. Mature spruce-fir forests provide important thermal cover for deer and moose in the winter. Young aspen-birch and mixed aspen-conifer forests (Management Indicator Habitat 4) provides important foraging opportunities for game species, such as grouse, moose, and deer.

Currently, 1,942 acres or four percent of aspen-birch and mixed aspen-conifer forests (MIH 4) in the project area are less than ten years old (Table 3-TR-1). More than half of these acres are located near existing roads.

Table 3-TR-1: Comparison of Acres of Young MIH 4 by Alternative.

Analysis Area	Existing Condition 2014		Alternative 1 2023		Alternative 2 2023		Alternative 3 2023	
	Acres	%	Acres	%	Acres	%	Acres	%
Windy Project Area[1]	1,942	4.4	0	0	2,228	5.0	2,610	6.0
Project area acres that are within ¼ mile of existing roads[2]	1,020	2.3	0	0	1,660	3.7	1,913	4.3

[1]Data source taken from data runs for the Jack Pine – Black Sprue Landscape Ecosystems for the Existing Condition (c1a_ay2014_010314.dbf), Alternative 1 (r2a_ay2023_122713.dbf), Alternative 2 (r3a_ay2023_123013.dbf), and Alternative 3 (r16_ay2023_022214.dbf) in the Windy Project Record.
[2]Data source from query of MIH 4 acres within ¼ mile of roads open to ATV's in the Windy Project Area

3.2.5 Environmental Consequences

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

Under Alternative 1 – No Action, there would be no harvesting that would create young aspen-birch habitat. The forest in the project area would continue to change through natural processes. In ten years' time (2023), all of the 1,942 acres of the existing young aspen-birch and mixed aspen-conifer forest would move into the sapling – pole age class. Within the project area, there would be zero acres of young MIH 4, the foraging habitat for game species such as deer, moose and grouse. This would reduce hunting opportunities in the project area. Forest-wide the amount of young MIH 4 acres would decline by about a third of the current amount of acres under Alternative 1.

Alternative 2

Direct, Indirect and Cumulative Effects

In ten years, Alternative 2 combined with other past, present and future actions would create 2,228 acres of young aspen-birch and mixed aspen-conifer forest that would provide foraging habitat for game species such as moose and grouse. As displayed in Table 3-TR-1, more than 70 percent of these acres would be within a quarter mile of existing roads providing an increase for hunting opportunities.

Cumulatively, the amount of acres of young MIH 4 in Alternative 2 would provide more opportunities for brood cover and foraging habitat Forest-wide creating the potential to increase the populations of game species Forest-wide. This is reflected in Table 3-TR-2.

Alternative 3

Direct, Indirect and Cumulative Effects

Alternative 3 combined with other past, present and future actions in ten years would create 2,610 acres of young aspen-birch and mixed aspen-conifer forest that would provide foraging habitat for game species such as moose and grouse. As displayed in Table 3-TR-1, more than 70 percent of these acres would be within a quarter mile of existing roads providing an increase for hunting opportunities.

Cumulatively, the acres of young MIH 4 in Alternative 3 would provide opportunities for brood cover and foraging habitat forest-wide creating the potential to increase the populations of game species forest-wide. This is reflected in Table 3-TR-2.

Table 3-TR-2: Cumulative Effects on Young MIH 4 Forest-wide

Young MIH 4 by LE	Existing Condition 2014		Alternative 1 2023		Alternative 2 2023		Alternative 3 2023	
	Acres	%	Acres	%	Acres	%	Acres	%
JPBS	6,976	2.4	1,970	1.0	4,199	2.0	4,581	2.0

Data Source: Queries for the Jack Pine – Black Spruce (JPBS) Landscape Ecosystems MIH 1-10, Forest-wide. This includes existing condition through 2014 and all decisions and proposals, including Alternative 1-No Action, Alternative 2, and Alternative 3 through 2023. It includes the Succession Modeling Rules for the Dualplan Harvest Model, (Forest Plan FEIS 2004, Vol 2, Appendix B, pp. B-17 and B-18).

3.3 Vegetation

3.3.1 Introduction

This section discusses the effects that each alternative is expected to have on landscape ecosystems. Landscape ecosystems represent the most current and best scientific information to use in analyzing forest vegetation and are described and delineated in the Forest Plan (FP) (FP, pp.2-55 to 2-78). Forest Plan landscape ecosystem objectives seek conditions more representative of native vegetation communities than those that currently exist.

3.3.2 Indicators

The Forest Plan provides four objectives for each landscape ecosystem; 1) age class distribution, 2) species composition, 3) Management Indicator Habitats, and 4) within-stand diversity. Because these objectives are measurable, they provide a good way to compare how the Windy Project's alternatives would move toward the Forest Plan's desired condition. Age class distribution, species composition, and within-stand diversity are discussed in this section and an analysis of Management Indicator Habitats is in the Project Record.

> **Landscape Ecosystems** are characterized the dominant vegetation communities and patterns, which are a product of local climate, glacial topography, dominant soils, and natural processes such as succession, fire, wind, insects, and disease (FP, p. 2-55).

Indicator 1: Age Class.
Each forest stand is in an age class. Age class is broken down by decade or a range of decades such as 0-9, 10-49, or 50-79. Each landscape ecosystem has a different set of age class ranges. Table 3-Veg-1 and Table 3-Veg-2 displays the age classes for the Jack Pine – Black Spruce (JPBS) Landscape Ecosystem (LE).

Indicator 2: Composition.
Forest type describes the dominant vegetation at the stand level and is delineated by areas that have similar species, such as white pine, aspen-white spruce-balsam fir, etc. The forest type of a stand is based on the tree species most dominant in the stand, but other species may be present as smaller components. As an example, a stand could be typed paper birch but could also have aspen, balsam fir, or spruce in the stand. Forest composition refers to the amount of different forest types such as jack pine, paper birch, and aspen across the project area or landscape ecosystem.

Indicator 3: Within-Stand Diversity.
Tree species diversity objectives in the Forest Plan differ from the composition (forest type) objectives in that they address the desired direction for total percentage of trees within a stand, not total acres of forest type. For this analysis, within-stand diversity or stand complexity refers to the vertical structure and associated species diversity at the stand scale. Vertical structure is the bottom to top configuration of vegetation within a forested stand and varies with forest type and ages. This includes components such as

snags, nest trees, and coarse woody debris.

3.3.3 Analysis Parameters

The geographic area selected for analyzing the direct and indirect effects of the three indicators is the Jack Pine – Black Spruce (JPBS) Landscape Ecosystem in the Windy Project Area because the proposed treatment units are in this landscape ecosystem. The model used for analysis includes all landscape ecosystems in the project area and this data can be found in the project record. The direct and indirect effects analysis covers only National Forest System land.

Two geographic boundaries with different spatial scales were selected for analyzing the cumulative effects for age class and composition indicators. The first analysis area included all ownership in the Jack Pine – Black Spruce Landscape Ecosystem in the project area. This boundary was chosen because activities on all ownerships in the project area would affect age class and composition at the project or local scale. The second boundary included all National Forest System land in the Jack Pine – Black Spruce Landscape Ecosystem Forest-wide. This boundary was chosen because at this scale, changes in age class and composition can be compared directly to Forest Plan landscape ecosystem objectives.

The cumulative effects analysis area for within-stand diversity indicator includes all National Forest System land and other ownership in the project area. This boundary was chosen because the activities on all ownerships in the project area would affect within-stand diversity and the other ownerships are adjacent to National Forest System land.

The base year of the analysis and existing condition is 2014. The existing condition is a reliable snapshot of past cumulative effects on forest types and age class. The composition and age class distribution of the area in the year 2014 would reflect all prior harvest, stand replacement natural disturbances or any other activity which affected forest type and/or stand age.

The analysis time frame for direct and indirect effects is between the years 2014 and 2023. This ten year age class is an appropriate timeframe because proposed actions would occur within this timeframe. In addition, all of the current acres of young age class would move out of the age class during this time. An analysis year of 2023 provides a picture of what the relative contribution would be from both management treatments and succession. An additional analysis year, 2017, was run to display the effects of recent past actions and events, particularly the Pagami Fire in 2011, which otherwise would not displayed in the 10 year analysis that ends in 2023.

The analysis time frame for cumulative effects on landscape ecosystems is between 2014 and 2023. This analysis used the same modeling assumptions as used in the Forest Plan Revision Environmental Impact Statement. The model made assumptions about when older short-lived species such as aspen would succeed to younger forest and what the new forest type would be. The model is described in “Succession Modeling Rules for the Dualplan Harvest Model” (Forest Plan FEIS, Appendix B).

3.3.4 Affected Environment

The forest that exists today evolved as a result of both natural and human processes. The pioneer logging that occurred during the late 19th century, followed by widespread slash-fueled wildfires, altered the composition and structure of the original forests. Recent timber management and fire suppression activities have contributed to current forest conditions. Natural disturbances and forest succession have also taken place to varying degrees on managed and unmanaged lands within the Windy Project Area. The forest that exists today is different from the forest that would have evolved under purely natural processes.

Figure 3-VEG-1: Example of a forested stand in Windy Project Area.

In 2011, the Pagami Creek Fire burned over 90,000 acres (including non-vegetated areas such as lakes and roads). Although the fire occurred predominantly in the Boundary Waters Canoe Area Wilderness (BWCAW), almost 9,000 acres (including non-vegetated areas) burned outside of the BWCAW in the Windy Project Area. The fire burned hot enough in over half of the acres in the Windy Project Area to replace the stand and create young age class.

Figure 3-VEG-2: Example of stand impacted by Pagami Fire.

The existing condition of the Windy Project Area age class distribution, composition and within stand diversity is shown in the tables under Environmental Consequences.

3.3.5 Environmental Consequences

Direct and Indirect Effects for all Alternatives

Indicator 1: Age Class.

Table 3-VEG-1 displays what the age class distribution would be under each of the alternatives in the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area in 2017 compared to the existing condition (2014). In addition to changes created by alternatives, it takes into account past actions (specifically the Pagami Creek Fire in 2011) and changes to the age class distribution that would likely occur naturally through succession. Although Alternative 1 would not create young age class there would be 8% or 3,522 acres in the 0-9 year age class, mainly due to recent past actions and the Pagami Creek Fire. Alternative 2 would have 15% or 6,955 acres in the 0-9 year age class in

2017; and Alternative 3 would have 17% or 7,740 acres in the 0-9 year age class, as a result of recent past actions, Pagami Creek Fire and proposed actions.

Table 3-Veg-1: Age Class Distribution in 2017 of the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area for all Alternatives.

Age Class	Existing Condition 2014		Alternative 1 2017		Alternative 2 2017		Alternative 3 2017	
	Acres	%	Acres	%	Acres	%	Acres	%
0-9	4,195	9	3522	8	6,955	15	7,740	17
10-49	14,120	31	14,307	32	14,244	32	14,244	32
50-79	19,628	44	20,709	46	17,838	40	17,120	38
80-109	3,842	9	4,440	10	4,062	9	4,029	9
110-180	3,150	7	1,957	4	1,836	4	1,802	4
180+	15	0	15	0	15	0	15	0
TOTAL:	44,950	100	44,950	100	44,950	100	44,950	100

Data Source: Nov. 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, Project File Runs: cla_ag_2014_jpb_0110314.dbf, r11_ag_2017_jpb_022114.dbf, r08_ag_2017_jpb_022114.dbf, r19_ag_2017_jpb_022514.dbf.

By the year 2023, the recent past actions and acres of young forest created by the Pagami Fire have moved out of the 0-9 year young age class and have moved up into the next older age class. Table 3-VEG-2 displays what the age class distribution would be under each of the alternatives in the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area in the year 2023. In addition to changes created by alternatives, it takes into account past actions and changes to the age class distribution that would likely occur naturally through succession. Alternative 1 would not create young age class in the Jack Pine – Black Spruce Landscape Ecosystem in the project area; Alternative 2 would create 3,432 acres of young age class; Alternative 3 would create 4,218 acres of young age class.

Table 3-Veg-2: Age Class Distribution in 2023 of the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area for all Alternatives.

Age Class	Alternative 1 2023		Alternative 2 2023		Alternative 3 2023	
	Acres	%	Acres	%	Acres	%
0-9	0	0	3,432	8	4,218	9
10-49	15,197	34	15,197	34	15,197	34
50-79	21,365	47	18,511	41	17,845	40
80-109	5,885	13	5,528	12	5,442	12
110-180	2,488	6	2,267	5	2,233	5
180+	15	0	15	0	15	0
TOTAL:	44,950	100	44,950	100	44,950	100

Data Source: Nov. 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, Project File, Runs: cla_ag_2014_jpb_0110314.dbf, r2a_ag_2023_jpb_122713.dbf, r3a__ag_2023_jpb_123013.dbf, r16_ag_2023_jpb_022214.dbf.

In addition to harvesting, there would be 7.8 miles of temporary road created in Alternative 2 and 9.0 miles of temporary road created in Alternative 3. The forest condition would be considered open while the roads were being used. It is expected that

within ten years after the end of road use, the area would be re-vegetated and moving towards a forested condition. The 2.1 miles of road that would be decommissioned in Alternative 2 and Alternative 3 would also move toward a forested condition after decommissioning. The 0.25 miles of road relocation would be removed from a forested condition and remain in an open condition for the long term.

Indicator 2: Composition.

Table 3-VEG-3 shows the acres, by alternative, of forest type that would be converted to another forest type in the Windy Project Area.

Table 3-VEG-3: Forest Type Conversion due to Proposed Management Activities.

Existing Forest Type	Resulting Forest Type	Acres		
		Alt. 1	Alt. 2	Alt. 3
Aspen/White Spruce/Balsam Fir	Jack Pine	0	25	25
	Mixed Pines	0	20	20
Total		0	45	45

Table 3-VEG-4 displays how many acres of each forest type would be present under each of the alternatives in the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area in the year 2023. In addition to changes created by the alternatives, it takes into account the likely changes to the composition that would occur naturally, through succession during the next ten years. In the Jack Pine – Black Spruce landscape ecosystem, under No Action, the amount of jack pine forest type would decrease because the stands would age and succeed to spruce-fir. Proposed actions in Alternative 2 and Alternative 3 would slightly increase the amount of jack pine/ black spruce forest type.

Table 3-VEG-4: Comparison of Forest Type Acres within the Jack Pine – Black Spruce Landscape Ecosystem in the Windy Project Area.

Forest Type	Existing Condition 2014	Alternative 1 2023	Alternative 2 2023	Alternative 3 2023
Jack pine	3,011	2,845	2,869	2,869
Red pine	7,449	7,449	7,449	7,449
White pine	752	752	777	777
Spruce-fir	10,094	12,219	12,081	12,081
Aspen	20,525	19,075	19,081	19,091
Paper birch	2,622	2,112	2,184	2,184
Total	**44,452[1]**	**44,452**	**44,442**	**44,452**

Data Source: Nov. 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, Project File, Runs: cla_ag_2014_jpb_0110314.dbf, r2a_ag_2023_jpb_122713.dbf, r3a__ag_2023_jpb_123013.dbf, r16_ag_2023_jpb_022214.dbf. [1]Total does not match age class tables because misclassified lowlands were removed from the calculations.

Indicator 3: Within-Stand Diversity.

Table 3-Veg-5 shows the Forest Plan objectives for within-stand tree species diversity and what is likely to happen to the individual species under each alternative in the Jack Pine-Black Spruce Landscape Ecosystem in the Windy Project Area. Windy has the typical boreal mixed species composition; however, there is a noticeable amount of jack pine that

has naturally filled in to some of the hardwood plantations harvested in the later part of the last century. There are also some plantations in the project area that cedar and white pine regeneration are naturally filling in. This may be due to lower numbers of deer in those sections of the project area but is a welcome addition to the within-stand diversity.

Under Alternative 1, within-stand diversity would be created primarily by succession as a result of the older jack pine, aspen and birch dying and being replaced by spruce, fir and brush. Other species would come in naturally as well but at a much lower rate.

The same process of succession would happen in Alternatives 2 and 3 outside of the treated stands. Most of the even aged and understory fuels treatments would reduce the amount of species diversity. Planting and seeding, and releasing areas with known advanced white and red pine regeneration would increase the pine and spruce component in those stands. Mitigations, such as leave trees, legacy patches, and other parts of treatment units not harvested would also help improve within- stand diversity.

Table 3.VEG-5: Changes in Within-Stand Tree Species Diversity by Alternatives.

Species (Forest Plan Objective)	Change in Prevalence of Species within Stands
Paper birch (Increase)	The paper birch component in most mature stands would be expected to decrease in all three alternatives. Birch is a disturbance based species that is replaced by more shade tolerant species as the stands age. When a disturbance occurs either through individual trees dying, harvesting or through a natural event such as fire, it regenerates, but not as aggressively as aspen. There would be more paper birch in the young stands created in Alternatives 2 and 3 since harvesting would create conditions favorable to paper birch regeneration.
Balsam fir (Decrease)	Balsam fir would be expected to increase in Alternative 1 given the assumption that a natural fire of significant size would not occur in the next 10 years. Balsam fir would be expected to decrease in the treatment units in Alternatives 2 and 3 but expected to increase otherwise.
Black spruce (maintain or decrease)	Black spruce would be expected to increase in all three alternatives due to the ability of this species to grow well under various light conditions and take advantage of mineral soil exposed after harvesting.
White spruce (increase)	White spruce would be expected to increase in all three alternatives due to the ability of this species to grow well under various light conditions and take advantage of mineral soil exposed after harvesting. In Alternatives 2 and 3, white spruce would be underplanted in 179 acres of other forest types.
Aspen (decrease)	All three alternatives would be expected to see aspen decrease as succession introduces a higher amount of shade loving species such as fir and spruce to the project area. Aspen would be expected to have slight increases in Alternatives 2 and 3 as it has the ability to sprout suckers from the root system of the cut trees in the harvested openings.
Jack pine (decrease)	Without any disturbance, the amount of jack pine would be expected to decrease in Alternative 1 as jack pine trees age and are replaced with more shade loving species. Both Alternatives 2 and 3 would increase the amount of jack pine since harvesting would create more sun loving conditions favorable to jack pine regeneration. In addition, jack pine would be seeded on 43 acres in Alternative 2 and 180 acres in Alternative 3 units within forest types other than jack pine.

Table 3.VEG-5: Changes in Within-Stand Tree Species Diversity by Alternatives.

Species (Forest Plan Objective)	Change in Prevalence of Species within Stands
White pine (increase)	White pine regeneration would be expected to decrease in Alternative 1 since succession introduces more shade loving species such as fir and spruce to the project area. This is expected even though white pine has a moderate tolerance of shade. White pine has not shown the ability to successfully regenerate itself in the project area as a whole likely due the blister rust fungus, absence of mineral soil and browse damage. In Alternatives 2 and 3, white pine regeneration would be expected to increase primarily due to the planting of white pine in the project area. There would also be an expected increase in natural regeneration of this species in the treatment areas where enough mineral soil is exposed, light increased and overstory pine available to cast seed. There are 20 acres of other forest types that would be planted with a portion of white pine in both Alternatives 2 and 3.
Red pine (maintain or increase)	There would be a small amount of red pine planted in Alternatives 2 and 3 but otherwise, there would be little difference between the alternatives.

There would be minimal difference between alternatives in the amount of white cedar, tamarack, red maple or lowland hardwoods within stands.

Structural diversity

Structural diversity in some harvested stands in Alternatives 2 and 3 would decrease. All clearcut with reserve harvests would leave a minimum of 6-12 leave trees per acre which would mitigate simplifying structural diversity to some extent (D-VG-6, FP, p. 2-22, and O-VG-8, FP, p. 2-23). In addition, stands greater than 20 acres regenerated with clearcuts, five percent of the stand would be retained in legacy patches of live trees (G-TM-5, FP, p. 2-20). Mitigations for other resources that add additional legacy areas would further contribute to maintaining structural diversity. Standing dead and un-merchantable trees would be left to become future coarse woody debris, snags, and cavity nest trees except in instances where they are piled in a secondary treatment.

Treatments other than clearcuts, such as patch clearcut, and thinning would leave additional mature overstory that would contribute to the vertical structure in the units and in many cases maintain more of the desired conifer species such as pine and spruce.

Cumulative Effects for All Alternatives

Indicator 1: Age Class.

All Ownership in Windy Project Area: This section of the cumulative effects analysis considered vegetation management projects on federal, State, and private lands within the project area. The analysis considered any vegetation management projects from the past, present and into the future that have or would create young forest.

The Minnesota (MN) Department of Natural Resources (DNR) is currently proposing

stand examinations and harvest needs on 369 acres in the Windy Project Area (Appendix F). Of the possible State harvesting, 145 acres are planned for general harvest and roughly 224 acres require a field visit to determine a prescription or are not specified. These 369 acres were analyzed in this project as a harvest to create young age class and constitute about 6% of the state land in the project area. This estimate is based on areas proposed for survey and not for actual treatment; therefore, the actual harvest acres would likely be much lower.

There are no known plans for harvesting on private lands (Appendix F). Besides the Windy Project, there are no other reasonable foreseeable projects on National Forest System land that would create young age class by 2023.

When looking at activities on all ownerships in the project area, Alternatives 2 and 3 would create more young age class than Alternative 1. Creation of young age class would move towards Forest Plan Objectives.

Forest-wide Landscape Ecosystem: This section of the cumulative effects analysis considered vegetation management projects on National Forest System land in the Jack Pine – Black Spruce Landscape Ecosystem across the Superior National Forest. The analysis included any vegetation management projects across the Forest from the past, present and into the future that have or would create young forest. Appendix F lists which projects were included in the analysis. Table 3-VEG-6 shows that both Alternatives 2 and 3 slightly move the forest closer to Forest Plan objectives for decade two than Alternative 1.

Table 3-VEG-6: Forest-wide Age Class Distribution for the Jack Pine – Black Spruce Landscape Ecosystem

Age Class	Decade 2 Objectives 2024	Existing Condition 2014	Alternative1 2023	Alternative 2 2023	Alternative 3 2023
	%	%	%	%	%
0-9	14	6	2	3	3
10-49	44	38	40	40	40
50-99	18	22	26	25	25
80-99	17	25	24	24	24
100-179	7	9	8	8	8
180+	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**

Data Source: Nov. 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, Project File, Runs: r01_ag_2014_jpb_0110214.dbf, r02_ag_2023_jpb_122613.dbf, r03_ag_2023_jpb_122713.dbf, r12_ag_2023_jpb_022214.dbf.

Indicator 2: Composition.

All Ownership in the Windy Project Area: Harvested State lands could be expected to regenerate to aspen types along with some planting and seeding of conifers. In addition, there are no expected composition changes on private lands in the Windy Project Area.

Cumulatively, little change in composition is expected across all ownerships in the project area.

Forest-wide Landscape Ecosystem: The composition of the landscape ecosystem forest-wide is the same for both alternatives. See Table 3-VEG-7. Even though Alternatives 2 and 3 change the forest type (composition) of some units, the overall change is so small it is not noticeable at the landscape scale. The increase in spruce fir and decrease in aspen would be a result of succession.

Table 3-VEG-7: Forest-wide Vegetation Composition for the Jack Pine – Black Spruce Landscape Ecosystem.

Upland Forest Type	Decade 2 Objectives 2024	Existing Condition 2014	Alternative 1 2023	Alternative 2 2023	Alternative 3 2023
	%	%	%	%	%
Jack pine	32	30	31	31	31
Red pine	10	10	10	10	10
White pine	3	4	4	4	4
Spruce-fir	16	6	10	10	10
Oak	0	0	0	0	0
Northern hardwoods	0	0	0	0	0
Aspen	35	45	40	40	40
Paper birch	4	4	4	4	4
Total [1]	**100**	**100**	**100**	**100**	**100**

Data Source: Jan 2014 Forest-wide Vegetation Analyses, Formated_Tables_Analysis_Runs, Project File Runs: r01_ag_2014_jpb_0110214.dbf, r02_ag_2023_jpb_122613.dbf, r03_ag_2023_jpb_122713.dbf, r12_ag_2023_jpb_022214.dbf.

Indicator 3: Within-Stand Diversity.

The effects to within-stand diversity across all ownership in the project area are similar to those on National Forest System land because of the limited amount of actions on other ownership. The possible future harvests on State land would simplify some of the structural or species diversity within the proposed stands; however the amount of area affected would be small.

Under Alternative 1 the within-stand diversity would be created primarily by succession as a result of the older jack pine, aspen and birch dying and being replaced by spruce, fir and brush. Under Alternative 2, along with succession, additional species diversity would be generated through partial harvests of mature stands (i.e., patch clearcut and thinning), diversity plantings and under plantings, releasing areas with known advanced white and red pine regeneration, and forest type conversions. Under Alternative 3, along with succession, additional species diversity would be generated through partial harvests of mature stands (i.e., patch clearcut and thinning), diversity plantings and under plantings, releasing areas with known advanced white and red pine regeneration, and forest type conversions. Alternative 3 would also have the potential to simplify some of the structural or species diversity within additional proposed stands from Alternative 2; however the amount of area affected would be small.

3.4 Threatened and Endangered Species

3.4.1 Introduction

Resource management projects that may affect federally listed threatened and endangered species or species proposed for listing are assessed in a biological assessment (BA). The Windy Project Biological Assessment documents the potential effects on Canada lynx (listed as threatened) and its critical habitat and the northern long-eared bat (proposed as endangered).

The Windy Project Biological Assessment tiers to the Programmatic Biological Assessments written for the Forest Plan (USFS 2004, USFS 2011) and provides more specific information on site-specific effects of the project to proposed, threatened, and endangered species. Rather than repeat the information from the biological assessment, this section summarizes the key findings and determinations and incorporates by reference the Windy Project Biological Assessment which is available in the project record or on the Superior National Forest website at www.fs.usda.gov/goto/superior/projects under the Windy EA name.

The determinations of effects in the Windy Biological Assessment were based on consideration of direct, indirect, and cumulative effects of the proposed activities. The effects of the alternatives were compared using quantitative indicators and other relevant scientific information. The analysis used currently accepted and applicable scientific literature and other scientific sources, as well as information from species experts and professional judgment of Forest Service biologists. The key sources for species information include those developed for the Forest Plan (Forest Plan FEIS, vol. 1, Section 3.3.4; vol. 2, p. B-29), Forest Plan Biological Assessments (USDA 2004, USDA 2011), and new relevant information collected for this project and documented for each species in the Windy Project Biological Assessment.

The determination of effects is used in conference and consultation with the U.S. Fish and Wildlife Service to help them determine whether or not a proposed action is likely to affect or jeopardize the continued existence of a listed species. The following definitions are used to make a conclusion on the effects of a project to proposed, threatened, and endangered species:

Threatened and Endangered Species

- **No Effect**
- **May affect but not likely to adversely affect** – used when it is determined that direct or indirect effects on listed species from the proposed alternatives are expected to be discountable, insignificant, or completely beneficial.
- **May affect and is likely to adversely affect** – used if any adverse effect to listed species may occur as a direct or indirect result of the proposed alternatives and the effect is not discountable, insignificant or beneficial, or the effect will harm, harass or wound the species.

Proposed Listed Species

- **Is likely to jeopardize proposed species** – the appropriate conclusion when the proposed action is likely to jeopardize the proposed species. The definition of jeopardy is to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

3.4.2 Determination of Effects for Canada Lynx

Lynx and lynx tracks have been observed along some of the roads in the Windy Project Area and hair/scat samples have been collected for use in an ongoing lynx DNA analysis. The Windy Project Area is large enough to support a resident breeding population of lynx. We assumed lynx presence throughout the project area and considered their habitat needs when planning our management activities.

The Windy Project Area is within Lynx Analysis Units 24, 25 and 28. Table 3-TE-1 shows the total acreage of each lynx analysis unit. The definition of lynx analysis unit (LAU) can be found in the Forest Plan in Appendix E: Canada Lynx, 5 Scales of Analysis (FP, p. E-4).

Table 3-TE-1: Acreage of Lynx Analysis Units in Windy Project Area.

Lynx Analysis Unit	Gross Acres
LAU 24	17,713
LAU 25	41,043
LAU 28	24,914

Data source: January 2013 Monitoring and Evaluation Data for the Superior National Forest.

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

This alternative will have *no effect on lynx and will not modify critical habitat*. Alternative 1 would comply with all applicable Forest Plan management direction related to Canada lynx and its habitat. There would be no cumulative effects because there are no direct effects. No effects are expected under Alternative 1 for the following reasons:

- **Foraging habitat:** Under this alternative, there would be no conifer planting to increase within stand structure and diversity; however, older stands would continue to provide a young fir and spruce component for hares. Between 55-60 percent of each LAU would provide forest conditions for snowshoe hare in 2017.
- **Denning habitat:** Denning habitat is not a limiting factor. A range of 23-41 percent of the forest in the project area would be old enough to provide den site components such as large downed trees and dense cover. Lynx on the Superior National Forest will also use younger stands for denning if thick vertical cover provides den site concealment.
- **Roads and Trails:** The road and trail densities in Alternative 1 would range from 1.1 mile per square mile to 2.0 miles per square mile. These densities would

remain the same since no road decommissioning would occur. There would be no temporary roads built under Alternative 1 – No Action.

- **Connectivity habitat:** The amount of lynx habitat would range from 84 to 92 percent in 2017. The 2011 Programmatic Biological Assessment indicates that connectivity is not a factor at the LAU and Forest-wide levels due to new scientific information.
- **Other indicators:** Most of the ownership is National Forest System land where foraging, denning and matrix habitats are well-distributed. There would be no increase in the percent of unsuitable habitat in Windy as a result of management actions in Alternative 1.

Alternative 2

Direct and Indirect Effects

This alternative *may affect but is not likely to adversely affect lynx and it is not likely to adversely modify critical habitat*. Alternative 2 would comply with all applicable Forest Plan management direction related to Canada lynx and its habitat. Forest conditions would continue to provide for lynx denning, foraging, and movement across the analysis area. Effects of Alternative 2 are expected to be insignificant or discountable for the following reasons:

- **Foraging habitat:** Between 54-55 percent of each LAU would provide forest conditions for snowshoe hare in 2017 with percentages increasing by 2023. Older stands would continue to provide a young fir and spruce component for hares as well as favorable conditions for red squirrels.
- **Denning habitat:** Denning habitat is not a limiting factor. Between 21 and 35 percent of the forest would be old enough to provide den site components such as large downed trees and dense cover in patches larger than 5 acres. This measure is higher than the 10 percent guideline in the Forest Plan. Lynx on the Superior National Forest will also use younger stands for denning if thick vertical cover provides den site concealment.
- **Roads and Trails:** The road and trail densities in Alternative 2 would range from 1.0 mile per square mile to 2.0 miles per square mile. This alternative has 8 miles of temporary roads proposed and would decommission 2.1 miles of existing road. Temporary roads are expected to have an insignificant and short-term effect on lynx. All temporary roads needed to access harvest units would be obliterated and allowed to return to a more natural state once reforestation objectives have been met
- **Connectivity habitat:** The amount of lynx habitat would be range from 82 to 89 percent in 2017. Proximity between denning and foraging habitat would be maintained. The 2011 Programmatic Biological Assessment indicates that connectivity is not a factor at the LAU and Forest-wide levels.
- **Other indicators:** Foraging, denning, and matrix habitats are well-distributed. Less than two percent of existing lynx habitat on all ownerships in the LAUs would become temporarily unsuitable as a result of management actions. The amount of habitat on federal lands should offset any short-term loss in habitat on non-federal lands.

Alternative 3

Direct and Indirect Effects

This alternative *may affect but is not likely to adversely affect lynx and it is not likely to adversely modify critical habitat*. Alternative 3 would comply with all applicable Forest Plan management direction related to Canada lynx and its habitat. Forest conditions would continue to provide for lynx denning, foraging, and movement across the analysis area. Effects of Alternative 3 are expected to be insignificant or discountable for the following reasons:

- **Foraging habitat:** Between 52-55 percent of each LAU would provide forest conditions for snowshoe hare in 2017 with percentages increasing by 2023. Older stands would continue to provide a young fir and spruce component for hares as well as favorable conditions for red squirrels.
- **Denning habitat:** Denning habitat is not a limiting factor. Between 21 and 33 percent of the forest would be old enough to provide den site components such as large downed trees and dense cover in patches larger than 5 acres. This measure is higher than the 10 percent guideline in the Forest Plan. Lynx on the Superior National Forest will also use younger stands for denning if thick vertical cover provides den site concealment.
- **Roads and Trails:** The road and trail densities in Alternative 3 would range from 1.0 mile per square mile to 2.0 miles per square mile. This alternative has 9 miles of temporary roads proposed and would decommission 2.1 miles of existing road. Temporary roads are expected to have an insignificant and short-term effect on lynx. All temporary roads needed to access harvest units would be obliterated and allowed to return to a more natural state once reforestation objectives have been met.
- **Connectivity habitat:** The amount of lynx habitat would be range from 82 to 89 percent in 2017. Proximity between denning and foraging habitat would be maintained. The 2011 Programmatic Biological Assessment indicates that connectivity is not a factor at the LAU and Forest-wide levels.
- **Other indicators:** Foraging, denning, and matrix habitats are well-distributed. Less than two percent of existing lynx habitat on all ownerships in the LAUs would become temporarily unsuitable as a result of management actions. The amount of habitat on federal lands should offset any short-term loss in habitat on non-federal lands.

Cumulative Effects of Alternative 2 or Alternative 3

The Windy EA alternatives were considered along with past, present and expected future management actions to address the cumulative effects on lynx. Appendix F summarizes the list of activities considered for all ownerships. Many of the indicators address cumulative effects by incorporating past actions and activities on nonfederal lands.

Climate change could result in less habitat for lynx on the forest in the future. Lynx are a boreal species and the conifer dominated landscape they are associated with may be slowly moving north. A milder climate with less snow could also increase negative interactions between lynx and other carnivores such as bobcats and coyotes.

In 2011, the Pagami Creek Fire started east of Ely, MN and spread through the Boundary Waters Canoe Area Wilderness (BWCAW) eventually impacting more than 92,000 acres. The fire spread to a few areas outside of the BWCAW including to land in LAU 24. This explains the higher percentage of unsuitable habitat in LAU 24. Our lynx models assume that lynx will begin seeing habitat benefits 3-5 years following a disturbance which is also why there is a large increase in suitable habitat in LAU 24 by the year 2017. The new vegetative growth in the Pagami Creek Fire area should attract snowshoe hare and create foraging habitat for lynx. Portions of the Pagami Creek Fire area were scorched by the extremely hot fire and may take longer to recover.

Adverse cumulative effects on lynx are not expected from vegetation management activities in the Windy LAUs. Management activities on National Forest System lands would result in 13% or less unsuitable habitat over the course of ten years under any alternative. We expect many of the State forest acres to continue to provide habitat and that minimal timber harvesting will take place on private lands. The percentage of unsuitable lynx habitat on all ownerships would remain below 30% under any of the alternatives. National Forest System lands make up 91% of the land area in the Windy Project Area. The amount of habitat on federal lands should offset any short-term loss in habitat on nonfederal lands. Timber harvesting could benefit lynx by creating habitat for prey species. Denning and foraging habitat would continue to be adequately distributed throughout each LAU.

As stated in the Programmatic BA, the greatest potential for cumulative negative impacts on lynx recovery is likely to be the result of human access. All temporary roads for this project would be decommissioned and are unlikely to have a measurable effect on lynx even when considered along with nonfederal temporary roads. Decommissioning of existing OML1 and OML2 roads would result in reducing open road miles in LAU 28 and in LAU 24. Here would be insignificant effects on lynx from the proposed road actions in the Windy Project Area when considered with all other road activities.

Insignificant or discountable effects are expected for lynx from all other activities considered in the Windy EA. Using fire for restoration or fuel reduction may temporarily reduce foraging conditions but is expected to improve prey habitat in five or more years. Fuel reduction and biomass activities may lead to the removal of downed trees which provide denning sites. Restoration activities such as mechanical site preparation would generally leave overstory trees standing but reduce shrub cover. The cumulative effect of all these activities on denning is expected to be minimal due to the broad availability of denning habitat in these LAUs. Lynx on the Superior National Forest generally choose areas with dense brush or regenerating fir for den site concealment (Moen and Burdett 2008). These types of microsites are abundant throughout both LAUs.

Private land development and road building will continue as will increased recreational demand in Windy. These activities could reduce the lynx competitive advantage and increase the risk of mortality. Residential development around lakes may reduce habitat quality. The high percentage of federal lands in these areas will help offset the negative effects from development that lynx may encounter on nonfederal lands.

3.4.3 Determination of Effects for Northern Long-eared Bat

The USDI Fish and Wildlife Service (USDI FWS) recently published a detailed description of northern long-eared bat distribution, demography, habitat use, reproduction, and factors affecting population persistence in a 12-month finding on a petition to list the species as endangered or threatened under the Endangered Species Act of 1973 (USDI FWS 2013c). The proposed rule recommended that the northern long-eared bat be listed as an endangered species throughout its range although designation of critical habitat was not determinable at this time given a lack of information regarding the species biological needs.

The Habitat Indicator used for northern long-eared bat in Windy is upland forest greater than nine years old (MIH 1). A broad range of tree sizes may be used for roosting and recommendations for maintaining maternity habitat include live or dead trees > 3” dbh (USDI 2014). These size trees are generally captured using upland forest indicator MIH1 greater than nine years.

Lowland forest may also provide roosting or foraging habitat for northern long-eared bat. Lowland forest was not used as an indicator in this Biological Assessment since there is no harvesting proposed in these areas. A few lowland forest stands may be impacted by temporary road-building or prescribed fire but these effects are too small to measure and no change in acres is seen between the action alternatives. There are approximately 17,500 acres of lowland forest in the Windy Project Area.

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

This alternative would have *no effect* on northern long-eared bat because no activities will take place. There are no known summer roosts or hibernacula in the project area. The amount of upland mature forested habitat would change from the existing condition of 91 percent in 2014 to 92 percent in 2017. There would be no cumulative effects because there are no direct effects. Current levels of snags are high because of the age of the existing forest and a reduction in existing snags may occur over time as snags decay.

Alternative 2 and 3

Direct and Indirect Effects

The effects of the Windy Project would be likely to adversely affect individuals and summer roosting habitat within the project area, but not likely to result in jeopardy to the northern long-eared bat. Critical habitat has not been defined at this time.

Under Alternative 2, the amount of upland forested habitat greater than nine years old would decrease from the existing condition of 91 percent to 84 percent in 2017. Under Alternative 3, the amount of upland forested habitat greater than nine years old would decrease to 83 percent in 2017. Upland forest acres would continue to provide summer roosting and foraging habitat. Based on the analyses for this project, the forest-wide trend for large patches in Spatial Zone 3 is consistent with objectives, standards and guidelines from the Forest Plan and would provide well distributed, closed-canopy forest conditions containing small wetlands and creeks for foraging habitat. Loss of suitable summer habitat alone would not be likely to have significant population-level effects.

Summer roosting locations found during project activities would be protected by project mitigations that would reduce adverse effects to individuals. However, all locations of summer roost sites would not be known and as a result an unknown number may be destroyed by clear-cutting, burning and other proposed activities that would remove trees during the breeding season. Activities taking place during the breeding period, generally April through October, could remove summer roost sites and result in the loss of individuals.

Cumulative Effects of Alternative 2 or Alternative 3

The Windy Project EA alternatives were considered along with past, present and expected future management actions to address the cumulative effects on northern long-eared bat. Appendix F of the Windy Project EA summarizes the list of activities considered for all ownerships.

White nose syndrome is likely to occur in the project area within the next decade because the fungal causative agent has been detected in the Soudan Mine and the spread of this fungus across the country has been rapid. Bats in the Windy Project Area could be using the Soudan mine since it is less than 60 miles west of the project area and within the recorded migration distances for northern long-eared bats. However, it is not known where the bats in the project area may be hibernating. Suitable hibernation habitat in cliffs or caves along the North Shore would not be affected by this project and is also less than 60 miles from the project boundary. Any known hibernacula on state park lands are expected to be protected. There is currently no protection of hibernacula that may occur on private lands but publicity of the dangers of white nose syndrome and protective measures have been wide spread.

Many of the State Park acres to continue to provide habitat and that minimal timber harvesting would take place on private lands. Private land development and road building would continue, as would increase recreational demand. These activities could reduce snags and large trees used for summer roosting and increase the risk of mortality. Residential development around lakes may reduce habitat quality. The high percentage of National Forest System land in these areas would help offset the negative effects from development that northern long-eared bats may encounter on nonfederal lands.

Insignificant or discountable effects are expected for northern long-eared bats from all other proposed activities. Using fire for restoration or fuel reduction may temporarily

reduce existing snags but may create new snags with a longer decay time and suitability for roosting. Restoration activities such as mechanical site preparation would generally leave overstory trees standing but reduce shrub cover and provide soil preparation for planting. The cumulative effect of all these activities on roosting habitat is expected to be minimal due to the broad availability of dead and dying trees in the project area.

3.5 Regional Forester's Sensitive Species

3.5.1 Introduction

Regional Forester's Sensitive Species (RFSS) are species for which population viability is a concern due to one or a combination of several factors: habitat and species rarity or poor distribution; a declining trend in population; risk to habitat integrity; and population vulnerability. Information on how species were screened and selected is provided in the Forest Plan Final Environmental Impact Statement (FEIS) (Forest Plan FEIS, Volume 2, pp. B-25 to B-26). The Regional Forester's Sensitive Species list for the Superior National Forest was most recently updated by the Regional Forester in 2011.

The Biological Evaluation is the tool used to consider the effects of a project on Regional Forester's Sensitive Species. The determinations in a biological evaluation address the question of how alternatives affect species viability at the local level, and resulting implications for species viability and distribution throughout the range. The analysis of effects results in one of the following determinations:

- **No impact**
- **Beneficial effects** – used when proposed alternative is determined to be wholly beneficial without potential negative impacts.
- **May impact individuals but is not likely to cause a trend to federal listing or loss of viability** – used when it is determined the proposed alternative may cause some negative effects, even if overall effect to species may be beneficial
- **High risk of loss of viability** in the planning area (National Forest), but not likely to cause a trend toward federal listing. Or, likely to result in a loss of viability and a trend toward federal listing.

The effects of the Windy Project alternatives to Regional Forester Sensitive Species are documented in three biological evaluations: 1) terrestrial animals, 2) aquatic species, and 3) plants. The Windy Project Biological Evaluations are available on the Superior National Forest website at www.fs.usda.gov/goto/superior/projects under the Windy Project EA and in the project record.

3.5.2 Determination of Effects Summary for Terrestrial Animals

For Alternative 1, the proposed activities would have no impact on the gray wolf, little brown myotis, tri-colored bat, heather vole, bald eagle, northern goshawk, olive-sided flycatcher, bay-breasted warbler, Connecticut warbler, American three-toed woodpecker, great gray owl, boreal owl, taiga alpine butterfly, Nabokov's blue butterfly, Freija's grizzled skipper, or wood turtle.

For Alternative 2 or Alternative 3, the proposed activities would have no impact on Freija's grizzled skipper or wood turtle.

For Alternative 2 or Alternative 3, the proposed activities may impact individuals but are not likely to cause a trend to federal listing or loss of viability for the gray wolf, little brown myotis, tri-colored bat, heather vole, bald eagle, northern goshawk, olive-sided

flycatcher, bay-breasted warbler, Connecticut warbler, American three-toed woodpecker, great gray owl, boreal owl, taiga alpine butterfly or Nabokov's blue butterfly.

3.5.3 Determination of Effects Summary for Aquatic Animals

Alternative 1 proposes no activities and no disturbance to the existing vegetation and the lake and stream habitat. In general, this alternative would result in *no impact* to the aquatic Regional Forester Sensitive Species (RFSS) animals, including: lake sturgeon, shortjaw cisco, nipigon cisco, northern brook lamprey, creek heelsplitter and black sandshell mussels, Quebec emerald dragonfly, ebony boghaunter dragonfly and headwaters chilostigman caddisfly.

Alternative 2 and Alternative 3 would have no impact on the lake sturgeon, nipigon cisco, and shortjaw cisco since there are no known occurrences within the project area. Alternative 2 and Alternative 3 may impact individuals or its habitat of the northern brook lamprey, creek heelsplitter and black sandshell mussels, Quebec emerald dragonfly, ebony boghaunter dragonfly and headwaters chilostigman caddisfly; but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

All management activities would be governed by the Windy Project Operational Standards and Guidelines, site specific mitigations, Minnesota Forest Resource Council Voluntary Site-Level Forest Management Guidelines and the 2004 Forest Plan objectives minimizing potential impacts to the suitable habitat for the aquatic RFSS.

3.5.4 Determination of Effects Summary for Plants

Alternative 1 would have no direct, indirect, or cumulative effects to alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, American shore-grass, fall dropseed muhly, dwarf waterlily, Oakes' pondweed, awlwort, lance-leaved violet, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, Caloplaca parvula, Certraria aurescens, Frullania selwyniana, Menegazzia terebrata, Ramalina thrausta, Sticta fuliginosa, Usnea longissima, Pseudocyphellaria crocata, Canada yew, barren strawberry, Canada rice grass, or Peltigera venosa.

Alternative 1 and 2 would have no direct, indirect, or cumulative effects to Appalachian fir club moss, large-leaved sandwort, Arctoparmelia centrifuga, Arctoparmelia subcentrifuga and Cladonia wainoi

The proposed activities in Alternatives 1, 2, and 3 may impact individuals of common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort, but are not likely to cause a trend to federal listing or loss of viability.

The proposed activities in Alternative 2 and 3 may impact individuals of alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, American shore-grass, fall dropseed muhly, dwarf waterlily, Oakes' pondweed, awlwort, lance-leaved violet, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, Caloplaca parvula, Certraria aurescens, Frullania selwyniana, Menegazzia terebrata, Ramalina thrausta, Sticta fuliginosa, Usnea longissima, Pseudocyphellaria crocata Canada yew,

barren strawberry, Canada rice grass, or Peltigera venosa but are not likely to cause a trend to federal listing or loss of viability.

The proposed activities in Alternative 3 may impact individuals of Appalachian fir club moss, large-leaved sandwort, Arctoparmelia centrifuga, Arctoparmelia subcentrifuga and Cladonia wainoi but are not likely to cause a trend to federal listing or loss of viability.

3.6 Soil Productivity and Wetlands

3.6.1 Introduction

This section addresses concerns that proposed management activities may impact soil quality and productivity through erosion, compaction, displacement and nutrient drain. An analysis of these impacts for implementing the Forest Plan was also performed in Chapter 3.6 of the *Chippewa and Superior National Forests Forest Plan Revision Final Environmental Impact Statement, Volume I* (USDA Forest Service 2004).

Appendix D, Operational Standards and Guidelines, of the Windy Project Environmental Assessment summarizes the Forest Plan standards and guidelines for resources, including soils, which would be used for implementation. Forest Plan standards and guidelines for the soil resource comply with Region 9 Soil Quality Standards (USDA Forest Service 2012). Additionally, Appendix D incorporates the Best Management Practices in *Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines* (Minnesota Forest Resource Council 2005). Minnesota Forest Resource Council (MFRC) BMPs are mitigations used to minimize impacts to the environment that can occur during management activities.

3.6.2 Indicators

Indicator 1: Acres affected by mechanical treatment.
The first indicator for the soil resource is acres proposed for mechanical treatment and associated temporary roads, skid trails and landings. This indicator analyzes the differences between alternatives related to the potential influence mechanical treatments have on erosion, compaction, and displacement.

Indicator 2: Miles of system road being decommissioned and constructed.
The second indicator for the soil resource is miles of road being decommissioned and constructed. This indicator examines the difference in the amount of road that would be used for vegetation management and the potential impacts from erosion, compaction and displacement. In addition, this indicator examines the difference in the amount of road being decommissioned and as a result the amount of land being returned to a productive status.

Indicator 3: Acres of site preparation and slash disposal on nutrient sensitive Ecological Land Types (ELTs).
The third indicator for the soil resource is proposed acres of slash disposal, site preparation, biomass harvest and prescribed burning on ELTs 8, 9, 11, 16, 17 and 18.This indicator highlights the differences between alternatives related to the effect these particular treatments have on potential nutrient drain on nutrient sensitive sites.

Indicator 4: Acres of wetland within proposed mechanical treatment.
The forth indicator is acres proposed mechanical treatment on ELTs 2, 5 and 6.This indicator highlights the differences between alternatives related to the potential effects of mechanical operations to wetlands.

3.6.3 Analysis Parameters

The analysis area used to examine the direct, indirect and cumulative effects of each alternative includes the mapped soil units (ecological landtypes: ELTs) on National Forest System land within the Windy Project Area where management activities are proposed. Ecological landtypes are mapped soil units whose natural boundaries best define site-specific soil resource information for the Superior National Forest. Potential effects to the soil resource are logically confined to the soil directly beneath where the activity takes place. An example would be a piece of heavy equipment causing soil compaction that reduces pore space for air, water and roots within a section of a treatment area does not impact pore space on adjacent areas.

The time period used for analyzing the direct and indirect effects of the proposed activities is fifteen years. The time period for cumulative effects is fifteen years prior to and after proposed management activities. This time frame was selected because the effects of the management actions would diminish over time and would not be measurable fifteen years from the time the management activity has occurred.

3.6.4 Affected Environment

The classification system used for the Windy Project is discussed in the *National Hierarchical Framework of Ecological Units* by Cleland and others (1997). This system classifies and maps ecological units based on associations of climate, topography, soils, water, and potential natural communities. An overview of the Ecological Classification System for ecological units is useful to understand the soils information presented in this document, including design criteria.

Within this hierarchical system, mapping units range from provinces that are thousands of square miles in size, to landtype associations (LTAs) that are broad geographic areas, to ecological landtypes (ELTs) which are more site-specific. The province is the largest unit representing the climate zones of North America. The Superior National Forest falls into the Laurentian Mixed Forest Province (212) with short, warm summers and long, cold winters. Accordingly, within the province there are increasingly smaller ecological units called sections, subsections, landtype associations, and ecological landtypes.

The Windy Project Area is located in the Northern Superior Uplands Section (212L), the Border Lakes (212La) and Laurentian Uplands (212Le) Subsections, and the Gabbro Lake Bedrock Complex (212La13), Isabella Moraine (212Le01), Kelly-Sawbill Landing Till Plain (212Le02) and Timber Freer Till Plain (212Le03) LTAs.

Table 3.7.Soils-1 displays how many acres of all the Windy Project Area lies in ELTs which are classified as wetlands and Table 3.7.Soil-2 displays the other ELTs in the project area. Lists of all the ELTs and acreage for each treatment unit are located in the project record. More detailed information concerning project area LTAs and ELTs can be found in the project record.

Table 3-SOIL-1: Wetland ELT acres within the Windy Project Area

ELT	Description	Acres
ELT 2	Poorly drained loamy soil	6,033
ELT 5	Poorly drained acidic organic soil	50
ELT 6	Poorly drained organic soil	19,958
	Total:	**26,041**

Table 3-SOIL-2: Transitional and upland ELT acres within the Windy Project Area

ELT	Description	Acres
ELT 1	Somewhat poorly drained loamy soil	1,172
ELT 8	Well-drained sand and gravel soils	4
ELT 9	Droughty gravel and sand soils	241
ELT 11	Well-drained sandy loam and loamy sand soil with gravely subsurface and thin surface organic layer	7,401
ELT 12	Poor to well-drained, bouldery, loamy soil	94
ELT 13	Well-drained sandy loam and loamy sand soil with gravelly subsurface	21,644
ELT 14	Moderately well-drained, sandy loam to silt loam soils	355
ELT 16	Well-drained sandy loam or loam soils	14,623
ELT 17	Well-drained sandy loam soils	1,940
ELT 18	Droughty loam and sandy loam soils	16
	Total:	**47,490**

3.6.5 Environmental Consequences

Alternative 1 (No Action)

Direct, Indirect and Cumulative Effects

Alternative 1 (No Action) would result in no future vegetation management activities associated with the Windy Project and no impacts from those treatments. No new roads would be constructed and no existing roads would be decommissioned. As a result, these roads would remain open for motor vehicle traffic in their current condition. Existing resource damage, such as erosion and rutting, would persist.

Additional damage from continued use could also occur. This damage would potentially result in sediment delivery to adjacent waterways and wetlands. Consequently, overall soil quality would decline in the impacted area resulting in a diminished capacity to support vegetation and function for watershed health. Areas of road that would not be decommissioned under Alternative 1 would remain unproductive.

Alternative 2 and Alternative 3

Direct and Indirect Effects

Indicator 1: Acres affected by mechanical treatment.

Alternatives 2 and 3 would result in future vegetation management activities. By following Operational Standards and Guidelines described in Appendix D, these treatments would result in minimal impacts to the soil.

To determine overall impacts to soil quality, the amount and area impacted and the degree of impact was analyzed. Table 3.6.Soil-3 shows the acres of harvest and the acres of mechanical site preparation or mechanical site preparation and prescribed fire.

Table 3-SOIL-3: Acres of Harvest and Mechanical Site Preparation

Treatment Type	Alternative 1	Alternative 2	Alternative 3
Harvest[1]	0	3,958	4,742
Site Preparation[2]	0	946	1,418

[1]Acres shown are stand acres. Actual treated acres would be less than the acres shown to account for legacy patches, reserve islands, and other resource protection measures.
[2]Acres of site preparation could include mechanical treatments or mechanical treatments and prescribed fire treatments for the purpose of site preparation.

Much of the impact to the soil within harvest areas, including mechanical site preparation, is associated with landings and primary skid trails. Landing and primary skid trail impacts to soil include soil compaction and, as a result of compaction, reduced water infiltration and an increased potential for erosion. Additionally, soil compaction resulting from vehicle and skidder traffic usually results in reduced vegetation growth and regeneration. Units scheduled for summer harvest would have the greatest potential for compaction. Frost action and floral and faunal activity tend to reduce compaction within three to eleven years after activity (Mace 1971; Thorud and Frissell 1976; Zenner et. al 2007; Puettmann et. al. 2008). The projected amount of area impacted by landings and skid trails are shown in Table 3.6.Soil-4.

Table 3-SOIL-4: Acres impacted by Landings and Skid Trails [1, 2]

	Alternative 1	Alternative 2	Alternative 3
Landings	0	40	47
Skid Trails	0	119	142

[1]Landings calculation assumed 1% of harvested area would be utilized.
[2]Skid trail calculations assumed 3% of harvested area would be utilized. Figures obtained by averaging actual monitoring data on the Superior National Forest.

Management activities could also include biomass utilization. Biomass utilization would be allowed on those soils listed in Table G-WS-8 of the Forest Plan (p. 2-16) as being acceptable areas for “Whole tree Logging.” Those soils are considered to have a high nutrient capacity, because of their soil characteristics, and therefore would not likely be susceptible to detrimental nutrient loss as a result of biomass harvest. Additional areas analyzed for slash removal but not included in those ELTs acceptable for “Whole tree Logging” may also include biomass utilization. The analysis of the associated impacts is included in the Indicator 3 discussion.

Nutrient removal associated with harvest activity and biomass utilization is a potential impact to site productivity. Results of the five-year analysis of treatment areas in the long-term site productivity study on the Marcell Experimental Forest, in northern

Minnesota indicated that total tree harvest had no impact on site productivity. Aspen stands where total tree harvest occurred within the study area produced 40,400 suckers per hectare. This is well within the typical range of 25,000 to 50,000 per hectare (Stone and Eiloff 1998). Impacts to site productivity associated with harvest activity in the Windy Project Area are expected to be minimal.

Impacts of temporary road construction include compaction and displacement of soil and potential sediment delivery to nearby wetlands and waterways. However, the impacts would be minimized by using existing corridors where possible. Impacts would also be greatly reduced through the use of Operational Standards and Guidelines. Most of these impacts would be short-term (less than fifteen years). Once treatment activities were completed the road would be rehabilitated and re-vegetated.

Indicator 2: Miles of system road being decommissioned or constructed.
Some existing National Forest System roads within the Windy Project Area are not needed for management activities. Under both Alternative 2 and Alternative 3, 2.1 miles of road would be decommissioned. The roads cover approximately 5 acres (using a 20 foot road width) and the decommissioning would allow for that land to be returned to a productive status. Construction of a ¼ mile segment of road is needed to facilitate decommissioning of a section of road currently in a wetland under both Alternatives 2 and 3. The new road would be constructed to standard in an upland area where resource impacts would be minimal. Short-term impacts associated with the construction activity are anticipated to be minimal and wouldn't be expected to have noticeable effects beyond the time needed to build the road. The new road will impact approximately 0.6 acres.

Indicator 3: Acres of mechanical site preparation and slash disposal on low nutrient ELTs.
Alternatives 2 and 3 would include 950 acres and 1,134 acres respectively of mechanical site preparation and/or slash disposal, which could include prescribed burning or biomass utilization, on low nutrient ELTs (ELTs 8, 9, 11, 16, 17, and 18). Those ELTs impacted are shown in Table 3.6.Soil-5.

Table 3-SOIL-5: Acres of Nutrient Low ELTs (8, 9, 11, 16, 17, and 18) with Mechanical Site Preparation and/or Slash Disposal within the Windy Project Area.

ELT	Alternative 1	Alternative 2	Alternative 3
ELT 8	0	0	0
ELT 9	0	0	0
ELT 11	0	691	798
ELT 16	0	248	316
ELT 17	0	11	11
ELT 18	0	0	9
TOTAL	0	950	1,134

Short term reductions in soil nutrients are possible in those areas where mechanical site preparation and/or slash disposal would occur, which in the short term could reduce

vegetative growth. This reduction of soil nutrients would occur infrequently, every 60-100 years depending on the rotation age, and therefore would have a minimal impact (Grigal 2004). Over time nutrients are replaced from the atmosphere, parent materials from below, and to a lesser extent from the regenerating stand.

Mechanical site preparation and slash disposal would not occur across entire treatment units; therefore all of the residual material would not be removed from the site. Additionally only a portion of the slash would be removed from treatment units. Figure 3.6.Soil-1 shows a typical site after slash disposal.

Figure 3-SOIL-1: Typical slash disposal treatment, note the amount of material left on site.

The Clara Environmental Assessment (USDA 2009) modeled the amount of slash that would be left after different treatments. The Clara Environmental Assessment estimated slash disposal would reduce the amount of material from 17.5 tons per acre before treatment to 10 tons per acre after treatment (Clara Table 3-FUEL-5 p. 3-75). Thus, over half of the biomass would remain on site after treatment to provide nutrients and reduce potential erosion. The remaining 10 tons would include a substantial proportion of twigs, leaves, and needles. These fine materials would be more readily available as nutrients

than larger branches (MFRC Site Level Biomass Harvest Guidelines p. 14), and contain a substantial proportion of nutrients compared to the rest of the tree (Forest Plan FEIS, p. 3.6-13). Precipitation, dust deposition and nitrogen fixation would also add nutrients to sites (MFRC Site Level Guidelines, p. 18).

Indicator 4: Acres of wetland within proposed mechanical treatment.
Alternatives 2 and 3 include 373 acres and 690 acres respectively of wetland ELTs, or less than one percent of the Windy Project Area, proposed for mechanical treatments. Not all wetland acres within the Project Area would be impacted because some of the mapped wetlands would be excluded from the units during implementation. For wetlands that would be treated, Operational Standards and Guidelines require that all mechanical operation occur during frozen conditions. Under frozen conditions, effects to wetlands such as rutting or compaction would not occur or would be minimal. Through the use of Operational Standards and Guidelines, and based on past experience, it is anticipated the Windy Project would have minimal impacts to wetlands. Table 3.6.Soil-6 displays the wetland ELT treatment acres within each alternative.

Table 3-SOIL-6: Wetland ELT acres proposed for treatment within the Windy Project Area.

ELT	Alternative 1	Alternative 2	Alternative 3
ELT 2	0	146	230
ELT 5	0	< 1	1
ELT 6	0	226	459
Total	**0**	**373**	**690**

Cumulative Effects

Management activities on non-federal lands would have minimal impacts to the soil through the implementation of Operational Standards and Guidelines. Monitoring of impacts from timber harvest on public and private land in Minnesota show minimal amounts of erosion and rutting as a result of timber harvest activities. Erosion that resulted in sediment delivery to a wetland or water body from roads and skid trails was observed on 4% and 0.5% respectively. Rutting from management activities was detected in 11.3% of 6,147 locations assessed for rutting. Of those locations where rutting was observed, 64% had less than 5% of the surface area in ruts. Also, on 88.7% of the sites the rutting was limited to roads, skid trails and landings (Dahlman 2008). Minimal cumulative effects are anticipated through the use of Operational Standards and Guidelines which incorporate Forest Plan standards and guidelines, Minnesota Forest Resource Council Guidelines and project guidelines.

No discernible impacts to long-term soil productivity have been identified as a result of past management activities within the Windy Project Area. Grigal (2004) reviewed the analysis for long-term site productivity completed as a portion of the Generic Environmental Impact Statement (GEIS) done for timber harvest in the state of Minnesota. In his review of the GEIS, he concluded that updated nutrient budgets and results of long-term studies indicate the nutrient capital is sufficient to tolerate numerous biomass removals and harvest rotations with minimal impacts to site productivity for

most mineral soils in Minnesota. Known past and reasonably foreseeable future management actions that would occur on land impacted by proposed management activities would have minimal cumulative impacts to the soil resource.

3.7 Non-Native Invasive Plants

3.7.1 Introduction

Non-native invasive species are generally defined by two characteristics: 1) they were not historically (i.e., pre-European settlement) present in a region's ecosystems, and 2) they have the ecological ability to invade and persist in native plant and animal communities, and often become dominant species at the expense of native species.

Ground disturbance associated with Windy Project activities could create conditions favorable to the introduction or spread of non-native invasive plants (NNIP). This potential effect is analyzed in this section, which describes the NNIP that are currently known to exist in the Project Area, as well as the effects of the alternatives on NNIP.

3.7.2 Indicators

Two indicators are used to analyze the effects of the alternatives on NNIP.

Indicator 1: Miles of new upland road construction on National Forest System land.

The majority of new upland roads being constructed in the Windy Project Area are temporary roads, with a minimal amount (0.25 miles) of road relocation for restoration purposes. This indicator is useful for distinguishing among alternatives because currently the vast majority of terrestrial non-native invasive plant impacts are along roads on the Superior National Forest. New roads are areas that are likely to be invaded by non-native invasive plants.

Indicator 2: Acres of treatment units within 50 feet of NNIP occurrence.

This indicator is useful for distinguishing among alternatives because NNIP occurrences near vegetation treatment units have the highest likelihood of spreading as a result of management activities, and the areas where they would likely spread are those where ground disturbance has occurred, such as nearby units. This analysis only includes inventoried NNIP populations, not NNIP for which no inventory exists, such as orange and yellow hawkweed, or oxeye daisy.

3.7.3 Analysis Parameters

The area covered by the analysis of direct and indirect effects includes National Forest System land within the Windy Project Area. This area was selected because this is where project activities would occur which cause the direct and indirect effects. The area covered by the cumulative effects analysis includes lands of all ownerships within the Windy Project Area. This cumulative effects analysis area was selected because private lands within project area boundaries share a number of physical characteristics (e.g. soils, landforms, etc.) with adjacent National Forest System lands. These characteristics influence land uses, which in turn influence NNIP distribution throughout the project area, so the Windy Project Area makes a logical analysis unit for cumulative effects.

The time period for direct effects is ten years from the time project activities begin, because no effects of project activities would occur until implementation, and because

most project activities should be completed within ten years. Indirect and cumulative effects, for the most part, are also confined to this ten year time frame however, when evaluating whether any effects are likely from climate change, long-term time frames are also considered.

3.7.4 Affected Environment

Table 3-NNIP-1 displays the non-native invasive plants that are known to occur in the analysis area. This list was developed based on results from NNIP inventory data collected on the Superior National Forest. Non-native invasive plants are typically spread in several ways such as vehicle wheels or bodies, livestock, wildlife, boat traffic, or human foot traffic. Non-native invasive plants typically enter an area along a corridor of ground disturbance such as a road or trail. Depending on numerous factors such as shade tolerance, degree of invasiveness, dispersal mechanisms, and habitat availability, NNIP may or may not spread into adjacent forested or non-forested ecosystems. Typical areas that have some weed infestation in the analysis area are roadsides, trails, portages, gravel pits, parking areas, campgrounds, helispots, and administrative sites.

Mesic forested sites with shady understories on the Superior National Forest are fairly resistant to invasion by most NNIP. NNIP that disperse into such plant communities tend to get out-competed quickly by native shrubs, forbs, and trees. However, some NNIP are exceptions to this general observation. For example, common buckthorn and Siberian peashrub can thrive in the understory of mesic native plant communities. There are no known occurrences of either of these species in the Windy Project Area.

Conversely, there are a number of native plant communities typical of droughty, shallow-soiled sites that are susceptible to invasion by NNIP. These sites have less abundant shrub and forb layers, and as a result are more susceptible to being invaded by NNIP, especially if some ground disturbance occurs. These types of sites correspond to Ecological Landtypes (ELTs) 7, 9, 11, 16, 17, and 18. Most susceptible among these are rock outcrops, which correspond to ELT 18. ELT 18 is zero to eight inches of soil over bedrock. The amount of actual rock outcropping within areas of mapped ELT 18 would be less. There is very little (approximately 1% of analysis area) mapped ELT 18 in the analysis area.

In general, the analysis area has a moderate level of NNIP infestation (Table 3-NNIP-1). Orange hawkweed, yellow hawkweeds, and oxeye daisy are the most abundant NNIP. They are found at low abundance levels along most roads in the analysis area and pose a moderate ecological risk to native plant species. The high ecological risk species, spotted knapweed and Canada thistle, are less abundant, totaling approximately 26.4 acres of infestations. The other moderate ecological risk species, cypress spurge, common tansy and St. Johnswort, occupy approximately 4.4 acres in the analysis area. The following analysis only considers the effects of moderate and high risk species. The low risk species do not pose enough of a threat to native plant communities to warrant consideration in the analysis.

Table 3-NNIP-1: Non-native Invasive Plants known in the Windy Project Area

Species	MN Status*	Life History/ Habitat Summary	Acres	Ecological Risk**
Spotted knapweed *Centaurea maculosa*	P	Short lived perennial, spread entirely by seeds, dry to mesic uplands (Wilson and Randall 2002)	25.5	High
Canada thistle *Cirsium arvense*	P	Perennial, spread by seed and rhizome, occupies disturbed sites (Lym and Christianson 1996)	0.9	High
Bull thistle *Cirsium vulgare*	No status	Biennial, spread by seed, occupies disturbed sites (Lym and Christianson 1996)	0.04	Low
Cypress spurge *Euphorbia cyparissias*	No status	Moderately aggressive herbaceous perennial spread by rhizome and seed (Czarapata 2005)	0.004	Moderate
Orange hawkweed *Hieracium auranticum*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Callihan et al. 1982)	43***	Moderate
Yellow hawkweeds *Hieracium* sp.	No status	Several similar non-native invasive yellow hawkweeds occur in Project Area; perennial, spread by seed and rhizome, widespread in disturbed upland sites (Gleason and Cronquist 1991)	43***	Moderate
St. Johnswort *Hypericum perforatum*	No status	Herbaceous perennial; spread by seed and lateral roots, dry to mesic uplands (Krueger and Sheley 2002)	3.4	Moderate
Oxeye daisy *Leucanthemum vulgare*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Krueger and Sheley 2002)	43***	Moderate
Common tansy *Tanacetum vulgare*	P	Herbaceous rhizomatous perennial, spread mostly by seed; disturbed uplands (LeCain and Sheley 2011)	1.0	Moderate

* **P** = Prohibited noxious weed (Minnesota Statutes 18.76 to 18.91) that must be controlled.
** Species represents either a low, moderate, or high threat to natural communities (USDA Forest Service 2010). Risk given in table represents risk in most susceptible habitat.
*** Estimated acres based on miles of road in Project Area.

3.7.5 Environmental Consequences

Alternative 1 (No Action)

Direct and Indirect Effects

Although all the indicators are zero for Alternative 1 and no ground disturbance would occur, this alternative would still have direct effects on NNIP. Any non-native invasive plant in the analysis area would continue to exist and would probably be spread in the analysis area along typical corridors for weed dispersal such as roads, trails, gravel pits,

and parking lots. Any public or administrative vehicle use in the analysis area (e.g., passenger vehicles, trucks, road maintenance equipment, All Terrain Vehicles (ATVs)) would have the potential to spread NNIP. Wildlife and human foot traffic in the analysis area would also have the potential to spread NNIP, but the likelihood of spread by these means would be lower than from vehicle use. Overall, this alternative would have the least amount of ground disturbance and, therefore, the least risk of weed spread.

Table 3-NNIP-2: Indicators for NNIP analysis by Alternative.

Indicator	Alt. 1	Alt. 2	Alt. 3
Miles of new upland road construction on NFS lands	0	2.7	3.3
Acres of treatment units within 50 feet of NNIP occurrence	0	994	1,158

Alternative 2 (Proposed Action)

Direct and Indirect Effects

Indicator 1—Miles of new upland road construction on National Forest System land.

Approximately 2.7 miles of new upland road relocation and temporary roads would be constructed in Alternative 2. Non-native invasive plant species would be likely to spread along the sides of some of the new upland road construction in the analysis area. Some species, like oxeye daisy and orange and yellow hawkweed, are already found along most roads in the analysis area, and would probably quickly colonize the sides of some new upland roads. However, the ecological consequences of the spread of these species would be minor, since they primarily stay on roadsides and do not compete well with native upland vegetation.

Other species, such as Canada thistle and spotted knapweed, are not as common in the analysis area, but have a high ecological risk (Table 3-NNIP-1). These species can outcompete native vegetation and degrade wildlife habitat. Project activities would probably cause some of these species to spread, and most new infestations would be confined to the disturbed areas. There is a risk that these species could spread to nearby undisturbed susceptible habitat (like wetland edges for Canada thistle) and degrade native plant communities.

Tansy, cypress spurge, and St. Johnswort have a moderate risk of ecological consequences. Project activities would probably cause new infestations of these species in disturbed areas such as along temporary roads. The ecological consequences of the spread of these species would be minor, since they primarily stay on roadsides and do not compete well with native upland vegetation. Furthermore, roadside infestations are easier to find and manage than infestations in forested communities.

A number of factors would minimize NNIP impacts in Alternative 2. Some of the potential NNIP spread would be offset by the fact that the majority of new roads proposed in the Windy project area are temporary roads and would be decommissioned after use. As native forbs, shrubs, and trees start to re-vegetate decommissioned roads after road use stops, these species would gradually begin to outcompete moderately

invasive species like yellow hawkweed. Herbicides were used to treat weed infestations across the project area during the past two years, and some potential NNIP spread would be offset by the 21.0 acres (174 sites) and 17.0 acres (109 sites) of weed treatments conducted in 2012 and 2013, respectively; similar acreage is expected to be treated in 2014. Lastly, the risk of NNIP spread would be minimized by an operational standard and guideline that specifies treatment of known infestations prior to mechanical or burning treatments. This would also reduce the risk of spreading NNIP.

For these reasons, there would be a low risk of impacts from weed spread tied to road construction.

Indicator 2 – Acres of treatment units within 50 feet of NNIP occurrence.
Approximately 994 acres of vegetation treatment units would occur within 50 feet of an inventoried NNIP occurrence in Alternative 2. For this alternative, there is a risk that NNIP occurrences near a treatment unit could spread to the unit as a result of ground disturbance associated with the treatment (e.g. timber harvest or mechanical site preparation). The risk of NNIP spread would be minimized by an operational standard and guideline that specifies treatment of known infestations prior to vegetation management activities. Furthermore, as noted above for indicator 1, herbicides were used in 2012 and 2013 to treat invasive plant infestations in the analysis area, which will help reduce the risk of future NNIP spread. Alternative 2 would have a greater risk of weed spread associated with vegetation treatments than Alternative 1, but following Operational Standards and Guidelines would minimize the risk of ecological consequences of NNIP spread due to management activities.

Five of the proposed treatment units are within ¾ mile of the Boundary Waters Canoe Area Wilderness (BWCAW) boundary but none are immediately adjacent to the boundary. The risk that vegetative treatments proposed under Alternative 2 would cause NNIP impacts to the BWCAW is low primarily because the treatment units would be some distance from the BWCAW. The greater risk of NNIP impacts to the BWCAW arises from the vegetation conditions in the Pagami Creek Fire burned area; this risk is discussed below under cumulative effects.

Alternative 3 (Proposed Action)

Direct and Indirect Effects

Indicator 1—Miles of new upland road construction on National Forest System land.
Approximately 3.3 miles of upland road relocation and temporary roads would be constructed in Alternative 3 (Table 3-NNIP-2). Road construction would have the same types of effects on the spread of NNIP as described for this indicator in Alternative 2. However, the magnitude of effects would be slightly greater than what they would be for Alternative 2 since slightly more miles of roads are proposed for construction. This indicator suggests that there would be slightly greater weed spread under Alternative 3 compared to Alternative 2.
As with Alternative 2, some of the effects of this potential weed spread in Alternative 3 would be offset by weed treatments conducted in 2012 and 2013 in the analysis area, the

fact that the majority of new roads would be temporary roads, and by operational standards and guidelines.

Indicator 2 – Acres of treatment units within 50 feet of NNIP occurrence.
Approximately 1,158 acres of vegetation treatment units would occur within fifty feet of an inventoried NNIP occurrence in Alternative 3 (Table 3-NNIP-2). The types of effects of timber harvest on weed spread would be similar to those described above for Alternative 2. However, the magnitude of effects would be slightly greater for Alternative 3 since more acres of harvest units occur within fifty feet of an NNIP occurrence. As with Alternative 2, five of the proposed treatment units are within ¾ mile of the BWCAW boundary but none are immediately adjacent to the boundary and hence the risk of NNIP spreading to the BWCAW as a result of management activities is very low. This indicator suggests that there would be somewhat greater weed spread under Alternative 3 resulting from vegetation management treatments. As with Alternative 2, the potential effects of weed spread under Alternative 3 would be minimized by weed treatments conducted in 2012 and 2013 in the analysis area, the fact that the new roads would all be temporary roads, and by operational standards and guidelines.

Cumulative Effects Common to All Alternatives

Based on analysis of past, present, and reasonably foreseeable actions (Appendix F), the cumulative effects of the Windy Project on NNIP would be negligible and would not differ much between Alternatives 1, 2, and 3. Some effects would be negative and others would be beneficial.

Past actions influenced the composition and distribution of NNIP in the cumulative effects analysis area. For example, development of a transportation system (i.e. roads and railroads) and recreational trail system provided corridors for the introduction and spread of these species. Mixed land ownership patterns in the analysis area have also contributed to development of the transportation system and NNIP spread. Most non-native invasive plant species, like tansy, were introduced unintentionally. Past timber harvest in the cumulative effects analysis area has also contributed to NNIP. Cumulatively, these past actions influenced the present composition and distribution of these species in the analysis area.

NNIP would continue to spread in the analysis area under all alternatives as a result of present and reasonably foreseeable actions on National Forest System land and lands under other ownership. The effects of NNIP would continue to be concentrated in developed areas (e.g. roadsides, trails, powerlines) and not undeveloped forestlands. Some road construction is likely on state lands in the analysis area. For example, some new roads could be built in connection with state timber harvest, and this could result in a small amount of NNIP spread. Also, ongoing and future special use authorizations (Appendix F) could also contribute to some small increases in NNIP along the special use roads. In contrast, the Superior National Forest Travel Management Project would result in 2.1 fewer miles of road open to motorized recreation in the project area (Appendix F). Road decommissioning associated with the travel management rule would be beneficial and result in a small reduction in potential weed spread. Overall, road construction and use of existing roads could lead to small increases in NNIP infestation on both National

Forest System land and lands under other ownership in the cumulative effects analysis area via spread along travel corridors for Alternatives 1, 2, and 3.

Timber harvest on non-federal ownership, such as future vegetation management on state lands (projected 369 acres of vegetation treatments, Appendix F), would also make a small contribution to the spread of NNIP. Ongoing federal timber sales within the analysis area would make a small contribution to NNIP spread as well. Monitoring (see below) has shown that when timber harvest results in weed spread, the new infestations tend to be small and located on access roads and landings where they can be easily treated.

As noted in the analysis of direct and indirect effects, there is a low risk that project activities would cause NNIP to spread to the BWCAW. On the other hand, the 2011 Pagami Creek Fire created early seral vegetative conditions on approximately 8,500 acres within the Windy Project Area. There is a greater risk that NNIP infestations that existed in the portion of the Windy Project Area that burned would spread via the burned area into the BWCAW, and NNIP treatments conducted since that fire have attempted to limit NNIP spread to the BWCAW.

Weed treatments were conducted on 21.0 acres (174 sites) and 17.0 acres (109 sites) in the Windy Project Area in 2012 and 2013, respectively; similar acreage is expected to be treated in the future. This is a beneficial effect with respect to NNIP spread. On April 27, 2006, Forest Supervisor Jim Sanders signed a decision to implement a Forest-wide NNIP Management Environmental Assessment, which would provide for treatments of NNIP in the project area (USDA Forest Service 2006) under all alternatives. Such treatments would minimize impacts from NNIP spread directly, indirectly, and cumulatively caused by project activities.

It is difficult to quantify a threshold for cumulative weed impacts. One way of approaching this question is to compare the abundance of NNIP on high risk sites in the project area to their abundance on high risk sites forest-wide. There are approximately 9.9 acres of NNIP infesting sites at increased risk of NNIP invasion (i.e. ELTs 7, 9, 11, 16, 17, and 18) in the analysis area. This represents a small fraction (approximately 6%) of NNIP on high risk sites forest-wide, which further demonstrates that Windy Project activities would pose minimal risk of cumulative effects of weed spread.

Monitoring of a sample of Windy Project activities for NNIP spread (see Section 2.3) would help detect new infestations that arise as a result of project activities; new infestations would be treated under the 2006 Forest-wide NNIP Management Environmental Assessment. Monitoring results to date suggest that Superior National Forest invasive plant mitigations are successful in minimizing the spread of these species. Monitoring of harvested stands treated under the Silver Island Environmental Assessment (Tofte Ranger District) found only 0.008 acres of new infestations that appeared tied to harvest activities (USDA Forest Service 2007). No spread was observed into forested stands; for example, one stand next to Sawbill Landing (which has a heavy spotted knapweed infestation) was thinned and burned, but no spotted knapweed was found in the treated stand. In 2007 monitoring of harvested stands treated under the Virginia EIS

(Laurentian Ranger District) found only 0.1 acres of new infestations on skid trails and landings in harvest units, but no infestations within the regenerating stands themselves (USDA Forest Service 2008). For these reasons, the cumulative impacts of the Windy Project on NNIP would be negligible.

Projected climate change in the project area is also likely to contribute to cumulative effects (Appendix F). Projected warmer temperatures in the project area might allow current invasive species to expand their range and new species to colonize the project area. The Windy Project Area receives recreational use and the cumulative effect of increased temperatures and trail use/road construction could potentially exacerbate NNIP populations in the area under future projected conditions.

3.8 Water Quality

3.8.1 Introduction

There is concern about the water quality and watershed health in the Windy Project Area. The proposed harvest treatments and temporary road construction through uplands and lowlands to access forest stands in the project area may negatively affect the water quality of the lakes, streams and open water wetlands for the forest users. This section addresses the direct, indirect and cumulative effects to water quality and watershed health.

3.8.2 Indicators

Three indicators were chosen from the Forest Plan Final Environmental Impact Statement (FEIS) to evaluate the effects to water quality from harvest activities – temporary road construction on ecological landtypes (ELT) 1-6 (lowlands), number of new temporary water crossings to access to harvest units, and the percentage of watershed in upland open and upland young forest less than 16 years old (Forest Plan FEIS, pp. 3.6-1 – 3.6-60).

A **watershed** is defined as the area from which all surface water drains to a common point, commonly thought of as the area that drains water into a given lake or stream (Forest Plan Glossary-30). The mapping system for watersheds consists of multiple levels. These watershed levels are described in detail in the Forest Plan FEIS pages 3.6-1 -3.6-2.

Indicator 1: Miles of new temporary roads crossing lowlands to access vegetation treatment activities.

Indicator 1 evaluates the potential effects of new temporary road construction crossing ecological landtype (ELT) 1-6 to access the proposed vegetation treatment activities. ELTs 1-6 are classified as lowlands as defined in the Superior National Forest Land Management Plan, 1994. This is a good indicator for assessing the potential to inundate or desiccate habitat due to water level and/or flow regime disruption. If not properly designed and mitigated, roads crossing lowlands can lead to changes in hydrologic function, and may directly affect aquatic populations and habitat.

Indicator 2: Number of new temporary water crossings to access vegetation treatment activities.

Indicator 2 evaluates the potential effects of water crossings to aquatic species measuring the potential change in sediment input, stream flow regimes, channel conditions, stream connectivity, and fish migration barriers. This can lead to aquatic habitat loss.

Indicator 3: Proportion of upland open and upland young forest within each sixth level hydrologic unit code (HUC) watershed.

Indicator 3 assesses the portion of upland open and upland young forest within each sixth level hydrologic unit code (HUC) watershed that occurs within or intersects the project area. The goal is that vegetation treatment activities would not increase total combined acreage of upland young forest (<16 years) and upland openings above 60% of the total area of any sixth level watershed on all ownerships (Forest Plan, S-WS-1, pp. 2-13).

Indicator 3 has also been chosen for analysis because potential effects from vegetation treatment and other activities associated with action alternatives could influence peak stream flows. This could potentially reshape stream channels, increase erosion, and decrease biological integrity, which would be evident at the watershed scale (Verry et al. 2000).

3.8.3 Analysis Parameters

The analysis area for direct, indirect, and cumulative effects for Indicator 1 includes both lands within and outside of the project area that are within one mile of any new proposed temporary road construction needed to access units. This analysis area was chosen because effects to watershed health, such as water quality, from roads are evident within one mile or less of a road (Verry et al. 2000). Indicator 2 would include lands within the project area because effects to aquatic habitat from road crossings are evident at the crossing location. Indicator 3, the cumulative effects analysis, includes lands of all ownerships of the sixth level HUC watersheds that intersect the project area. This was selected because watersheds: 1) are natural integrators of effects related to water flow and water quality, 2) account for the amount of open and young forest resulting from harvest on National Forest lands, and 3) can be used to evaluate similar conditions on other lands within the watershed (FEIS pp. 3.6-5 and 3.6-6).

The timeframe selected for Indicator 1 is 20 years because the effects from road construction and vegetation treatment activities may be observable for many years following the initial impact of activity. The timeframe for Indicator 2 is 10 years as identified in the Forest Plan, FEIS (pp. 3.6-6). The timeframe selected for Indicator 3 is 10 - 20 years because sediment into the stream flow and the channel conditions can be measured during this timeframe as well as measuring vegetation growth (FEIS pp. 3.6-6).

3.8.4 Affected Environment

Lakes, Streams, Fishes

The Windy Project Area contains approximately 3,064 acres of named lakes, many miles of named streams (see Windy Mid-Level Report: Water Resources for list); and numerous intermittent streams, open water wetlands, ephemeral ponds, wet meadows, seeps, and springs. They flow into the Rainy River watershed basin. The named lakes and streams are classified by the Minnesota Department of Natural Resources as supporting cold-water and warm-water fisheries. Cold-water fisheries originates from the family Salmonidae (trout species such as brook, brown, and splake) and warm-water fisheries from the following families: Percidae (walleye pike); Catostomidae (white sucker); Esocidae (northern pike, muskellunge); and Centrarchidae (bass) families; along with numerous minnow species of the Cyprinidae family (chubs, dace, and shiners).

Other Aquatic Species

Within the Windy boundary, there is other aquatic “wildlife” such as reptiles and amphibians associated with open water wetlands, ephemeral ponds, wet meadows, seeps, and springs. Many rely on ephemeral wetlands for successful metamorphosis from larva to adult. They are the following: Tiger Salamanders (*Ambystoma tigrinum*), Blue-spotted Salamanders (*Ambystoma laterale*), and Wood Frogs (*Rana sylvatica*) (Oldfield and Moriarty 1994). See the Windy Project Record for a listing of amphibians, reptiles, and

their habitats found within the project area. Some reptiles and amphibians, while not dependent on ephemeral wetlands, opportunistically use these habitats. Breeding amphibians sometimes number in the thousands in these wetlands, while other species such as the Common Garter Snake (*Thamnophis sirtalis*) and Snapping Turtle (Chelydra serpentina) can benefit from foraging on the temporarily abundant prey.

Indicator 1 and 2: Roads and Crossings

Roads and trails are often the primary source of sediment in streams and lakes associated with land use activities. Any new road or trail construction can concentrate surface runoff and accelerate the rate of runoff. Most impacts occur during initial road construction and gradually decrease as roadside vegetation is reestablished and disturbed soil surfaces stabilize. Currently, there are 217 miles of known roads and trails on all land ownership within the Windy Project Area (Windy Mid-Level Report: Transportation Report).

A coarse level stream crossing survey occurred at 132 crossings on federal roads. It determined approximately 18 crossings were undersized, perched and/or required replacement to enhance aquatic organism passage, improve stream flow, sediment transport, riparian function, and maintain flood flow. As funding allows, crossings would be replaced following the Forest Plan standards and guidelines. A list can be found in the Windy Mid-Level Report: Water Resources.

It is important to replace undersized and perched culverts, especially with the current concerns about climate change and its impacts from predicted increases in heavy precipitation events. This can lead to increases in flooding and soil erosion which can cause infrastructure damage (stream crossings); and increases in landslides and stream bank erosion as experienced by the June 2012 floods in northern Minnesota. Stream bank erosion can lead to water turbidity and an increase in contaminants and nutrients in streams. Other impacts from climate change are increases in temperatures in streams impacting thermal habitat in cold water streams and ultimately impairing the fisheries, as well as other aquatic organisms. For example, eggs and fry associated with gravel habitats and fine sediments appear to have been most affected by the June 2012 floods in northern Minnesota, as opposed to other life stages (S. Handler, et al. 2013); and cold-water fish species like ciscos are likely to be impacted in many lakes across the assessment area as temperatures increase. Increases in heavy rainfall events have been increasing in the upper Midwest in general and for Minnesota in particular. The models indicate this trend will continue over the next century (S. Handler, et al. 2013).

Indicator 3: Watersheds

When assessing the effects to water quality, sixth level twelve digit hydrologic unit code (HUC) watersheds are examined. The surface water from watersheds eventually drain into a given lake or stream and the watersheds' ecological composition, structure and function can be impacted through land management activities such as road building, water crossings, harvesting; and natural disturbances such as flood events, climate change effects, etc.

The Windy Project Area drains into the Rainy River watershed basin, and it is divided into eleven sixth level HUC watersheds. Table 3-WQ-1 shows the existing condition of total acres of each watershed, acres of each watershed inside the project area, percent of total watershed in upland young, and percent of the project area in upland young.

Table 3-WQ-1: Existing Condition (2014) of Sixth Level Watersheds Intersecting the Windy Project Area.

Watershed Name	Acres of Watershed	Watershed Acres in Windy Project Area	Percent Watershed in Upland Young
Headwaters Cross River	20,232	1,761	6
Hog Creek	15,261	4,267	4
Perent River	26,072	4,420	26
Silver Island Lake	27,550	19,826	10
Dumbbell River	32,331	19,458	8
Arrowhead Creek	17,525	14,293	9
Island River	18,795	16,070	31
Mitiwan Creek	26,920	229	15
Isabella River	20,550	430	59
Phoebe River	18,951	22	2
Malberg Lake- Kawishiwi River	25,804	197	14

DataSource:T:\FS\NFS\Superior\Project\Tof\TimberVeg\Windy\GIS\Analysis\WindyAnalysis_2014\WindyEA_60 percent_Run1B_2014.xlsx. *Percent numbers are rounded to the nearest tenth.

3.8.5 Environmental Consequences

Alternative 1 – No Action

Direct and Indirect and Cumulative Effects

Indicator 1: Miles of new temporary roads crossing ecological landtype 1-6 (lowlands) to access vegetation treatment activities.

Alternative 1 would maintain the existing road transportation system. No new temporary roads would be constructed over ELT 1-6 (lowlands). There would be no new direct, indirect, or cumulative effects from Indicator 1. However, improvement of watershed conditions and reduction in sediment sources would not occur from decommissioning 2.1 miles of National Forest System Roads. For example, the 0.4 miles of FR 379 that crosses a wetland would not be proposed for decommissioning, nor would the wetland be restored to its natural ecological function. Also, continued use of unclassified roads and trails may continue to contribute sediment into streams and potentially impact the water resources.

Indicator 2: Number of new temporary water crossings to access vegetation treatment activities.

Alternative 1 would maintain the existing number of water crossings; and no new crossings would be constructed to access the vegetation treatment activities. There would be no new direct, indirect or cumulative effects from Indicator 1.

Indicator 3: Proportion of upland open and upland young forest within each sixth level watershed.
Under Alternative 1, there would be no additional young forest created through vegetation treatment activities other than what would naturally occur. Water quality and watershed health as measured by Indicator 3 is rated high under the existing condition and would remain so under Alternative 1. There would be no new direct, indirect, or cumulative effects from Alternative 1.

Alternative 2 and Alternative 3

Direct, Indirect and Cumulative Effects

Indicator 1: Miles of new temporary roads crossing ecological landtypes 1-6 (lowlands) to access vegetation treatment activities.
Alternative 2 would construct .16 miles of new temporary roads and Alternative 3 would construct .19 miles of temporary roads on ecological land-type (ELT) 1-6 (lowlands). This could potentially change water levels or flow regimes in lowlands which could impact aquatic habitat. This could lead to blockage of cross-drainage and down road channelization which could take 20 years to recover (MFRC Guidelines, Forest Roads - p. 44). In both Alternative 2 and 3, 2.1 miles of National Forest System Roads would be decommissioned, reducing potential sediment sources. As an example, 0.4 miles of FR 379 traverses a wetland and would be decommissioned restoring the wetland to its natural ecological function. Adherence to the Windy Project Operational Standards and Guidelines found in Appendix D, and site specific mitigation measures associated with each unit card during project implementation would minimize the impacts to water quality and aquatic habitat from the temporary road construction crossing lowlands in either alternative.

Impacts to the water quality within the Boundary Waters Canoe Area Wilderness (BWCAW) from the temporary roads crossing lowlands would be minimal to nonexistent since they are greater than a mile from the border and mitigation measures are in place to reduce any impacts. The effects to water quality and watershed health from roads are generally evident and relevant within one mile or less of the road (Verry et al. 2000).

Indicator 2: Number of new temporary water crossings to access vegetation treatment activities.
Alternative 2 and Alternative 3 would insert one temporary water crossing on temporary roads to access timber stands. Water crossings can increase sediment transport, disrupt natural stream flow and flood flow, reduce riparian function, and impede aquatic organism passage. Following Forest Roads guidelines in the Minnesota Forest Resources Council Voluntary Site Guidelines and installing culverts/bridges of sufficient size to handle hydrologic flows for the site would minimize impacts and enhance the water

quality and overall watershed health of the project area. The water crossing would be removed after the roadbed is closed and obliterated.

Impacts to water quality within the BWCAW from the temporary water crossing would be minimal to nonexistent since it is greater than five miles from the border and mitigation measures are in place to reduce impacts. Impacts to water quality from road crossings are generally evident at the crossing.

Indicator 3: Proportion of upland open and upland young forest within each 6th level watershed.

Alternative 2 and 3 would convert some of the land into upland open forests, but the watersheds would remain below the 60 percent threshold. See Table 3-WQ-2 below. Thus, it is expected that peak stream flows within the Windy Project Area would have minimal effects on the health of the water quality and potentially reshaping stream channels, increasing erosion, and decreasing the biological integrity.

Table 3-WQ-2: Percentage of Upland Open, Upland Young Forests in Sixth Level HUC Watersheds by Alternative in 2023.

Watershed Name	Alternative 1 2023	Alternative 2 2023	Alternative 3 2023
Headwaters Cross River	11	11	11
Hog Creek	5	5	5
Perent River	25	25	25
Silver Island Lake	11	14	14
Dumbbell River	6	9	11
Arrowhead Creek	4	7	8
Island River	28	32	32
Mitiwan Creek	18	18	18
Isabella River	59	59	59
Phoebe River	<1	<1	<1
Malberg Lake- Kawishiwi River	13	13	13

DataSource:T:\FS\NFS\Superior\Project\Tof\TimberVeg\Windy\GIS\Analysis\WindyAnalysis_2014\WindyML_60 percent_2011.xlsx; WindyEA_60 percent_alt1_Run1B_2014.xlsx; WindyEA_60 percent_alt2_2023_Run3.xlsx; WindyEA_60 percent_alt3_2023_Run12A.xlsx.
*All numbers are rounded to the nearest tenth.

Any water draining from the proposed treatment units in Alternative 2 and Alternative 3 would potentially flow towards the BWCAW and could impact the water quality, but mitigation measures are in place to reduce any of these impacts.

Cumulative Effects for Alternative 2 and Alternative 3

The list of potential cumulative actions in Appendix F was reviewed; and the past, present and reasonably foreseeable future actions that may contribute to cumulative effects that affect water quality were considered. This would include any road construction and/or water crossings related to a timber sale, trail construction that crosses water, fuels reduction (prescribed burns), special use permits for road access, as well as routine road maintenance activities, private development and the percentage of the watershed in upland open and upland young forest exceeding sixty percent.

Currently, there are five sales for a total of 1,628 acres that are ongoing within the Windy Project Area. No stands within the project area are planned to be released in 2014; and 8 stands totaling 89 acres are planned for release in 2015. The State is currently proposing stand examinations and harvest needs on 224 acres within the project boundary. Private land encompasses less than one percent (240 acres) of the ownership within the project boundary; and the Superior National Forest anticipates minimal harvesting on private lands since these areas are relatively small and disbursed. As long as Operational Standard and Guidelines found in Appendix D and Minnesota Forest Resource Council Voluntary Site-Level Guidelines (MFRC) are followed during road construction and the placement of water crossings, impacts to water quality would be minimized. In addition, best management practices are followed by state managers; and it would be in the best interest of private land owners to also follow guidelines minimizing cumulative effects.

Fuel reduction activities in this area are ongoing and approximately 150 acres are being treated. Mitigation measures would be followed to reduce impacts to water quality.

Two special use road permits are on-going within the Windy Project Area. They have been issued to the Minnesota Department of Natural Resources (MN DNR) and will expire in 2015. At the end of their permit periods, one road will be decommissioned to motorized traffic and the other road will entirely decommissioned. Under the Forest-wide Travel Management Project (USDA 2009), 1.4 miles of OML 1 roads and 0.7 miles of OML 2 roads will be decommissioned and allowed to return to a natural state. No miles will be converted to an OML 1 or 2 roads. Decommissioning roads would reduce impacts to water quality.

Reasonably foreseeable future actions on federal lands within the Windy Project Area include: 1) potential expansion of the Harriet Lake Camping Area, 2) shoreline stabilization work at Kawishiwi and Windy Lakes, and 3) vegetation management plans at all of the rustic campgrounds in the Project Area. These actions would enhance the water quality at these lakes.

Based upon the proposed percentage of upland open and upland young forest resulting from Alternatives 2 and 3 and a review of the shared drainage areas, the watersheds would not be expected to exceed the 60 percent threshold when combined with cumulative actions. Water quality within the BWCAW would not be impacted by the proposed alternatives.

Overall, impacts to water resources and biota from erosion and sediment, compaction, rutting, chemical contamination, and changes in water flow would be reduced by implementing the Windy Project Operational Standards and Guidelines found in Appendix D and site specific mitigation measures; the Superior National Forest Management Plan standard and guidelines; and the MFRC guidelines.

3.9 Boundary Water Canoe Area Wilderness

3.9.1 Introduction

The Forest Service has the responsibility to protect the wilderness character of the Boundary Waters Canoe Area Wilderness (BWCAW). The northern boundary of the Windy Project Area is adjacent to the BWCAW. This analysis considers how any of the proposed actions outside the Wilderness boundary would affect the Wilderness.

Wilderness qualities used to monitor wilderness character are defined as:

- **Untrammeled** – wilderness is essentially unhindered and free from modern human control or manipulation.
- **Natural** – wilderness ecological systems are substantially free from the effects of modern civilization.
- **Undeveloped** – wilderness is essentially without permanent improvements or modern human occupation.
- **Outstanding opportunities for solitude or a primitive and unconfined type of recreation**– wilderness provides outstanding opportunities for people to experience solitude or primitive and unconfined recreation, including the values of inspiration and physical and mental challenge (USDA 2005).

Evaluating proposed actions against the specific measures developed for each of the four qualities can help managers understand how the actions would either improve or detract from wilderness character.

The untrammeled and undeveloped qualities of wilderness listed above will not be addressed in this analysis because none of the proposed activities occur within the BWCAW or would impact the untrammeled and undeveloped qualities. The natural quality or effects to the ecological integrity of the Wilderness will be addressed in other resource sections in the Windy Project Environmental Assessment. Potential effects to the BWCAW are described in Sections 3.4 and 3.5 for wildlife, Section 3.7 for non-native invasive plants and Section 3.8 for water quality.

This analysis will disclose potential impacts to the fourth quality, outstanding opportunities for solitude or a primitive and unconfined type of recreation. Sound from mechanical activity could affect opportunities for solitude provided by and expected in a wilderness setting. This potential impact will be analyzed in detail. The proposed vegetation management activities would not be visible from within the BWCAW, and therefore, there would be no effects to Wilderness users resulting from seeing the harvest activities.

3.9.1 Indicators

Indicator 1: Acres of mechanical treatment within one mile of wilderness recreation sites.

This indicator highlights the difference between alternatives by identifying the acres of treatment within one mile of specific BWCAW sites (lakes and trails) that may be affected by sound from mechanical activity, and the indicator compares how the effects generated by each alternative would differ.

3.9.2 Analysis Parameters

The area analyzed for direct and indirect effects includes specific BWCAW lakes and trails that are within one mile of harvest units. These BWCAW lakes and trails are located outside of the Windy Project Area but are within one mile of the project area boundary. This analysis area was chosen because visitor presence is more common on lakes with designated campsites than forested areas not along travel routes, and sound associated with the project is not expected to be noticeable further than one mile from the source of the sound.

Although visitor use does occur in more remote areas of the BWCAW, few people travel off of established routes because of the brushed-in character of the wilderness forest. The mandatory permit system requires visitors to enter the BWCAW at an established entry point. The permit system also limits the amount of use to protect Wilderness resources and provides a means for monitoring visitor travel patterns (FP, p. 3-55). Most visitors come to the BWCAW to travel on canoe routes, portages and hiking trails. This analysis recognizes that very few people recreate in those areas of the Wilderness that are off of commonly established routes.

A distance of one mile was used based on the research and estimation of sound impacts as described in the Echo Trail EIS. The Echo Trail EIS estimated that at an approximate distance of one mile from the harvest activity (not taking into account vegetation, wind, or topography) the harvest activity would sound like a secluded woods (USDA 2006c, pp. 3-92).

The area analyzed for cumulative effects includes all ownerships in the one-mile zone around the wilderness recreation sites and lakes. This analysis area boundary was selected because the most likely impact of timber harvest activity on recreation sites would be sound, and the effects beyond one mile of the sound source are usually negligible.

The time period for the direct, indirect, and cumulative effects analysis is ten years. This time period was selected because the impacts are directly related to the amount of time needed to implement the vegetation management activities and supporting transportation system. The vegetation management activities, if implemented, would likely be completed within the next ten years.

3.9.3 Affected Environment

The Forest Plan includes direction for managing the Wilderness. The Forest Plan states "To achieve the objectives for management of the BWCAW, the Wilderness has been divided into four management areas. The desired future conditions of both the physical and social aspects of the resources differ slightly between management areas." (FP, pp. 3-40 through 3-47) These management areas pertain only to land within the Wilderness and they provide a context for the type of experience visitors can expect.

The area of the BWCAW adjacent to the Windy Project Area is in the Semi-primitive Non-motorized Wilderness Management Area (MA). Semi-primitive Non-motorized Wilderness MAs provide visitors with a semi-primitive wilderness experience in a predominantly unmodified natural environment. They are generally located along the main travel routes, where a visitor expects to encounter others more frequently and solitude is not one of their highest priorities. The desired social conditions confirm that opportunities for experiencing isolation and solitude are moderate to low (FP, p. 3-45).

Use levels are moderate-high at the Hog Creek Entry Point and on Perent Lake. From 2011 to 2013, the annual average of overnight permits issued for the Hog Creek Entry Point was approximately 263. All of the overnight visitors that enter the BWCAW at Hog Creek travel west towards Perent Lake where they remain for all or a portion of their stay. A small portion of visitors at this Entry Point travel west down the Perent River towards Isabella Lake. In addition to the overnight visitors that enter the Wilderness at the Hog Creek Entry Point for overnight use, there are a number of anglers that fish Perent Lake. On average there are approximately 29 self-issue day use permits per year that are completed by users who enter the BWCAW at the Hog Creek Entry Point. This use is distributed from May through October. Compared to other BWCAW entry points on the Tofte Ranger District, Hog Creek receives moderate levels of use (pers. comm. Benson 2014).

3.9.4 Environmental Consequences

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

Alternative 1 would not harvest any timber therefore; there would be no additional sounds from harvest during the summer or winter and no affect to visitors at wilderness recreation sites. There would be no direct, indirect, or cumulative effects from the Windy Project under Alternative 1.

Existing and foreseeable future sound impacts from multiple sources within and adjacent to the project area would continue to impact the solitude of BWCAW visitors. Included would be sounds from vehicle traffic on roads and entry points near the Wilderness and sounds generated by timber harvest activity from previous decisions on National Forest System lands. Other sounds continuing to impact wilderness solitude include Forest Service aircraft on fire detection flights, aerial law enforcement and wildlife surveys, and emergency motorized use for search and rescue and firefighting operations.

Alternative 2

Direct and Indirect Effects

The Echo Trail and Glacier Projects conducted an in-depth analysis of sound impacts from vegetation management activities to the BWCAW. The vegetation activities in the Windy Project are similar and therefore this analysis uses similar methods and data. As with the Echo Trail and Glacier analyses, there are several other variables that can influence sound levels that have not been taken into account when calculating this analysis. These variables are site specific and include temperature, humidity, wind, topography, vegetation, and the frequency (Hz) of harvest machinery sound.

Table 3-BW-1 defines the scale of impacts for number of days and decibel level. Table 3-BW-2 describes the decibels of sound. The terms describing scope in this table are taken from page 5 of the Minnesota Pollution Control Agency Guide to Noise Control (MPCA 1999). Decibel (dBA) is the commonly used unit for measuring sound pressure levels (MPCA 1999, Guide to Noise Control in Minnesota, page 17).

Table 3-BW-1: Definition of Duration for Sound Impacts.

Duration	Number of days
Short term	1-60
Medium-term	61-90
Long-term	91+

Table 3-BW-2: Definition of Scope for Sound Impacts.

Decibels	Scope	Example
30-60	Small	Secluded forest is 30 decibels, and a library is 50 decibels.
61-90	Moderate	Heavy truck traffic is 80 decibels. At 90 decibels, a chainsaw is at the high end of moderate or the low end of wide in scope.
90 or louder	Wide	A jointer/planer is 100 decibels.

The Windy Project Area includes three units (313-047,313.029, 313.048) proposed for harvest that are located within one mile of wilderness recreation sites, lakes, or rivers. In certain conditions, vegetation management activities in these units could project a low decibel sound into the BWCAW. The areas of the BWCAW that may be impacted are listed below.

- The majority of harvesting activities within one mile of lakes and recreation sites within the BWCAW would impact the area south of Perent Lake. There is one unit proposed for treatment that is within one mile of the area south of the Island River, and three additional units within one mile of the wilderness south of Perent Lake but no visitor use is anticipated within this area as there are no travel routes or recreation sites. Although visitor use does occur in areas off of the established

travel routes, few people travel off of these routes because of the brushed-in character of the wilderness forest.

- Perent Lake is within one mile of three units that are proposed for harvest activities, the closest unit being 0.8 miles away from Perent Lake. Within the BWCAW, users on Perent Lake may hear harvesting or vegetation management operations.

- There are three campsites on the south side of Perent Lake that are all approximately one mile from one unit proposed for harvesting. It is possible that visitors staying at one of these campsites may hear sounds associated with timber harvesting under certain weather and wind conditions.

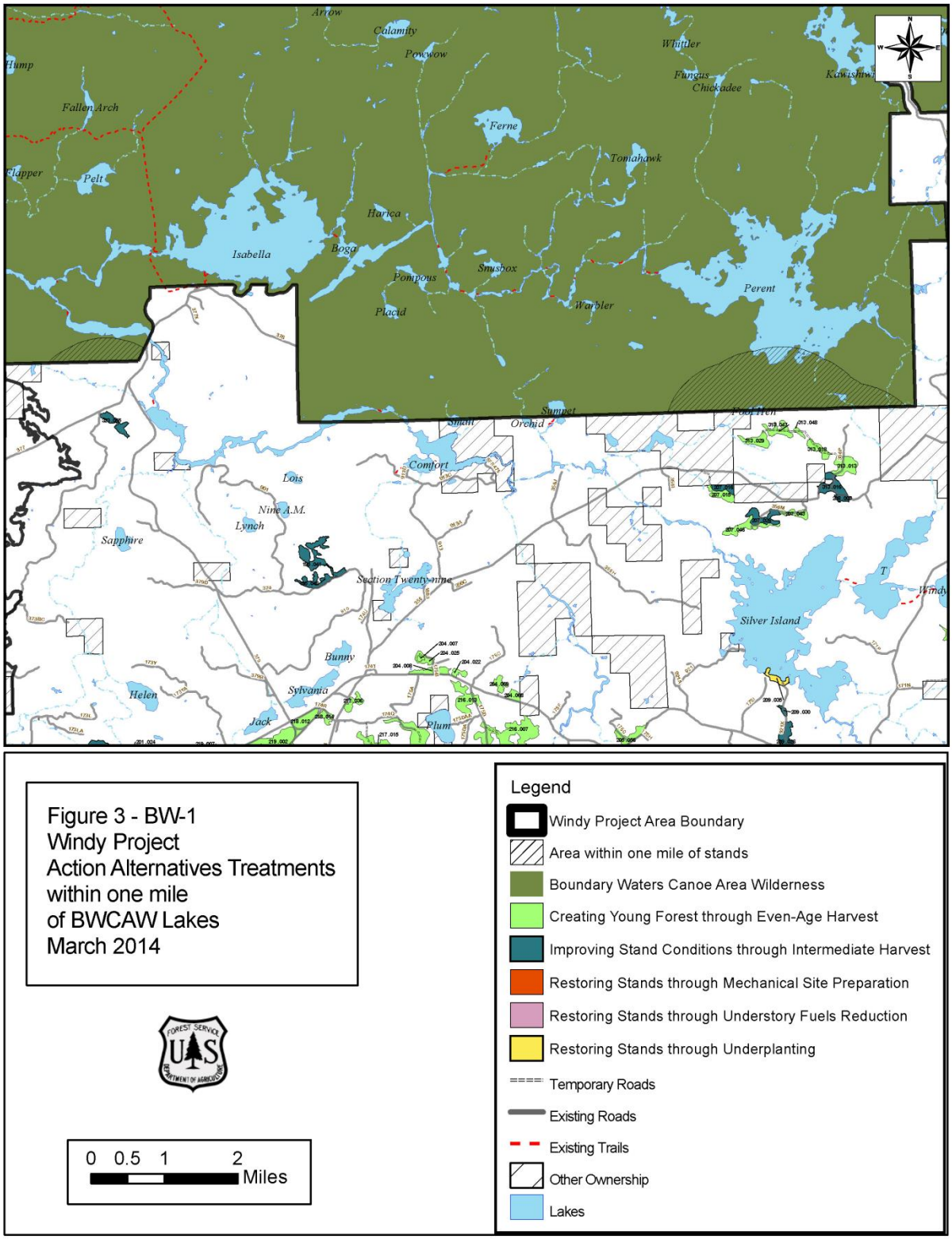
The total acres proposed for mechanical treatment within one mile of affected wilderness lakes is approximately 61; all of these acres are proposed for harvest. District personnel estimate about seven acres or less of harvesting activities can be accomplished in one day, so the proposed activities would take approximately 9-10 days. Based on the definitions in Table 3-BW-1, these impacts are considered short term (1-60 days).

Based on analysis from Echo Trail Area Forest Management Project FEIS (USDA 2006, p. 3-92), it is estimated that six harvest machines operating in one location create a 'point' source of sound averaged to be 100 decibels two feet from the source. At about one mile from this point source, the sound decreases to about 32 decibels. A secluded forest has a decibel level of about 30. At an approximate distance of one-mile from timber harvest activity, not taking into account vegetation, wind, or topography, the sounds associated with the activity may still be discernible under some conditions but would not be louder than the surrounding natural environment.

The closest unit is more than one half mile away from travel routes in the BWCAW, so the decibel level of sound emanating from these units would be greatly reduced as it travels through adjacent vegetation across this distance. Based on definitions in Table 3-BW-2, the decibel levels from harvesting activities would be small in scope (30 to 60 decibels).

It is important to note that timber harvesting activities typically occur during daylight hours between 7:00 am and 6:00 pm. Activities of wilderness visitors as well as environmental noise such as wind and waves are often increased during the daytime. These activities often contribute more to measurable decibel levels at wilderness recreation sites than timber harvesting activity occurring within one mile of a particular site. During evening hours after 6:00 pm, when many wilderness visitors pause and other environmental noises have lessened, there would be minimal or no sound associated with timber harvesting activity to compromise wilderness solitude.

Figure 3-BW-1: Alternative 2 and 3 Treatments within one mile of BWCAW lakes.



It is also important to note that once timber harvesting activity is completed for the day or all units planned for harvest are complete, the sound stops. This is in contrast to other sounds mentioned with the potential to affect wilderness solitude including motor vehicle traffic which would likely continue into the unforeseeable future. There would not be long-term sound effects beyond the time needed to complete each harvest unit.

Unit 313-047, which is within one mile of campsites on Perent Lake, is restricted to winter only operations. It is likely that the other two stands located within one mile of sites on Perent Lake will also be harvested in the winter. Since 2005, no visitors have completed a self-issue permit for winter entry at the Hog Creek Entry Point. Due to the difficulty of getting into the lake and the lack of plowed roads in this area it is unlikely that any visitors have been on Perent Lake in the winter months. Because it is unlikely that visitors will be present during the winter, it is unlikely that any harvesting activities within one mile of these lakes will impact recreation visitors on Perent Lake.

Sound generated by machinery used for timber harvest occasionally occurs on National Forest System land in the area outside of the BWCAW. The harvesting under Alternative 2 would generate sound similar to sound that currently is heard. In this portion of the BWCAW, opportunities for isolation and solitude are moderate to low (FP, p. 3-45). This alternative would not change the recreation experience of BWCAW users.

Given the long distance of harvest activities from BWCAW sites (one half to one mile), coupled with the variety of activities within the project area that generate motorized sounds similar to harvest activity sound, Alternative 2 would have minimal or no measurable impact on the experience of the BWCAW user.

Cumulative Effects of Alternative 2

The cumulative effects analysis looked at effects from past, present, and future actions on all ownerships within the analysis area that would add incrementally to the effects of this project. An overall list of past, present, and future actions that may, depending on the resource, have overlapping effects is described in Appendix F. This list was used to identify those actions that would add negative effects to the recreation experience.

Existing and foreseeable future sound impacts from multiple sources within and adjacent to the project area would continue to impact the solitude of BWCAW visitors. Included would be sound from vehicle traffic on roads and entry points near the Wilderness and sound generated by timber harvest activity on National Forest System land. Other sounds continuing to impact wilderness solitude include Forest Service aircraft on fire detection flights, aerial law enforcement and wildlife surveys, and emergency motorized use for search and rescue and firefighting operations.

Cumulatively, sound generated by machinery used for timber harvest occasionally occurs on National Forest System land in the area outside of the BWCAW. The harvesting under Alternative 2 would generate sound similar to that which is currently heard. In this portion of the BWCAW, opportunities for isolation and solitude are moderate to low (FP, p. 3-45). This alternative would not change the recreation experience of BWCAW users.

Alternative 3

Direct and Indirect Effects

Alternative 3 (Proposed Action) does not propose any stands in addition to those discussed in Alternative 2 that are within one mile of recreation sites, lakes, or rivers in the BWCAW. No activities beyond those described in Alternative 2 (above) are proposed in Alternative 3, so the impacts to wilderness visitors are likely to be identical. No additional analysis is needed for Alternative 3.

Conclusions Related to Wilderness Qualities, All Alternatives

Opportunities for Solitude

Due to the small area affected, and the temporary and short term nature of sounds that may be perceived from the wilderness, there would be negligible differences in impacts to solitude between alternatives. Alternatives 2 and 3 would have slightly higher impacts than the no action alternative. BWCAW users in the area would continue to find a level of solitude and quietness similar to existing conditions.

Sounds from motorized vehicles or equipment are present and audible on Perent Lake, Hog Creek, Isabella Lake, and the Island River. Sound generated from vehicle traffic on roads and entry points near the wilderness and sound generated by timber harvest activity are the sounds most audible on these lakes. Existing and foreseeable future sound impacts from multiple sources within and adjacent to the project area would continue to impact the solitude of BWCAW visitors. Therefore, there would be no difference between alternatives in the type or quality of sound.

Under Alternative 1 visitors in the BWCAW on Perent Lake, Hog Creek, Isabella Lake, and the Island River would at times, hear motorized sound. A person seeking total solitude or total escape from motorized sounds would not find that place on these lakes. Under Alternatives 2 and 3, the duration of sound impacts from management activities would be short-term (less than 60 days), and the decibel levels should be small in scope (30 to 60 decibels).

Natural

Impacts to the natural aspect of wilderness character would be minor, and would not represent an increase beyond the impacts that are characteristic of the area. This conclusion is based on the potential effects to the natural quality or the ecological integrity of the BWCAW as described in detail in resource sections of the Environmental Assessment and summarized below.

Vegetation (Section 3.3)

Effects to landscape ecosystems, which are ecological units of forest type associations, are disclosed in the Environmental Assessment in Section 3.3. Forest Plan direction for landscape ecosystems includes consideration of land in the BWCAW (FP, p. 2-55).

There are no activities proposed within the BWCAW and no vegetation inside the BWCAW would be treated as a result of the Windy Project. On a landscape level, the Windy Project would move the project area towards landscape ecosystem objectives, improving ecological function. All effects from the Windy Project would be within the effects disclosed in the Forest Plan FEIS and would comply with Forest Plan standards and guidelines. In conclusion, the effects to the natural aspect of wilderness character in terms of vegetation would be negligible.

Wildlife (Sections 3.4, 3.5, and Appendix G)

Sections 3.4 and 3.5 of the Environmental Assessment summarize effects to wildlife disclosed in the Windy Project Biological Assessment and Biological Evaluations. The effects to Management Indicator Habitats (MIHs) are disclosed in Appendices G.

The effects of the two proposed action alternatives would result in a decrease in MIH 13 (large mature patches). These effects would be beneficial to some species and negative for others. Effects to MIHs would be consistent with Forest Plan direction and the analysis of effects predicted by the Forest Plan FEIS. Overall, while forest type, age, and patch size would be altered by the action alternatives, these changes would benefit wildlife by helping to achieve Forest Plan goals and objectives for MIHs. MIH indicators were developed and analyzed in the Forest Plan FEIS and included consideration of the BWCAW. The achievement of Forest Plan objectives for MIH would benefit wildlife, including wildlife in the BWCAW.

Furthermore, the analysis discloses effects to Regional Forester Sensitive Species and Management Indicator Species (Section 3.5). Some individuals of these species would be impacted by the action alternatives. However, the determination of effects in the Biological Evaluation finds that while some species are impacted, the action alternative would not result in a trend towards federal listing for any species. Population viability determinations are made considering the entire Superior National Forest, including in the BWCAW.

Finally, the analysis discloses effects to threatened and endangered species. Analysis for lynx is tiered to the Forest Plan FEIS cumulative effects analysis for threatened and endangered species, which covered the entire Superior National Forest, including the BWCAW. Furthermore, the lynx analysis recognizes the BWCAW as refuge and analyzes connectivity between lynx habitat inside and outside the Wilderness (Windy Project Biological Assessment). The Biological Assessment makes a determination of '*not likely to adversely affect'* for lynx.

Non-native Invasive Plants (Section 3.7)

There would be minimal risk from any alternative with regard to spreading non-native invasive species into the BWCAW, and therefore, none of the alternative would affect the natural aspect of wilderness character. Neither action alternative includes management activities immediately adjacent to the BWCAW.

The risk that vegetative treatments proposed under Alternative 2 or 3 would cause NNIP impacts to the BWCAW is low primarily because the treatment units would be some distance (about ¾ mile) from the BWCAW boundary. The greater risk of NNIP impacts to the BWCAW arises from the vegetation conditions in the Pagami Creek Fire burned area; this risk is discussed below under cumulative effects. The 2011 Pagami Creek Fire created early seral vegetative conditions on approximately 8,500 acres within the Windy Project Area boundary. There is a greater risk that NNIP infestations that existed in the portion of the Windy Project Area that burned would spread via the burned area into the BWCAW, and NNIP treatments conducted since that fire have attempted to limit NNIP spread to the BWCAW. Other vectors of spread of NNIP into the BWCAW such as recreationists traveling into the BWCAW currently occur and would continue to occur.

Five of the proposed treatment units are within ¾ mile of the Boundary Waters Canoe Area Wilderness (BWCAW) boundary but none are immediately adjacent to the boundary.

Water Quality (Section 3.8)

None of the alternatives would have a measurable effect on water quality in the BWCAW and the natural aspect of wilderness character. Since there are no proposed stream crossings within one mile of the BWCAW, Alternatives 2 and 3 would not result in a negative effect to water quality associated with stream crossings. The Environmental Assessment shows that there would be minimal effects from the action alternatives due to the nature of activities proposed, the use of mitigation measures, and because no sixth level watershed exceeds the 60 percent effects threshold for upland open or upland young forest. Short-term impacts would be minimized given that required Forest Plan standards and guidelines would be followed under the action alternatives and MFRC guidelines are followed for State and private projects during project implementation and construction activities.

Untrammeled

Potential for Illegal Intrusion by Off-Highway Vehicles

All but four of the proposed activities are over one half mile from the BWCAW boundary and any units proposed for harvest beyond one half mile from the BWCAW would not create any new opportunities for illegal motorized use in the Wilderness. The four units proposed for harvest total approximately 83 acres and would be accessed by a temporary road which is scheduled to be decommissioned after harvest related activity is complete. The temporary road proposed to access these stands is approximately ¼ mile outside the BWCAW. This road will be constructed immediately prior to harvesting activities and decommissioned shortly after harvesting activities are complete. The potential for new opportunities for illegal motorized use in the wilderness is minimal during harvesting activities.

In addition to decommissioning the temporary road proposed to access stands within one half mile of the wilderness boundary, two other roads would be decommissioned within one half mile of the wilderness boundary in the Windy Project Area. Therefore, the potential for illegal motorized OHV access into the BWCAW would be reduced due to

the lack of forest roads open to motorized use near the BWCAW boundary. No effects are expected to the untrammeled quality of wilderness character under any of the alternatives.

Cumulative Effects of Alternative 3

The cumulative effects analysis looked at effects from past, present, and future actions on all ownerships within the analysis area that would add incrementally to the effects of this project. An overall list of past, present, and future actions that may, depending on the resource, have overlapping effects is described in Appendix F. This list was used to identify those actions that would add negative effects to the recreation experience.

Existing and foreseeable future sound impacts from multiple sources within and adjacent to the project area would continue to impact the solitude of BWCAW visitors. Included would be sound from vehicle traffic on roads and entry points near the Wilderness and sound generated by timber harvest activity on National Forest System land. Other sounds continuing to impact wilderness solitude include Forest Service aircraft on fire detection flights, aerial law enforcement and wildlife surveys, and emergency motorized use for search and rescue and firefighting operations.

Cumulatively, sound generated by machinery used for timber harvest occasionally occurs on National Forest System land in the area outside of the BWCAW. The harvesting under Alternative 3 would generate sound similar to that which is currently heard. In this portion of the BWCAW, opportunities for isolation and solitude are moderate to low (FP, p. 3-45). This alternative would not change the recreation experience of BWCAW users.

3.10 Other Determinations

3.10.1 Heritage Resources

To satisfy the Forest's responsibilities for undertakings under Section 106 of the National Historic Preservation Act, a heritage resource inventory has been conducted for the project area. Results of this inventory were documented in the *Windy EA* Cultural Resource Reconnaissance Report (CRRR), #1307001. This document lists all heritage survey reports conducted to date and previously identified heritage resources within or adjacent to the project area. This document identifies heritage mitigations including locations which will need additional survey coverage prior to project implementation and heritage sites which will need to be avoided during implementation. The *Windy EA* CRRR #1307001 was signed by the Forest Archeologist on January 8, 2013, and the findings will be reported to the Minnesota State Historic Preservation Office (SHPO), Bois Forte Band of Chippewa, Grand Portage Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, and the Advisory Council on Historic Preservation in the 2014 Superior National Forest Heritage Annual Report (Windy Project Record).

The analysis area for heritage resources includes all proposed treatment units and proposed road treatments, including access roads to treatment units and proposed road decommissioning, within the project boundary.

No new vegetation management actions would occur under Alternative 1, therefore there would be no direct, indirect, or cumulative effects to heritage resources.

Under Alternative 2 and 3, impacts to heritage resource sites would be avoided through application of Operational Standards and Guidelines (S-HR-9, Appendix D) and site specific mitigation measures. Heritage resource sites would be excluded from the treatment units, with the boundaries marked (where appropriate), in the field prior to project implementation. Should previously unknown heritage resources be identified during project implementation, project activities would cease and the Forest Archaeologists will be contacted. Appropriate measures would be developed to ensure site protection in consultation with the Minnesota State Historic Preservation Officer and Tribal Historic Preservation Officers representing the Bands in the 1854 ceded territory.

The direct, indirect, and cumulative effects of Alternative 2 and 3 on heritage resources have been evaluated following the provisions of the 2013 Continuing Programmatic Agreement with Minnesota State Historic Preservation Officer and acknowledged by the Bois Forte Band of Chippewa, Grand Portage Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, and the Advisory Council of Historic Preservation. Based on review of existing data and literature and contingent upon the implementation of specified mitigation measures, the Superior National Forest Heritage Resources Staff determines that there would be no effects to heritage resources under Alternative 2 (No Effects Letter Heritage, Windy Project Record). Implementation of Operational Standards and Guidelines, mitigation measures (i.e. flag and avoid), post treatment monitoring, and maintenance of confidentiality with respect to heritage

resource locations would effectively eliminate direct and indirect effects as they relate to the action alternatives of the Windy Project. There would be no cumulative effects to heritage resources, as all potential direct and indirect effects would be mitigated. As heritage resources would receive identical protections under either action alternative, there is no substantive difference in impact to heritage resources under Alternative 2 or Alternative 3.

3.10.2 Scenery/Recreation

Windy Project activities that may affect the scenic or recreation resources were assessed in the Windy Scenery/Recreation Resource Report. A summary of that report is included here. The complete report is in the Project Record and available upon request.

The Windy Project Area is used for both summer and winter recreational activities. Summer recreation use is extensive and consists of hiking, fishing, camping at developed campgrounds, dispersed backcountry camping, picnicking, berry picking, biking, canoeing, boating, and sightseeing. Winter use is also extensive and consists of snowmobiling, cross country skiing, dog sledding, ice fishing, and snow shoeing. The area is also popular for fall hunting and year-round birding. In addition to these activities, this area is also used by forest visitors who are interested in seeing some of the impacts of the 2011 Pagami Creek Fire.

Under all alternatives, existing and foreseeable future noise impacts from multiple sources within and adjacent to the project area would continue to impact recreation users. Included would be noise from vehicle traffic on roads, motorboat traffic on lakes near the project area and noise generated by landowners on county state or private property within the project area. Timber harvest activity on National Forest System land and other ownership including state, county, and private industry lands would continue.

No new management actions would occur under Alternative 1. There would be no direct, indirect, or cumulative effects from the Windy Project under Alternative 1.

The effects of vegetation management in the Windy Project Area would be nearly identical in Alternative 2 and 3. These effects would be of short duration because: 1) activities would occur during day light hours, 2) the sound is influenced by distance, time of day, weather, wind and other factors, making it less noticeable at times, and 3) most recreationists would hear or see activity for less than a week because of how the sites are used.

Within the Windy Project Area, roads such as FR 369 (Trappers Lake Road), FR 373 (Northwest Road), and FR 377 (Tomahawk Road) are used by the recreating public for travel to and from recreation sites, driving for pleasure recreational opportunities, and snowmobiling when these roads are not plowed. There are several stands proposed for even aged harvesting along FR 369 and FR 373 and one stand proposed for a thinning treatment on FR 377. Temporary openings created along these roads by timber harvesting shall be laid out to be similar in size, shape, and edge characteristics to natural openings in the landscape.

Chapter 4: Lists and References

4.1 Lists of Preparers and Contributors

Interdisciplinary Planning Team for the Windy Project: This is a list of the core interdisciplinary team (IDT).

Becky Bartol, Environmental Coordinator, Team Leader
Dave Grosshuesch, NEPA Planner
Erica Hahn, Silviculturist
Peg Robertsen, Wildlife Biologist
Brianna Schueller, Fuels Planner

Ad Hoc Members: This list includes individuals who were part of the full interdisciplinary team or contributed substantial portions to the analysis.

David Avery, Transportation Planner
Dave Bartol, Forester
Jon Benson, Recreation Specialist
Ryan Brown, Heritage Resources
Gene Dressely, Timber Management Assistant
Jack Greenlee, Forest Ecologist
Casey McQuiston, Forest Soil Scientist
Amy Wilfahrt, Fisheries Biologist

Other Contributors: This list includes individuals who were not formal members of the interdisciplinary team but who gathered information used in the analysis process, contributed to the development of alternatives and/or prepared the environmental analysis.

Tom McCann, GIS Analyst
John Olson, Engineer
Jill Schug, Cartographic Technician
Peter Taylor, Forest Environmental Coordinator

4.2 Distribution Lists

Tribal Contacts

The following individuals were contacted throughout the Windy Project.

Tribal Band	Contact
Grand Portage Band of Chippewa	Norman Deschampe
Bois Forte Band of Chippewa	Kevin Leecy, Corey Strong, Dave Larson, Bill Latady
Fond du Lac Band of Chippewa	Karen Diver, Nancy Schuldt, Wayne Dupuis
1854 Treaty Authority	Millard “Sonny” Myers; Darren Vogt

Scoping Package

The following individuals and organizations received a notification letter or email that the Windy Project Scoping Report was available on the Superior National Forest website. They were on a mailing list that was generated by the Forest Supervisor’s Office and had

indicated they wanted to receive information about vegetation management projects in the Tofte District or Forest-wide. The following list also includes area landowners who were identified by a search of property owners within the Windy Project Area in the Lake County landowner database.

All Terrain Vehicle Assoc. of MN	Thomas Gardner
Arrowhead Coalition for Multiple Use	Stephen Good
Duluth Public Library	Alan Goodman, Lake County Highway Department
Ely Echo	Janet Green, MN Center for Environmental Advocacy
Natural Resources Library, University of MN	Diane Greenley, ACMU
Town of Morse	Greg Grell, WDSE-TV
Cook County News Herald	Duane and Sue Gustafson
Twin Metals Minnesota	Len Hardy, Range Riders ATV Club
Wilson Lake Homeowners Association	Howard Hedstrom, Hedstrom Lumber Company Inc.
Andrea Allison, John B. Ridley Research Library	Bert Heep, Piragis Northwoods Co.
Alan Anderson	Jim Heinz
Bob Anderson	Brian Henry
Mike Anderson, Wilderness Society	Darlene Hill
Frederick Anderson	Howard Hoganson, NCFES, University of MN
Curt Anderson	Jim Howe
Lori Andresen	John Hughes
Bruce Bates	Scott Hull
Rose Berens, Boise Fort Heritage Center	John Hunt, Minnesota Trout Unlimited
Jim Berkeland, Blandin Forestry	William Lon
Ray Bisco	Rick Jannett
Denny Bone, St. Louis Co. Land Dept.	Douglas Johnson
Bart,Boyer	Warren Johnson
Wayne Brandt, MFI/MN Timber ProdAssoc.	James Johnston, FSEEE
Mickey Brazell	David Jones, Midwest 4WD Association
Randall Breeden	William Karow
James Brewer	Richard Kayser, STORA ENSO NORTH AMERICA
Ron Brodigan, Great Lakes School of Log Bldg	Bob and Georgine Koschak
Leonard Cersine	Martin Kubik
Michael Christensen	Carl Kunnari
Thomas Christiansen	David Larson, Bois Forte Reservation
Sam Cook, Duluth News Tribune	Kevin Leecy, Nett Lake (Bois Forte) Tribal Office
William Corrigan	John Leinen, North Country Trail Assoc
Cindy Craig, United Northern Sportsmen	Peter Leschak
Jim Crouch, Jim Crouch & Associates	Michael Levig, Arrowhead ATV Club
Tony Damato, UM Dept of Forest Resources	Steve Loch
Matthew Davis, North Country Trail Assoc.	John Lofgren
Leroy DeFoe, Fond Du Lac Tribal Office	Debbie Mark, Seagull Outfitters
Norman Deschampe, Grand Portage Reservation	Thomas Martinson, Lake Co. Land Dept. (MFRP)
Director of Ecological Services, MN DNR	Peter McClelland
Karen Diver, Fond Du Lac Tribal Office	Leslie McInenly, Minnesota Forest Resources Council
Jeff Drew	Nancy McReady, Cons. With Common Sense
Robert Dunn	Bruce Mellor
Scott Elkins, Sierra Club	Mike Miller
Donald Emery	J Phillip Morud
Craig Engwall, MN DNR	Judi Motschenbacher
Gary Erickson, Sappi	Susan Mulholland
Marc Fink, FSEEE	Daniel Mundt, Mundt & Associates
Ric Foster, Blue Ribbon Coalition	Scott Neustel
Ken Norenberg, United Northern Sportsmen	Harmon and Karla Seaver

Lois Norrgard, Sierra Club	Koeneke Shoredge
John Norton	Janet Simonen, Cook County Bd. of Commissioners
Tim O'Hara, MN Forest Industries Inc	Tamara Smith, Fish and Wildlife Services
Gerald Olsen	Mark Stange
Michael O'Phelan	Gwen Steel, Izaak Walton League Of America
Bob Owens, Owens Forest Products	Robert Stodola Jr.
John Paulson, Minnesota Power/land And Water	Bud Stone
Matt Puro, Potlatch Corp.	John Todd
Lee Radzak, Minnesota Historical Society	Ronald Tveiten
Wilma Rahn, Lake County Board of Commissioners	Jim Uhrinak
Jim Raml	Darren Vogt, 1854 Authority
Charles Rasor	Doug Wallace
Kevin Reuther, MN. Center for Environ. Advocacy	Jay and Ella Warmington
Joseph Roberts	Kris Wegerson
Randy Roff	Michael West, West Logging Construction
Ron Rude	Ken Westlake, EPA
Bradley Sagen	Thomas Wetzel
Jerry Schliep	Dyke Williams
Lori Schmidt	Dave Williams, Bear Track Outfitters
Connie Schumann	M. Wisti
John Paulson, Minnesota Power/land And Water	Bud Stone
Matt Puro, Potlatch Corp.	John Todd
Lee Radzak, Minnesota Historical Society	Ronald Tveiten
Wilma Rahn, Lake County Board of Commissioners	Jim Uhrinak
Jim Raml	Darren Vogt, 1854 Authority
Charles Rasor	Doug Wallace
Twin Metals	

A notification letter about the Windy Project and scoping period was also sent to the following individuals who own property near Wilson Lake because the property is adjacent or near some of the fuel reduction work proposed in the Windy Project.

Bergmann Jeffrey A & Eileen T
Buck Lisa Nave Revocable Tr
Bye Jonathan M & Susan M
Carlen James B & Patricia B
Clark Randy J & Meredith A
Demars Anthony R +Zachow Norma Jean
Ernest Arthur J Jr Et Al
Griffin Richard J Revo Trst
Grotte Mark R & Marsha E
Hahn Douglas H + Chestnut-Hahn L A
Kenton Gregory
Kingston Thomas W
Kirk George C + Hite-Kirk Susan M
Kirsch Esther L Trust Agmnt
Kirsch Jeffrey Clift
Knutson Michael + Evans Carolyn
Lange David J & Kathryn R
Mark Jeffrey P & Anne M
Martin Shawn B & Mary K
Martinson Thomas C & Janet K
Meller William H & Jane E
Mitchell Stephanie A
Morris Holly A & A Jack
Obraske James G & Robin A
O'brien William R & Wendie M
Panettiere Brian & Nanine
Petz Bruce R & Janice L
Radel Dwayne & Jane
Smythe Deana L
Starker Paul G
Sullivan Susan
Superior Land Preservation Llc
Wilson Lake Homewoners Association
Witte Gwynne Thompson +Thompson S M

Environmental Assessment

Approximately 30 individuals and organizations who provided scoping comments or requested to keep their names on the mailing list for the Windy Project Environmental Assessment will receive notification of its publication.

4.3 References and Literature Cited

Note: The Superior Forest Plan is cited simply as "FP" instead of using standard convention (USDA Forest Service 2004…) because it is so commonly referenced throughout the document. Similarly, the Record of Decision and Final Environmental Impact Statement for the Forest Plan Revision is cited as "Forest Plan ROD" and "Forest Plan FEIS" respectively. Documents that support the Forest Plan FEIS, such as the biological evaluation, are cited conventionally. The Forest Plan and Forest Plan FEIS and ROD are on the Superior National Forest website: www.fs.fed.us/r9/forests/superior.

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