United States Department of Agriculture

Forest Service

December 2015

Environmental Assessment

Kabetogama Project

LaCroix Ranger District, Superior National Forest
St. Louis County, Minnesota
Townships 66-68 North, Ranges 20-21 West

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CHAPTER 1: PURPOSE AND NEED

1.1 INTRODUCTION

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

SUMMARY OF PROJECT

Who: The LaCroix Ranger District of the Superior National Forest is proposing the Kabetogama Project.

Why: The purpose of the Kabetogama 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.

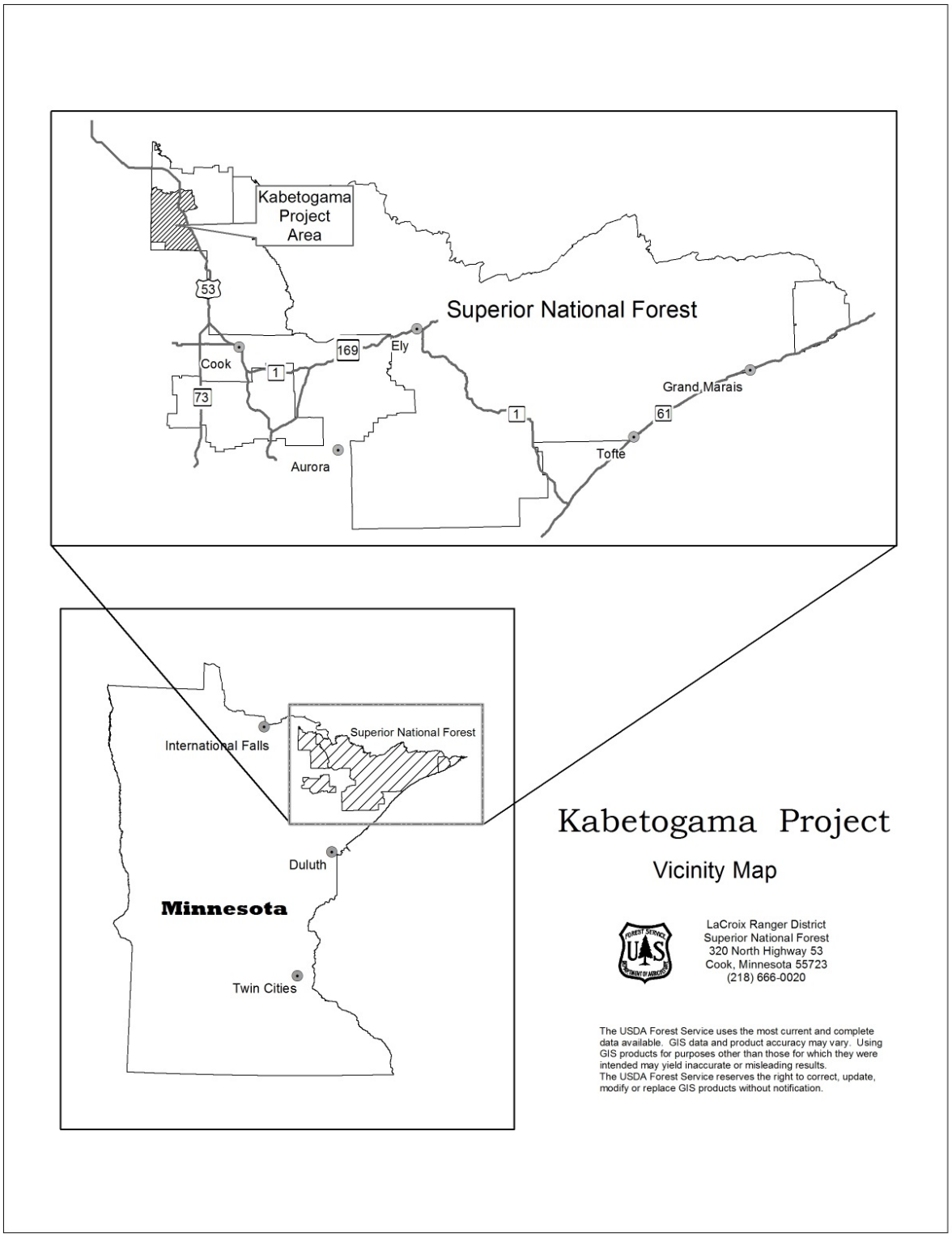
The key objectives of the Kabetogama Project are to promote diverse, productive, healthy, and resilient native vegetation communities; provide sustainable forest products; improve forest health and productivity; improve riparian area function; improve moose habitat; provide sources for gravel materials; and improve the Forest transportation system. These objectives are described further in this document.

What: Activities proposed to accomplish these objectives include harvesting (such as clearcut with reserves, coppice cut with reserves, seed tree cut with reserves, thinning or shelterwood prep cut) non-harvest treatments such as wildlife habitat improvement, release and riparian and other reforestation activities. Additional proposed activities include constructing and decommissioning temporary roads to access units and decommissioning roads no longer needed.

Where: The Kabetogama Project Area is located in St. Louis County, Minnesota. The Vicinity Map (Figure 1-1) shows the general location of the Kabetogama Project Area. Townships included in the project area, from west to east, are: Township (T) 68 North (N) Range (R) 21 West (W), R20W; T67N, R21W, R20W; T66N, R21W, R20W. The Kabetogama Project Area encompasses approximately 68,000 acres, of which about 22,000 acres are National Forest System land.

When: If a decision is made to implement these activities, they would begin in 2016. Given the large scale of the proposal and cost of restoration activities, implementation would be limited by available funding and resources in any given year. Implementation of the primary treatments would be expected to occur over ten years.

Figure 1-1: Kabetogama 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 1500-158) for implementing the National Environmental Policy Act (NEPA). The major sections of the EA are as follows:

- **Chapter 1: Purpose and Need.** This section 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 alternative, both of which are analyzed in detail in Chapter 3. 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.
- **Appendices**. The appendices provide more detailed information to support the analyses presented in the Environmental Assessment.

    Appendix A: Vegetation Treatment Descriptions and Unit Specific Design Criteria
    Appendix B: Proposed Treatments by Stand Unit for Alternative 2
    Appendix C: Operational Standards and Guidelines
    Appendix D: Monitoring Plan
    Appendix E: Past, Present and Reasonably Foreseeable Future Actions
    Appendix F: Response to Scoping Comments
    Appendix G: Economics
    Appendix H: Herbicide Proposal

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 Kabetogama Project Record and is available at the LaCroix Ranger District Office in Cook, 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 KABETOGAMA PROJECT AREA

MANAGEMENT AREAS

The Forest Plan divides the Superior National Forest outside the Boundary Water 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 Kabetogama Project Area is located completely in the Forest Plan Management Area (MA): General Forest (FP, pp. 3-5 to 3-8).

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 the General Forest 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. A full range of silvicultural practices are used when managing the vegetation. Natural disturbances to the landscape are mimicked through management activities such as timber harvest and management-ignited fires to prepare sites for regeneration of new forest and to reduce woody fuel that could cause wildfire (D-GF-5).

Also in the General Forest Management Area, larger patch sizes are emphasized, especially those patches associated with young, even-aged vegetative conditions. Aspen, red pine, spruce/fir, white pine, jack pine, lowland conifer, and a number of hardwood species occur in large amounts, depending upon the landscape ecosystem (D-GF-2). 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; the boundaries of these cut areas appear to follow natural landscape patterns (D-GF-1).

General Forest Management Areas emphasize land and resource conditions that provide a variety of goods, uses, and services. These include wood products, other commercial products, scenic quality, developed and dispersed recreation opportunities, and habitat for a diversity of terrestrial and aquatic wildlife and fish. Numerous roads open to public travel provide access to resources and roaded recreation opportunities. Non-motorized recreation opportunities also occur. Compared to the other management areas, the General Forest Management Area generally has the most amount of young forest and the largest sized timber harvest units.

These desired conditions for age class, composition, and diversity would begin to bring the ecosystem closer to the range of natural variability, increasing the resiliency of the forest. The assumption is that a forest closer to natural conditions is likely to be sustainable in an ecological sense, ensuring the long-term persistence of all components of the ecosystem and the functioning relationship among the components (Minnesota Forest Resource Council Northeast Landscape Management Plan, 2003). In addition, managing for resilient forests is one action that can be taken to enhance the ability of ecosystems to adapt to climate change and its effects. Forests that thrive under future conditions, as well as to meet goals for forest management (Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers, GTR NRS-87, 2012) were looked at by the Kabetogama interdisciplinary team. More information on climate change, see section 1.4.

LANDSCAPE ECOSYSTEM OBJECTIVES

The Forest Plan contains objectives for management of landscape ecosystems. 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. Management in each landscape ecosystem, based on the Forest Plan, 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. Management indicator habitats 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 management indicator habitats objectives is a key component of providing for the full diversity of desired wildlife habitats.

The predominant landscape ecosystems in the Kabetogama Project Area are the Mesic Birch/Aspen/Spruce-Fir (MBA) and Dry-Mesic Red and White Pine (DRW) (Figure 1-2 and Table 1-1). The following tables show the age class and composition of the Kabetogama Project Area as well as for the landscape ecosystem Forest-wide. The Kabetogama Project Area represents three percent of the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem and about four percent of the Dry-Mesic Red and White Pine Landscape Ecosystem. 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 Kabetogama contribute to meeting Forest-wide objectives based on opportunities in the specific area. Opportunities to move the existing condition of the Kabetogama Project Area closer to the desired conditions described in the Forest Plan were used to develop the Purpose and Need.

Figure 1-2: Landscape Ecosystems in the Kabetogama Project Area

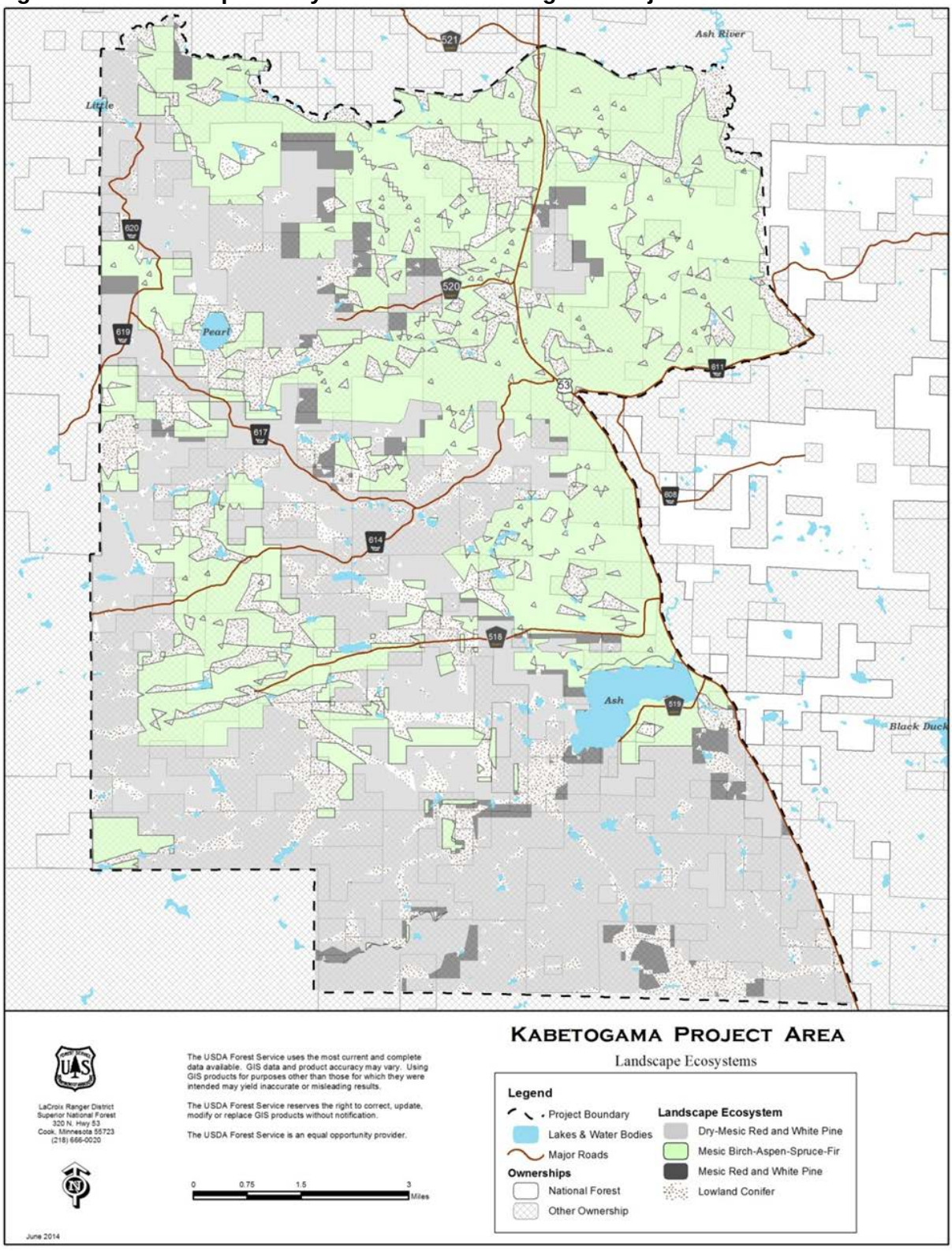


Table 1-1: Kabetogama Project Area Summarized by Landscape Ecosystems				
Landscape Ecosystem	**Acres**	**% of Project Area**	**% of Forest-wide Landscape Ecosystem**	**Young Age Class Acres**
Mesic Birch/Aspen/Spruce-Fir (MBA)	9,133	41	3	0
Dry-Mesic Red and White Pine (DRW)	8,331	38	4	0
Lowland Conifer B (LLC-B)	621	3	<1	0
Mesic Red and White Pine (MRW)	517	2	<1	0
Lowland Conifer A (LLC-A)	358	2	<1	0
Other*	3,059	14	N/A	N/A
TOTAL	**22,019**	**100**		

*Lowland Non-Forest (LNF), Lowland Hardwood (LHW), Upland Non-Forest (UNF), and Cedar

Data Source: Kabetogama Mid-level Report. These acres include only National Forest System land. Total may be slightly off due to rounding.

Table 1-2 compares vegetation composition of the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem in the Kabetogama Project Area with Forest-wide existing conditions in 2013 and Forest-wide objectives for 2020. There is less spruce-fir and more aspen in the Kabetogama Project Area compared to the landscape ecosystem Forest-wide. Table 1-3 compares age classes in the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem in the Kabetogama Project Area with Forest-wide existing conditions in 2013 and Forest-wide objectives in 2020.

Table 1-2: Vegetation Composition of the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem in the Kabetogama Project Area and Forest-wide				
Forest Type	**Kabetogama Project Area 2014 Existing Condition**		**Forest-wide 2013**	**Forest Plan Objective Decade 2 (2020)**
	Acres	**%**	**%**	**%**
Jack Pine	601	7	3	4
Red Pine	893	10	5	5
White Pine	313	3	3	4
Spruce-Fir	771	8	25	26
Northern Hardwoods	413	5	5	4
Aspen	5,840	64	45	42
Paper Birch	295	3	14	14
TOTAL	**9,126**	**100**	**100**	**100***

*Numbers may not total 100 percent due to rounding.

Table 1-3: Age Class Distribution of the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem in the Kabetogama Project Area and Forest-wide				
Forest Type	Kabetogama Project Area 2014 Existing Condition		Forest-wide 2013	Forest Plan Objective Decade 2 (2020)
	Acres	%	%	%
0-9	0	0	6	11
10-49	7,255	79	38	48
50-79	409	4	17	10
80-99	1,103	12	26	17
100+	359	4	13	14
TOTAL	**9,126**	**100**	**100**	**100***
*Numbers may not total 100 percent due to rounding.				

1.4 PURPOSE OF AND NEED FOR ACTION

An interdisciplinary team of natural resource specialists compared the existing condition of the Kabetogama Project Area with desired conditions and objectives in the Forest Plan. This analysis called the Kabetogama Mid-level Assessment, considered all resources (such as vegetation, recreation, wildlife, and watershed) 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.

There is a need to promote diverse, productive, healthy, and resilient native vegetation communities by moving towards landscape ecosystem and management indicator habitat objectives.

Forest Plan desired condition for vegetation across the forest is

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

A Forest Plan Objective for this resource is

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 (O-VG-1).

Disturbance is a natural and vital part of the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem and the Dry-Mesic Red and White Pine Landscape Ecosystem, the dominant landscape ecosystems in the Kabetogama Project Area. Historically these landscapes were heavily influenced by fire. In the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem, a 100-200 year fire rotation period was common. Following a stand replacement fire, the stand was rapidly colonized by aspen and birch. Low intensity surface fires were generally not present in this system. Eastern spruce budworm also played a role in stands dominated by balsam fir and white spruce. The overstory and understory were killed by budworm infestations. If the stand burned, succession reset to the aspen and birch dominated growth stages. If fire did not occur, the small balsam fir and spruce missed in the understory usually provided a seedling/sapling size stand that could continue to mature and ultimately became multi-aged.

In the Dry-Mesic Red and White Pine Landscape Ecosystem, a mixed severity fire regime occurred with a mix of surface and stand replacement fires. These fires were the primary method of regenerating the forest and influenced composition of tree species. Red and white pine trees survived most fires. Only the more severe crown fires likely killed all the red and white pine in an area, while surface fires acted to reduce ladder fuels and accumulations of fuel that would lead to more severe crown fires. In the Lowland Conifer Landscape Ecosystem, fire occurred between 150-300 years. The semi-closed cones of black spruce provided abundant seed after a stand replacement fire. Moreover, tamarack usually regenerates after a disturbance, is shade intolerant, and is typically present in this landscape ecosystem.

After European settlement, timber harvest replaced fire as the major disturbance agent that created young forest in northern Minnesota. Young forest or younger age class, provide habitat needs for wildlife species included moose and deer (young aspen/birch) and snowshoe hare (young conifer). 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 (0-9 years) objective is eleven percent for the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem and ten percent for Dry-Mesic Red and White Pine Landscape Ecosystem.

The desired condition for the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem is a forest dominated by aspen (42 percent), spruce/fir (26 percent), birch (14 percent), and with lesser amount of red pine (5 percent), jack pine, white pine, and northern hardwoods (4 percent). Within-stand structural and species diversity is desired, with increasing amounts of paper birch, white cedar, white spruce, white pine, tamarack, and red pine.

The desired condition for the Dry-Mesic Red and White Pine Landscape Ecosystem is a forest dominated by aspen (43 percent), red pine (13 percent), white pine (12 percent), spruce fir (12 percent), and with lesser amount of jack pine (10 percent), and birch (9 percent). Within-stand structural and species diversity is desired, with increasing amounts of white spruce, white cedar, jack pine, red pine, white pine, and tamarack within stands. Maintaining paper birch and black spruce at 2003 levels (base year of Forest Plan) is also desired.

Management indicator habitat objectives in both the Dry-Mesic Red and White Pine Landscape Ecosystem and the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystem are to increase the amount of young aspen-birch and jack pine forest.

In addition to containing objectives for landscape ecosystems, the Forest Plan also contains desired conditions for management areas. Management areas (MAs) are portions of the landscape with similar desired conditions, objectives, standards, and guidelines as outlined in the Forest Plan. Each management area has a unique theme that differs from that of neighboring management areas. Where landscape ecosystems direction provides vegetation objectives for forest type, forest age, and tree species diversity, the desired conditions for management areas describe what is desired socially and economically within a specific management area. Projects must reflect a blend of both management area and landscape ecosystem direction.

The Kabetogama Project Area is located completely in the General Forest Management Area. General Forest Management Areas emphasize land and resource conditions that provide a wide variety of goods, uses, and services. These include wood products, other commercial products, scenic quality, developed and dispersed recreation opportunities, and habitat for a diversity of terrestrial and aquatic wildlife and fish. Numerous roads open to public travel provide access to

resources and roaded recreation opportunities. Non-motorized recreation opportunities also occur. Compared to the other management areas, the General Forest Management Area has the most young forest and the largest sized timber harvest units.

Current conditions and need for change

Forested stands (on National Forest System lands) in the Kabetogama Project Area are a mix of aspen, paper birch, red pine, white pine, jack pine, spruce, and balsam fir. Forest types vary in age from 15 to 183 years old with zero acres in the young (less the 10 years old) age class. Some stands are healthy and vigorous while others show declining health. Those stands that are declining are doing so because of insect and disease, old age for the species (species such as aspen and birch are short-lived species that begin to decline and die around 60 years old), trees growing close together and competing with each other for water and light (such as red pine), or because the soils where these occur are better suited to growing different tree species. While declining trees do provide benefits and are an important part of the ecosystem, there is a need to improve health of some of these forest communities to maintain the overall health and resiliency of the project area and to maintain a healthy mix of forest types (composition) and ages.

Currently, the Kabetogama Project Area is not contributing young age class forest types toward the Forest-wide landscape ecosystem objectives (see Table 1-1). Actions are needed to create young age class that would provide wildlife habitat and a diverse functioning ecosystem. The Forest Plan directs the use of harvest as the primary stand replacement management tool. Management actions are also needed to maintain the desired composition of jack pine, white pine, paper birch and spruce/fir forest types which are all under-represented in the Dry-Mesic Red and White Pine and in the Mesic Birch/Aspen/Spruce-Fir Landscape Ecosystems (see Tables 1-2 and 1-3).

To move vegetation towards desired conditions, a number of management activities are proposed (see Table 1-4). Up to 2,255 acres of young forest would be created through even-aged timber harvest. These are primarily stands of older aspen, paper birch, jack pine, or black spruce. Most of these harvested stands would be allowed to regenerate naturally and become younger stands of their original forest type. About 1,455 acres of newly created young forest would receive secondary treatments (see Table 1-5) of site preparation and/or release.

This action also includes the maintenance and/or enhancement of older forest conditions. Up to 2,067 acres of thinning would occur in primarily red and white pine stands and 370 acres of shelterwood prep cut. The goal of these treatments is to reduce the density of stands leading to increased vigor of the remaining trees. In addition to using timber harvest as a tool to promote older forest conditions, a variety of non-harvest activities are also included. The goal of these treatments is to favor advanced regeneration of long-lived conifer reducing hardwood and brush competition. Activities include 119 acres of release.

Both secondary treatments are designed to favor conifer trees and reduce competition of hardwood or brush. Follow-up diversity planting of white pine, red pine, and white spruce would occur on 664 acres. Conversion, planting and/or seeding would occur on 474 acres.

There is a need to provide sustainable forest products

The Forest Plan desired condition is that

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 (D-TM-1).

And

Tree vegetation is present in amounts, distributions, and characteristics that allow contribution to a sustained yield of timber and pulpwood products (D-VG-4).

A Forest Plan Objective for this resource is

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 constructions (O-TM-1).

Vegetation management in the Kabetogama 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. Over 5,100 acres of forest within the Kabetogama Project Area have been identified as needing some type of treatment to create young age class or improve stand condition. Timber harvest on the suitable forestlands within the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

Figure 1-3: Timber Products from Previous Timber Sale.

There is a need to improve forest health and productivity

Forest Plan desired condition for vegetation across the forest is

Resource conditions minimize undesirable fire, insect, and disease outbreaks, when such events occur; healthy ecosystems are resilient and able to recover (D-ID-1).

A Forest Plan Objective for this resource is

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

Most red pine stands in the project area were established through planting. 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 and maintaining a high rate of growth. A high level of stand vigor reduces susceptibility to insect and disease outbreaks.

There is a need to improve riparian area function

The desired condition for riparian areas on the Superior National Forest is for riparian areas to serve as landscape connectors. Riparian areas, habitats, and associated vegetation 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. Plants are present at a variety of ages and sizes and at densities adequate to provide bank stability. Where suitable to the site, a multi-layered forest canopy is present in the riparian area, providing shade, leaf-litter, and coarse woody debris to lakes, stream, and wetlands. Some of these sites have an overstory of conifer that provides shade for aquatic and wetland ecosystems and thermal cover for wildlife. Super canopy trees provide nest sites for riparian associated species. Openings in riparian area vegetation resulting from road crossings, trails, campsites, water access, or other recreational uses, occur infrequently and result in minimal alterations of riparian ecological function (D-WS-10).

A Forest Plan Objective for this resource is

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 (O-WS-3).

A riparian area is the area of land along lakes, streams, and wetlands forming a transition from the aquatic ecosystem to the terrestrial ecosystem. There are two named lakes, several streams, and numerous ponds and wetlands in the Kabetogama Project Area with associated riparian areas.

The Kabetogama Project riparian areas exhibit limited erosion and generally contain diverse forest types and age. However, eleven areas including along Ash Lake and its tributaries, and other unnamed streams in the project area are suitable for riparian treatments based on stand type and age. The stands are comprised of quaking aspen or paper birch. These stands of older trees are beginning to die and are being replaced by balsam fir, red maple, and brush. There is a need to improve the condition of these riparian areas by maintaining and promoting long-lived species such as white pine and white spruce that contribute coarse woody debris to streams and lakes. The Kabetogama Project proposal includes up to 100 acres of riparian treatments. Herbicides would not be used in riparian areas.

There is a need to improve moose habitat for browse

The Forest Plan desired condition is that

Aquatic and terrestrial wildlife habitats of 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 (D-WL-2).

The Kabetogama Project Area is not within the primary moose range; however, some evidence of moose activity has been detected. Moose habitat, available in limited amount in the project area, could be improved by addressing the need to promote diverse, productive, and healthy native forest communities and improve riparian function as described above. With these improvements, several of the Minnesota Department of Natural Resources (DNR) habitat management recommendation would be implemented. The Kabetogama Project actions contain 664 acres of diversity planting of conifer that would increase stand complexity and provide long-term thermal cover for moose. Additionally, oak and/or blueberry habitat improvement treatment is proposed on 269 acres which is designed to open up canopy to favor oak and/or blueberry species. Timber harvest on 2,255 acres would create young forest which would provide additional browse for moose.

There is a need to improve the Forest transportation system

The Forest Plan desired conditions is that

The existing National Forest System roads that are suitable for passenger vehicles provide a safe and affordable system for administrative and public access to NFS land (D-TS-1).

And

The National Forest road system is the minimum needed to provide adequate access to both NFS and non-NFS land (D-TS-2).

And

The transportation system design considers environmental, social, and health concerns (D-TS-3).

A Forest Plan Objective for this resource is

Attempt to meet demand for special use activities when consistent with the Forest Plan direction and when the proposed use cannot be accommodated on non-NFS land (O-SU-2).

Forest system roads are maintained based on an Objective Maintenance Level (OML) designation that range from OML 1 to OML 5. In general, OML 1 roads are minimally maintained and developed and are generally two-track native surface routes; while at the opposite end of the spectrum, OML 5 routes are generally two-lane, paved routes suitable for passenger car travel. The Kabetogama Project Area contains both OML 1 and 2 roads.

The Kabetogama Project Area currently has generally good access throughout. However, there is a need to provide adequate access to conduct the proposed vegetation management in some locations. Approximately six miles of temporary roads on National Forest System land are proposed to meet this need. There is also an access need for long-term vegetation management and to federal lands was well as to allow access to other ownerships. The Kabetogama Project proposes to add 2.1 miles of roads to the transportation system (see Table 1.7). This would entail changing nine existing and presently unclassified roads to OML 1 or OML 2 to better reflect the intermittent nature of use.

Most roads in the project area cross multiple ownerships. There is a need to both obtain and grant right-of-way access for some of these segments with the appropriate landowner to ensure long-term access to National Forest System lands.

There is also a need to provide reasonable access across National Forest System land to a non-NFS landowner in one location. The Kabetogama Project proposes to allow one long-term special use authorization for the landowner to construct a less than one-tenth of a mile road to their land that is currently surrounded by federal land. This road would be added as a long-term special use permitted road.

There is a need to decommission roads or sections of roads that are no longer needed. The Kabetogama Project proposed to remove 1.4 miles of OML 1 or unclassified roads from the transportation system.

There is a need to provide gravel materials for local uses

The 2004 Superior National Forest Land and Resource Management Plan desired condition and for minerals are as follows:

Exploration and development of mineral and mineral material resources is allowed on National Forest System land, except for federally owned minerals in designated wilderness (BWCAW) and mining Protection Area (MPA) (D-MN-1).

And

Ensure that exploring, developing, and producing mineral material resources are conducted in an environmentally sound manner so that they may contribute to economic growth and national defense (D-MN-2).

There is a demand for sand and gravel from the existing pits within the project area. Most of the demand has been for large projects in and around the project area. Several large projects on Minnesota Trunk Highway 53 and the Neutrino Plant in Ash River have relied on mineral materials to complete projects. There is also demand for small volumes of material for construction, reconstruction, and maintenance of roads and trails. Additionally, there is some demand for small construction projects for the development of private land: septic systems and driveways. The demand for this type of material is less than 500 yards annually.

Existing sand and gravel resources are unlikely to prove adequate to meet demand over the next 10 years, so there is a need to provide availability of additional sand and gravel resources to meet this demand. Expansion of gravel pits in the project area is proposed to meet this demand.

PROPOSED ACTION

The interdisciplinary team identified potential actions to accomplish the purpose and need for the Kabetogama 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 Forte Bands of the Lake Superior Chippewa and large private landowners. The interdisciplinary team also consulted with, and reviewed data from, Minnesota Department of Natural Resources (MN DNR) personnel and St. Louis County. The focus of the discussions was to coordinate forest management activities that would occur across ownership boundaries and share data.

The Kabetogama Project EA analyzes the Proposed Action (Alternative 2) as described below.

A summary of the acres proposed of each treatment type are shown in Tables 1-4 through 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: Vegetation Management by Primary Treatment

Treatment Description	Acres
Create Young Forest with Harvest	**2,255**
Clearcut with Reserves	532
Coppice Cut with Reserves	1,366
Seed Tree Cut with Reserves	357
Maintain and/or Enhance Existing Forest with Harvest	**2,437**
Thinning	2,067
Shelterwood Prep Cut	370
Non-Harvest Treatments	**488**
Wildlife Oak-Blueberry	269
Release	119
Riparian	100
Total of all Primary Treatment Types	**5,180**

Table 1-5: Summary of Proposed Action: Vegetation Management by Secondary Treatments

Treatment Description	Acres
Post-harvest Treatment in Young Forest	**1,455**
Site Preparation	357
Release	1,098

Table 1-6: Summary of Proposed Action: Vegetation Management Reforestation

Treatment Description	Acres
Reforestation	
Natural Regeneration	1,282
Diversity Planting	664
Conversion, Planting and/or Seeding	474

Herbicide treatments could occur on units identified for ‘Create Young Forest with Harvest’ (except for lowland black spruce stands), and on units identified for ‘release’ treatments; this could total up to 2,249 acres. All herbicide treatments would be completed using hand application methods which target competing species. Herbicide treatments would occur in compliance with measures to avoid and minimize adverse effects as described in Appendix H Herbicide Proposal.

Table 1-7: Summary of Proposed Action: Transportation System Management				
Map Number	**Route Number**	**Present Class**	**Proposed Class**	**Miles**
Add to Transportation System				**2.1**
A1	U6207	Unclassified	OML 1	0.4
A2	U6618BA01	Unclassified	OML 2	<0.1
A3	U6618A01	Unclassified	OML 1	<0.1
A4	U6SC52001	Unclassified	OML 1	<0.1
A5	U6217	Unclassified	OML 1	0.4
A6	U6614BC01	Unclassified	OML 1	0.4
A7	U6614B05	Unclassified	OML 1	0.3
A8	U6614BB03	Unclassified	OML 1	0.4
A9	U661405	Unclassified	OML 1	<0.1
Add to Long-term Special Use				**<0.1**
S1	U6SC51802	na	Long-term Special Use	<0.1
Remove from Transportation System				**1.4**
D1	U6227	Unclassified	Decommission	<0.1
D2	637	OML 1	Decommission	0.8
D3	614HCA	OML 1	Decommission	0.2
D4	U6214	Unclassified	Decommission	0.3
D5	U6638A01	Unclassified	Decommission	<0.1

Temporary roads: Approximately six miles of temporary roads would be used to access some of the proposed treatment units. Final locations of all temporary roads will be identified during implementation. All temporary roads would be closed to motorized traffic and rehabilitated returning the encumbered lands to resource production at the end of the project related activities per Forest Plan direction (S-TS-3 and G-TS-16).

Gravel Pits: Twelve gravel pits are proposed for expansion. Gravel pits would be managed according to Pit Management Plans which include measures to avoid and minimize adverse effects.

Table 1-8: Gravel Pits in the Kabetogama Project Area				
Pit Name	**Current Size (Acres)**	**Potential Size (Acres)**	**Pit Type**	**Proposed 10-year Expansion (Acres)**
Arrowhead	0.4	1.18	Continuous	1.0
Ash Lake	0.35	1.27	Continuous	1.0
Ash River	0.1	0.5	Continuous	0.5
Black	0.5	1.4	Continuous	0.8
Cobble	0.14	4.5	Continuous	1.0
Cold Springs	0.38	3.0	Continuous	2.0

Table 1-8: Gravel Pits in the Kabetogama Project Area				
Pit Name	**Current Size (Acres)**	**Potential Size (Acres)**	**Pit Type**	**Proposed 10-year Expansion (Acres)**
Darby	0.2	0.77	Continuous	0.5
Deer	0.03	1.4	Continuous	0.5
Emily	0.17	6.0	Continuous	1.0
Gary	0.09	1.1	Continuous	0.5
Johnson Farm	0.8	5.0	Continuous	2.0
Kabetogama	0.6	4.5	Continuous	1.0
Kinmount	8.0	75.0	Continuous	35.0
Hill	0.4	1.1	Continuous	1.0
Coy	0	5.0	Continuous	0.5
Bab	0.3	10.0	Continuous	1.0
Popple	0.22	1.1	Continuous	1.0
Popular Bluff	0.38	40.0	Continuous	2.0
South Kinmount	0.25	72.0	Continuous	10.0
West Pearl	1.1	5.0	Continuous	3.0
Winter	0.2	4.0	Continuous	1.0

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 C.

Climate Change: This section summarizes the current state of knowledge regarding climate change impacts in the region, on the Superior National Forest, and on specific vegetation types within the Kabetogama Project Area.

No single project can develop a perfect plan to mitigate all the risks and uncertainty posed by climate change. However, there are incremental adjustments that can be made within an individual project or across an entire landscape to put the forest in a better position to adapt or tolerate climate change. The Kabetogama Project incorporated some adaptation actions (Forest Adaptation[1]) into the Proposed Action. Those adaptation actions were identified by the interdisciplinary team after taking deliberate steps to consider the best available information on observed and projected climate trends, as well as anticipated climate change impacts to forests.

[1] Adjustments, both planned and unplanned, in natural and human systems in response to climatic changes and subsequent effects. Ecosystem-based adaptation activities use a range of opportunities for sustainable management, conservation, and restoration.

The Kabetogama team worked closely with researchers from the Northern Institute of Applied Climate Science and utilized the two main sources of information in their work to consider climate change. First, the team considered the information in the Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers (Swanston and Janowiak 202, URL: http://www.treesearch.fs.fed.us/pubs/40543). This 2012 general technical report by the United States Department of Agriculture's Northern Research Station provided information, perspective, and tools for considering how to adapt forest ecosystems to a changing climate. It provided the interdisciplinary team a framework for considering the impacts of climate change to forests in the Kabetogama Project Area.

The second resource used by the team was the Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (http://www.treesearch.fs.fed.us/pubs/45939). This document provides an evaluation of key ecosystem vulnerabilities for forest ecosystems in the Laurentian Mixed Forest Province in Minnesota across a range of future climate scenarios. It provides information on potential future forest change based on model projections, published research, and local knowledge, and key stressors that contribute to the vulnerability of major forest systems. The team used this document to understand the major stressors and threats to forest ecosystems based on a range of climate scenarios. Then, the team considered site-specific conditions for the Kabetogama Project Area that could modify the general climate change projections, such as soils, management history, and topography.

With these resources the Kabetogama team developed a proposed action that includes climate change adaptation strategies and approaches. Table 1-9 summaries the synthesis and strategies for selected forest types in the Kabetogama Project Area.

Generally, in most climate change projections:

- Species such as quaking aspen, black spruce, balsam fir, and white spruce are likely to experience reduced suitable habitat and biomass across the assessment area.
- Species such as jack pine, red pine, and paper birch are less likely to experience reduced suitable habitat and biomass across the assessment area.
- Other species such as eastern white pine and red maple may experience increased suitable habitat and biomass across the assessment area.
- Many species currently common in northern Minnesota may decline under hotter, drier future climate scenarios.

We determined that many activities identified to move the forest towards the desired condition outlined in the Forest Plan would also be beneficial as climate change adaptation tactics. These "win-win" opportunities were preserved. Identified additions or slight adjustments made to the proposed action to improve adaptability of the forest are summarized in Table 1-9.

Table 1-9: Regional projections, local considerations, and adaptation actions applied to proposed action for selected forest types in the Kabetogama Project Area

Forest Type	Regional projections and Kabetogama Project Considerations	Adaptation action applied to the proposed action
Jack Pine	Jack pine comprises only a small portion of stands in the area, which makes maintaining it very important. The old jack pine in the project area has balsam fir, red maple, and brush common in the understory. These stands are old because they occupy sites not conducive to harvest operations and are thus difficult to regenerate. With little chance for fires to regenerate these stands in the future, they will convert to other non-desirable species. Jack pine is well suited to drier sites and conditions and might do well under future climate projections. Some of the younger (25-40 years old) planted jack pine stands are dense and susceptible to competitive stress which could be exacerbated under the climate projections. They also occupy some moist soil types.	In old jack pine stands: Regenerate stands adjacent to proposed regeneration harvests to improve economic feasibility using traditional harvest or service work. Plant pockets of white and red pine. In younger jack pine stands: Thin to reduce competitive stress and improve vigor Manage for jack pine across a range of wet and dry sites
Aspen/Paper Birch	Much of this area is well suited to aspen and paper birch given better soils than are typical on the rest of the Superior. Pure aspen stands are less resilient than mixed stands. Mixed stands in the project area tend to have a component of spruce-fir and/or white pine. White pine may be better suited to warmer, drier conditions than spruce/fir species. Paper birch is a common associate of aspen and can occur in mostly pure stands after fire or ground disturbance. Ensuring these associates of aspen are maintained is important in the context of projected climate change and to desired future conditions within the Forest Plan.	In aspen stands: Focus on off-site aspen for conversion to other forest types. Plant white spruce within aspen stands to retain aspen/spruce forest type for wildlife habitat. Leave scattered clumps of aspen for reserve islands within stands. Control competing vegetation in stands converted to spruce. Maintain paper birch as a forest type and as a component of aspen and spruce stands
White Pine	White pine stands in the area are on the poorer sites due to past harvest practices favoring aspen on better sites, which increases susceptibility to stress and doesn't distribute white pine across site types. Only 8 percent of stands are less than 80 years old, with no young stands and none 40-80 years old. It also occurs as a component in other forest types and is well distributed across the area. White pine blister rust is not a major issue in the project area. White pine germinates well in shade but will not recruit into the canopy without sufficient sunlight. It could be favored by reduced competition if other boreal conifers decline.	In white pine stands: Reduce density in mature stands to prepare them for future regeneration harvests, favoring strong trees for the long term. Favor white pine as a component in other forest types after harvest. Protect/promote advance regeneration in red pine thinning to provide diversity and a potential future stand.

1.5 DECISIONS TO BE MADE

Based on the purpose and need identified for the Kabetogama Project, the scope of the project includes decisions concerning activities such as vegetation management and related transportation system.

The LaCroix 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 and the use of ground-based herbicide application as a cost effective tool to manage competing vegetation.
- The amount and type of related transportation system and gravel material extraction activities.
- 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.

1.6 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 through internal and external scoping processes. Public comments were solicited from potentially interested parties through meetings and discussions with the MN DNR, St. Louis County land managers, timber industry, and other organizations and groups. A meeting was held with the project wildlife biologist and a MN DNR biologist to ensure the proposed actions were in line with their wildlife management objectives in the area. Interdisciplinary team members consisting of Forest Service employees evaluated the concerns and issues based on the public input received.

A record of issues evaluated, publics contacted, and comments received are documented in the project file at the LaCroix District Office in Cook, MN.

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

The Kabetogama Project was listed in the Superior Quarterly (a Schedule of Proposed Actions for the Superior National Forest) starting in July 2013. In July 2014, a scoping letter requesting comments was mailed to 344 individuals, groups, and agencies who either own land within or adjacent to the project area or who have expressed an interest in these types of projects. The scoping package was also available on the Superior National Forest web page at www.fs.usda.gov/goto/superior/projects under “Land and Resources Management” then “Projects.” We received 18 written and verbal responses from individuals, groups, and agencies.

Comments received from the scoping report were varied. LaCroix District Ranger Andrew K. Johnson reviewed the comments along with the interdisciplinary team during an August 13, 2014 team meeting. Some of the public comments were in agreement with the proposed actions, while others conflicted. During this meeting the team discussed the comments and the depth of analysis required to address them.

The interdisciplinary team placed comments into categories to determine the best way to address the comment. See Appendix F for disposition of scoping comments. Several issues raised in scoping comments were analyzed in the EA and two alternatives recommended in scoping comments were considered but not analyzed in detail. Review of scoping comments did not result in identification of additional alternatives to be analyzed in detail.

Tribal Consultation

When developing the proposed action, the interdisciplinary team collaborated with representatives and specialists from 1854 Treaty Authority, Fond du Lac Band, Bois Forte Band, and Grand Portage Band of Lake Superior Chippewa during the scoping comment period in July 2014. We received comments back from Bois Forte on the purpose and need and proposed action. Continued consultation and communication will occur regarding this issue and the rest of the NEPA process for the Kabetogama Project with the Bands.

Administrative Objections

The Kabetogama Project is an activity implementing a land management plan and is not authorized under the Healthy Forest Restoration Act; therefore, the Kabetogama Project decision is subject to objections following Forest Service regulations at 36 CFR 218, Subparts A and B. As defined at 36 CFR 218.2, those eligible to file an objection to the Kabetogama Project are only individuals or organizations who 1) submitted timely and specific written comments regarding the proposed project during the scoping period or 2) submit timely and specific written comments during the comment period on the Environmental Assessment. 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 describes how an adequate range of alternatives was developed for the Kabetogama 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 alternative 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 and District Ranger considered all scoping comments to determine if there were any unresolved conflicts about effects. No issues were raised for the Kabetogama Project from scoping that would necessitate the development of an alternative to analyze in detail. However, two scoping comments did suggest other alternatives and those alternatives were analyzed 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 Kabetogama Project Environmental Assessment analyzes the effects of one alternative briefly and then focuses detailed analyses on two 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 three alternatives present 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. Additionally, there would be no new temporary roads constructed to access these areas, nor would the special use authorizations to access

nonfederal ownership occur. Expansion of existing gravel pits would also not occur. Selection of this alternative would not preclude future management actions in the project area.

ALTERNATIVE 2 – PROPOSED ACTION

The proposed action, included in the July 2014 Scoping Report, was developed by the interdisciplinary team to meet the purpose and need for the Kabetogama Project.

Alternative 2 Proposed Action emphasizes use of management activities to promote diverse, productive, healthy, and resilient native forest communities by moving towards landscape ecosystem and management indicator habitat objectives; provide sustainable forest products; improve forest health and productivity; improve riparian area function; improve moose habitat for browse; provide sources for gravel materials; and improve the Forest transportation system.

Alternative 2 creates young age class to provide wildlife habitat and a diverse functioning ecosystem. This alternative would create young age class through harvesting primarily in older aspen, paper birch, jack pine, and black spruce stands. Natural regeneration would be allowed for most of these stands resulting in younger stands of their original forest type; while the remaining acres would receive reforestation treatments.

Under Alternative 2 thinning would occur in primarily red and white pine stands. The goal of these treatments is to reduce the density of stands leading to increased vigor of the remaining trees.

Alternative 2 would open up canopy to favor oak and/or blueberry species. Release treatments would aide desirable species and enhance the presence of long-lived conifer species through competition control. Riparian treatments are intended to establish and promote long-lived conifer species in hardwood stands along lakes and streams. Timber harvest would create young forest which would provide additional browse for moose.

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. Descriptions of treatment types can be found in Appendix A. 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. Reserve and legacy patches that would remain unharvested within units are also not included as these will be identified 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. Specifically:

- Figure 2-1, Alternative 2 Proposed Action Treatment Map displays the locations of the proposed treatments in the project area.
- Appendix A gives a definition for each of the treatment types and mitigation measures.
- Appendix B lists the specific treatments and mitigation measures proposed for each unit.
- Appendix C 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.

- Appendix D gives a description of monitoring activities that would occur under Alternative 2.
- Appendix H provides proposed herbicide application background, techniques and products, cost comparisons, mitigations and project design criteria.

Table 2-1: Summary of Proposed Action: Vegetation Management by Primary Treatment for Alternative 2

Primary Treatment Description	Unit Acres
Create Young Forest with Harvest	2,255
Clearcut with Reserves	532
Coppice Cut with Reserves	1,366
Seed Tree Cut with Reserves	357
Maintain and/or Enhance Forest with Harvest	2,437
Thinning	2,067
Shelterwood Prep Cut	370
Non-Harvest Treatments	488
Wildlife Oak-Blueberry	269
Release	119
Riparian	100
Total of all Treatment Types	**5,180**

Table 2-2: Summary of Proposed Action: Vegetation Management Secondary Treatments and Reforestation for Alternative 2

Treatment Description	Unit Acres[1]
Post-harvest Treatments in Young Forest	1,455
Site Preparation	357
Release	1,098
Reforestation	
Natural Regeneration	1,282
Diversity Planting	664
Conversion, Planting and/or Seeding	474

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

Herbicide treatments could occur on units identified for 'Create Young Forest with Harvest' (except for lowland black spruce stands), and on units identified for 'release' treatments; this could total up to 2,249 acres. All herbicide treatments would be completed using hand application methods which target competing species. Herbicide treatments would occur in compliance with measures to avoid and minimize adverse effects as described in Appendix H Herbicide Proposal.

Summary of Actions – Transportation (Including Special Use Authorization)

Temporary and permanent road access would be needed to accomplish proposed vegetation management activities and provide special use authorizations to access other ownership. Road access would be needed to harvest units in Alternative 2. As shown in Table 2-3, Alternative 2 would add OML 1 and OML 2 roads to the transportation system and remove unclassified and OML 1 roads from the transportation system. Approximately six miles of temporary roads would be used to access some of the proposed treatment units. All temporary roads would be decommissioned upon completion of proposed activities and access is no longer needed. Temporary road and decommissioning directions are provided in the Forest Plan (pp. 2-47 to 2-50).

Table 2-3: Summary of Proposed Action: Transportation System Management for Alternative 2

Proposed Action	Miles
Add as OML 1 or OML 2 road	2.1
Add to long-term special use	0.1
Remove from transportation system	1.4
Construction of temporary roads	6.0

*Note: OML stands for Objective Maintenance Level. The Forest Plan (p. Glossary 17-18) defines OML 1, 2 and 3 as well as OHV (off-highway vehicle).

Summary of Actions-Gravel Pits: Twelve gravel pits are proposed for expansion. Gravel pits would be managed according to Pit Management Plans which include measures to avoid and minimize adverse effects. See Section 3.11.7 for details.

2.4 ALTERNATIVE CONSIDERED AND NOT CARRIED FORWARD FOR DETAILED ANALYSIS

Some of the comments submitted by the public regarding the Proposed Action included suggestions for alternatives. Some of the public's suggested alternatives were already part of, or incorporated into, the design of the proposed action and the no action alternative. Other comments were considered outside the project's Purpose and Need or would not comply with Forest Plan direction or applicable environmental regulations. 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.

ALTERNATIVE A: CONSIDER AN ALTERNATIVE THAT RESTORES KAB FROM ITS CURRENT 60+ PERCENT ASPEN TO CLOSER TO THE FOREST-WIDE 43 PERCENT

Public comment suggested there should be an alternative that restores forest composition in the Kabetogama Project Area from its current greater than 60 percent aspen closer to the Forest-wide goal of 43 percent.

Forest Plan objectives are applicable to the entire Forest landscape, and therefore are not directly applicable to smaller project areas. However, management actions in project areas such as Kabetogama contribute to meeting the Forest-wide objectives based on opportunities in the specific area. Opportunities to move the existing condition of the Kabetogama Project Area closer to the desired condition were used to develop the Purpose and Need.

The Forest Plan desired condition for vegetation across the forest is to maintain *native vegetation communities that are diverse, productive, healthy and resilient (D-VG-1).* A Forest Plan objective to move toward that desired condition is *to 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 (O-VG-1).* As this pertains to aspen, the Forest Plan objectives seek a decrease in aspen forest type on a Forest-wide scale. A Kabetogama Project purpose and need to achieve that objective is to promote diverse, productive, healthy, and resilient native vegetation communities by moving towards landscape ecosystem and management indicator habitat objectives. The management actions as proposed in the action alternative for the Kabetogama Project would contribute to the Forest-wide reduction in aspen.

The interdisciplinary team identified the aspen stands where forest type conversion makes the most silvicultural and ecological sense within a realistic cost framework. Conversion of aspen to a different forest type is a costly activity. When the amount of forest type conversion that would be necessary to achieve 43 percent aspen forest in the Kabetogama Project Area is considered, the financial cost would not make such an alternative realistically possible. In addition, attempting to transition reduce aspen to 43 percent of forest types in the project area all at one time would be potentially in conflict with other Forest Plan standards and guidelines and have detrimental effects to wildlife. The additional large openings and patches created by such a volume of harvest would make managing for a diversity of structure, age, and spatial patterns (O-VG-1) difficult. However, as discussed above, the activities proposed in Alternative 2 would contribute towards the 43 percent objective Forest-wide. Additional discussion on Forest Plan aspen objectives is available in Chapter 1 and Chapter 3, section 3.2.4.

ALTERNATIVE B: DO NOT CONSTRUCT ANY NEW ROADS

Public comment requested an alternative where no new roads would be constructed in the Kabetogama Project.

The effects associated with temporary roads were already analyzed in the Forest Plan EIS and mitigation measures to avoid and minimize adverse effects associated with temporary roads are built into the Forest Plan. These measures are built into the Kabetogama Project. Further, if temporary roads were not constructed, this alternative would not meet the purpose and need as well since nearly all the proposed treatment units are reached by temporary roads.

It is recognized that there are potential impacts to resources from project implementation and in this case, water resources from temporary road construction and use. We have analyzed these impacts throughout the EA including an extensive list of mitigation measures and Operational Standards and Guidelines we employ to reduce these impacts which are located in Appendix C.

Per Forest Plan direction (FP, D-TS-1, p. 2-47), we strive to use the minimum road system necessary for our vegetation management projects. Approximately six miles of temporary road would be needed to implement project management activities for the Kabetogama Project and two miles of existing road that is currently unclassified would be added as system road for project and Forest use (Table 1-7, EA p.16).

Temporary roads would be closed until they can be effectively decommissioned. This could be immediately following a harvest for units with natural regeneration or several years after the harvest for those units receiving secondary and reforestation treatments (such as site preparation, planting, seeding, or prescribed burning). Closing a temporary road after harvesting and before

secondary treatments is done by using some type of barricade, typically a rock or soil berm. Refer to the Transportation section in the Forest Plan for more information (pp. 2-47 to 2-50).

Inventories in the project area for travel management planning projects identified a number of unclassified roads. These roads were put on a decommissioning schedule along with temporary roads tied to past vegetation projects. These roads and any temporary roads for the Kabetogama Project would be decommissioned.

2.5 COMPARISON OF ALTERNATIVES CONSIDERED IN DETAIL

COMPARISON OF ACRES OF PROPOSED TREATMENTS

The following tables allow for a comparison of acres proposed for treatment in the two alternatives. Table 2.4 shows the acres of the proposed primary treatments, Table 2.5 shows secondary treatments, and Table 2.6 shows proposed transportation management activities.

Table 2-4: Comparison of Primary Treatments and Acres Proposed for Alternative 1 and Alternative 2

Primary Treatment Description	Alternative 1 Proposed Unit Acres	Alternative 2 Proposed Unit Acres[1]
Create Young Forest with Harvest	0	2,255
Clearcut with Reserves	0	532
Coppice Cut with Reserves	0	1,366
Seed Tree Cut with Reserves	0	357
Maintain and/or Enhance Forest with Harvest	0	2,437
Thinning	0	2,067
Shelterwood Prep Cut	0	370
Non-Harvest Treatments	0	488
Wildlife Oak-Blueberry	0	269
Release	0	119
Riparian	0	100
Total of all Treatment Types	**0**	**5,180**

[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.

Table 2-5: Summary of Proposed Action: Vegetation Management Secondary Treatments and Reforestation for Alternative 1 and Alternative 2		
Treatment Description	**Alternative 1 Proposed Unit Acres**	**Alternative 2 Proposed Unit Acres[1]**
Post-harvest Treatments in Young Forest	0	1,455
Site Preparation	0	357
Release	0	1,098
Reforestation		
Natural Regeneration	0	1,282
Diversity Planting	0	664
Conversion, Planting and/or Seeding	0	474
[1] Acres are for the total unit; treatment acres would be less.		

Table 2-6: Summary Of Proposed Action: Transportation System Management For Alternative 1 And Alternative 2		
Proposed Action	**Alternative 1 Proposed Miles**	**Alternative 2 Proposed Miles**
Add as OML 1or OML 2 Road	0	2.1
Add To Long-Term Special Use	0	0.1
Remove From Transportation System	0	1.4
Construction Of Temporary Roads	0	6.0
*Note: OML stands for Objective Maintenance Level. The Forest Plan (p. Glossary 17-18) defines OML 1, 2 and 3 as well as OHV (off-highway vehicle).		

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, and cumulative effects, see Chapter 3 and relevant appendices.

VEGETATION COMPOSITION

Under Alternative 1, natural processes would continue and there would be no new management of the vegetation. Also, no young forest occurs or would occur in the Mesic Birch/Aspen/Spruce-Fir and Dry-Mesic Red and White Pine Landscape Ecosystems in the Kabetogama Project Area. Natural succession would move some stands to the next age class category but no young stands would be created. With no young stands (0-9 age class), subsequently no stands would transition from 0-9 age class to 10-49 age class. Within-stand diversity would increase overall; however, lack of fire and disturbance would allow balsam fire or red maple to dominate the area. Both are short-lived species and susceptible to insect and

diseases. In conclusion, in many cases Forest Plan objectives to decrease certain species such as aspen, balsam fir, and northern hardwoods (especially red maple) and increase species such as red pine, jack pine, paper birch, tamarack, and white cedar would not occur under the No-Action Alternative.

Under Alternative 2, vegetation management activities would occur and would move the vegetation toward desired objectives for age class, composition, and within-stand diversity. Vegetation management activities include harvest, planting, burning, herbicide application for area and single tree release, and mechanical site preparation. The action alternative offers a change in forest type, increasing certain forest types to meet Forest Plan objectives; however, the bulk of the treatments would maintain forest type but move mature and old forest into the youngest age class. There would be 2,128 acres of young age class under Alternative 2 to provide wildlife habitat and a diverse functioning ecosystem. This alternative would create young age class through harvesting primarily in older aspen, paper birch, jack pine, and black spruce stands. Natural regeneration would be allowed for most of these stands resulting in younger stands of their original forest type.

Within-stand diversity of tree species would increase under Alternative 2 favoring species other than aspen in aspen dominated stands and reducing less desirable species such as balsam fir and red maple in many forest types. A mix of silvicultural practices would be employed to improve species diversity in stands.

THREATENED AND ENDANGERED SPECIES

Neither Alternative 1 nor Alternative 2 is likely to adversely affect Canada lynx and gray wolf, nor would destroy or adversely modify critical habitat for these species. Under both alternatives, forest conditions would continue to provide for lynx denning, foraging, and movement across the analysis area. Additionally, neither alternative would result in jeopardy to the continued existence of the northern long-eared bat.

Alternative 1 would have no effect on Canada lynx, gray wolf, and their critical habitat. Alternative 2 may affect, but is not likely to adversely affect these species or modify critical habitat, and effects are expected to be beneficial or discountable. Under both alternatives, forest conditions would continue to provide for denning, foraging, and movement of these species across the analysis area.

Neither Alternative 1 nor Alternative 2 is likely to jeopardize the existence of the northern long-eared bat. Alternative 2 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 Alternative 2 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 may impact individuals but is not likely to cause a trend to federal listing or loss of viability for aquatic species and habitats present in the project area. See the Aquatic Biological Evaluation for more information.

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. Alternative 2 proposed activities would have no impact on Freija's grizzled skipper or wood turtle. The proposed activities in Alternative 2 may impact individuals but are not likely to cause a trend toward federal listing or loss of viability for the little brown myotis, tri-colored bat, heather vole, bald eagle, northern goshawk, boreal owl, great gray owl, olive-sided flycatcher, bay-breasted warbler, Connecticut warbler, American three-toed woodpecker, taiga alpine butterfly, and Nabokov's blue butterfly. See the Terrestrial BE for more information.

Plant Species: Alternative 1 may impact five Regional Forester Sensitive 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 Regional Forester Sensitive Species plants would be directly, indirectly, or cumulatively impacted by Alternative 1. Alternative 2 may impact 34 Regional Forester Sensitive Species 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 Regional Forester Sensitive Species plants would be directly, indirectly, or cumulatively impacted by Alternative 2.

NON-NATIVE INVASIVE PLANTS

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 approximately 3.5 miles of upland temporary roads. There would be a low risk of impacts from weed spread tied to road construction. Approximately 154 acres of vegetation treatment units would occur within 50 feet of an inventoried non-native invasive plant occurrence in Alternative 2. There is a risk that non-native invasive plant occurrences near a treatment unit could spread to the unit as a result of ground disturbance associated with the treatment. The risk of spread would be minimized by an operational standard and guideline that specifies treatment of known infestations prior to vegetation management activities. 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 non-native invasive plant spread due to management activities.

Herbicide use for releasing desirable tree species from competition proposed under Alternative 2 has a very low risk of causing an increase of non-native invasive plants. These proposed treatments would be spot applications centered on the target tree or shrub species. They would involve no ground disturbance, so for that reason there is little risk of spreading non-native invasive plants.

WATER RESOURCES

Alternative 1 would have no direct effect to water quality because there would be neither an increase in road miles nor an increase in the percentage of watersheds in a young or open condition. Impacts to water quality would be minimal under Alternative 2 because Minnesota Forest Resource Council Guidelines, Forest Service Operational Standards and Guidelines, and site specific mitigation measures would be followed during implementation.

SOIL PRODUCTIVITY AND WETLANDS

Alternative 1 would have no direct effects on soils productivity because no soil disturbing activities would take place as a result of this alternative. Vegetation and road management activities proposed in Alternative 2 would result in minimal impacts to the soil resource; appropriate mitigation measures and operational standards and guidelines would be followed during implementation to reduce effects of soil resources. Actions taken to decommission existing roads in Alternative 2 would eliminate impacts caused by their current use, returning those areas of land to a productive status.

TREATY RIGHTS

Alternative 1-No Action would not be responsive to tribal interests such as improving moose habitat, maintaining or increasing Forest access, or planting long-lived conifer species in riparian areas and adjacent to wild rice lakes.

Under Alternative 2, moose habitat and browse would increase by implementing harvest activities creating young stands. Oak and/or blueberry species would be favored on 269 acres that regenerates oak and blueberry and increases mast production for a variety of wildlife species. Additional heritage resource surveys would be conducted in the project area if this alternative is selected.

BOUNDARY WATERS CANOE AREA WILDERNESS (BWCAW)

Alternative 1 would have no impacts to the Boundary Waters Canoe Area Wilderness. Alternative 2 would have no impacts to the BWCAW due to the distance between the project area and the BWCAW. The Kabetogama Project boundary is approximately 19.5 miles from the BWCAW at its closest point; however, the closest proposed treatment is approximately 20.5 miles from the BWCAW. Existing conditions would remain unchanged and impacts to wilderness visitors in the form of sound from roads, vegetation management activities, and other sources outside the BWCAW would continue to exist in their current state.

2.6 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). The acres listed are based on the acres in our vegetation database for each unit proposed for treatment. Acres that would actually be treated are likely be less because of further refinement of stand boundaries and operable areas during implementation.

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 Mesic Birch/Aspen/Spruce Fir 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 more stands. Alternative 1 would also not create any young forest. Stands within the project area are not at the age where they would transition to younger stands through natural succession. Alternative 2 would create up to 2,255 acres of young forest in primarily older aspen, paper birch, jack pine, or black spruce stands. Most of these harvested stands would be allowed to regenerate naturally and become younger stands of their original forest type. About 1,455 acres

of newly created young forest would receive secondary treatments of site preparation and/or release. Site preparation prepares an area for regeneration and reduces competition from brush and undesirable tree species currently on site. Release frees young trees from undesirable, competing vegetation.

Within-stand structural and species diversity is desired, with increasing amounts of red pine, jack pine, paper birch, tamarack, and white cedar as a component in stands. Under Alternative 1, within-stand diversity would increase overall. However, in many cases Forest Plan objectives to decrease certain species such as aspen, balsam fir, and northern hardwoods (especially red maple) and increase species such as red pine, jack pine, paper birch, tamarack, and white cedar would not occur. Alternative 2 would increase within-stand diversity on 664 acres.

The intent of treatments in the Kabetogama Project is to increase within-stand diversity by favoring species other than aspen in aspen dominated stands and reducing less desirable species such as balsam fir and red maple in many forest types. Both balsam fir and red maple are shade tolerant and able to thrive in a wide variety of environmental conditions, so they tend to dominate the midstory and understory of stands in the project area. Historically, fire would have kept their numbers in check and promoted the presence of other species such as red, jack, and white pine, aspen and paper birch, resulting in a diverse mix of tree species. Harvests with secondary treatments such as release of both natural and artificial regeneration, as well as non-harvest treatments to existing stands, are practical surrogates for a natural fire regime given the difficulty of implementing natural or prescribed fire at the scale necessary to move toward Forest Plan objectives. As an example, naturally regenerated aspen stands typically have other desirable species regenerating naturally as well, including white pine and white spruce. A release of those naturally occurring seedlings, whether through mechanical or chemical means (depending on the site), is an effective way to increase within-stand diversity without the added cost of site preparation and/or planting. If not released, many of those natural seedlings will be overtaken by aspen and die, requiring added cost to reintroduce that species diversity.

Restore Native Vegetation Communities

Alternative 1 would not treat any area in the Kabetogama Project Area. As the forest continues to age, succession would move some stands towards a spruce-fir forest. However, key species such as aspen, paper birch, and jack pine would continue to decline. In addition, stands with young rotation ages, such as aspen and jack pine are succeeding to balsam fir and brush in the absence of disturbance. The loss of these components of the native vegetation communities might reduce the resiliency of the forest and further compound the effects of climate change.

Activities in Alternative 2 would increase or maintain key tree species of native vegetation communities including increasing jack pine, red pine, and paper birch and maintaining white pine. Actions with this alternative would increase the amount of young acres with harvest, which is in line with Forest Plan desired conditions for the project's landscape ecosystems. Activities would also increase within-stand diversity with planting and seeding to help restore units to conditions more typical of native vegetative communities. Primary activities would release 76 acres and plant 100 acres in riparian stands. Secondary treatments would release 1,098 acres and diversity plant 664 acres and conversion plant and/or seed 286 acres.

Provide Sustainable Forest Products

Alternative 1 would not provide timber products from this area at this time; however, it would not preclude providing timber products in the future. Vegetation management has the potential to provide wood products for businesses and mills in northern Minnesota as directed by the Forest Plan. Treatments designed to meet other project objectives could be accomplished through the sale of marketable wood products, including tops of trees for biomass. Alternative 2 identifies approximately 5,100 acres of forest within the Kabetogama Project Area as needing some type of treatment to create young forest and improve stand condition with harvesting. Approximately 90 percent of these acres are suitable (correct age, basal area, etc.) for commercial timber harvest. Timber harvest on the suitable forestlands within the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

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, Alternative 2 would thin red pine stands. Thinning would increase growth rates and make trees more resistant to insects and diseases.

Improve Riparian Function

Alternative 1 would not maintain or promote long-lived conifers in riparian areas. Conditions would continue as they are and most likely become dominated by balsam fir and brush where species such as aspen, birch, and jack pine dominate.

Alternative 2 proposes to improve riparian areas by promoting and maintaining long-lived conifer species on 100 acres. Activities would include brushing understory to favor desirable species such as white pine or white spruce. Any harvesting activities planned adjacent to a water body would be done so only to improve riparian function and would follow Forest Plan and Minnesota Forest Resources Council Guidelines. Herbicides would not be used in riparian areas.

Improve Moose Habitat for Browse

Alternative 1 proposes no management activities; therefore, it would do less than the other alternative to create forage for moose. Approximately zero percent of the existing landscape is young forest, resulting primarily from the lack of disturbance in the last 10 years. Without management actions or natural disturbance events, foraging habitat is expected to remain under represented.

Alternative 2 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, 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.

Natural tree regeneration is planned for approximately 1,200 acres in Alternative 2. Regeneration would be dominated primarily by quaking aspen but would also include aspen-white spruce/balsam fir, black spruce, jack pine, bigtooth aspen, paper birch, and upland black spruce. Thermal cover would continue to be available to moose under both alternatives.

Diversity planting of conifer is planned on 664 acres to increase stand complexity and provide long-term thermal cover for moose. Habitat improvements on 269 acres would open up the canopy to increase oak and/or blueberry species favored by a variety of wildlife species.

Improve Forest Transportation System

The Kabetogama Project Area needs to provide adequate access to conduct the proposed vegetation management in some locations. Approximately six miles of temporary roads on National Forest System land are proposed to meet this need. There is also an access need for long-term vegetation management and to federal lands as well as to allow access to other ownerships. The Kabetogama Project proposes to add 2.1 miles of roads to the transportation system (see Table 2-6). This would entail changing nine presently unclassified roads to OML 1 or OML 2 to better reflect the intermittent nature of use.

Most roads in the project area cross multiple ownerships. There is a need to both obtain and grant right-of-way access for some of these segments with the appropriate landowners to ensure long-term access to National Forest System lands. There is also a need to provide reasonable access across National Forest System land to a non-NFS landowner in one location. The Kabetogama Project proposes to allow one long-term special use authorization for the landowner to construct a less than one-tenth of a mile road to their land that is currently land locked by federal land. This road would be added as a long-term special use permitted road. There is a need to decommission roads or sections of roads that are no longer needed. The Kabetogama Project proposes to remove 1.4 miles of OML 1 or unclassified roads from the transportation system.

Alternative 1 would not meet the purpose and need to provide access to landowners or for resource management, or to decommission unneeded roads. Alternative 2 would meet the purpose and need by providing access to landowners or for resource management, and to decommission unneeded roads.

Provide gravel materials for local uses

Alternative 1 would not allow for the expansion of existing gravel pits in the project area limiting the supply of gravel mineral materials in the general area for both public and private uses. As such, Alternative 1 would not meet the purpose and need of providing gravel materials.

Alternative 2 would allow the expansion of existing gravel pits in the project area, allowing for additional gravel mineral materials in the general area for both public and private uses; meeting the purpose and need.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter presents elements of the environment that could be affected by treatment activities. The "Affected Environment" portion of each section below describes the current condition of the issue indicators, trends relative to their status, and parts of the indicators that could be impacted by alternatives. The "Environmental Consequences" portion of each section below describes the direct, indirect, and cumulative effects of the alternatives.

Environmental effects are the consequences of implementing an alternative on the physical, biological, social, and economic environment. Three levels of effects will be discussed for each indicator:

- 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, that is, occur in a different place.
- Cumulative effects result from the incremental impacts of actions when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such further action. These actions are described in Appendix E. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

The interdisciplinary team examined and analyzed data to estimate the effects of each alternative. The data and level of analysis were commensurate with the importance of the possible impacts (40 CFR 1502.15). Effects are quantified where possible, although qualitative discussions may also be included. Acreage figures are estimates based on information from the Superior National Forest geographic information system database. The accuracy of the estimated acreage is sufficient for the analysis.

Data used for vegetation analysis are from the Forest Service Vegetation Spatial Database (FSVEG Spatial), the Superior National Forest database for stand information. The database includes information such as forest type and age. The database is continually updated when treatments that change stand characteristics, such as harvest, occur. Data from FSVEG Spatial was extracted in 2014 and used for this analysis.

The interdisciplinary team is aware of possible inaccuracies and limitations of the data. The forest vegetation is highly variable and constantly changing and not all stand data may be current. However, the interdisciplinary team concluded it is the best available forest information and is adequate for analysis and drawing conclusions. Additional data and accuracy would add precision to estimates and would be utilized if available.

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

3.2 VEGETATION

3.2.1 INTRODUCTION

The Forest Plan describes desired resource conditions for vegetation and guides natural resource management activities. These desired conditions include: having diverse, productive, healthy, and resilient native vegetation communities; vegetation present in amounts, distributions, and characteristics representative of the range of conditions resulting from natural disturbance; and will contribute to a sustained yield of timber and pulpwood products. Forest Plan objectives are used to help move the Forest toward the desired conditions. This vegetation section discusses effects each alternative is expected to have on vegetation composition, structure, age, and spatial patterns. Effects are described in the context of landscape ecosystems (LE) developed during Forest Plan revision. These LEs are "…characterized by 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." (Forest Plan, p. 2-55) Objectives for LEs are on pages 2-55 to 2-78 of the Forest Plan. See Chapter 1 section 1.3 of this document for information on LEs within the project area.

The Kabetogama Project is borne from the need to move vegetation characteristics toward desired conditions outlined in the Forest Plan, based on the midlevel analysis completed in 2013 considering existing conditions within the project area and across the Forest. Vegetation management activities within the action alternative (Alternative 2) follow Forest Plan direction to achieve the objectives using timber harvest, natural and artificial regeneration, tree release, and prescribed fire. Natural succession would also be used to meet objectives.

The interdisciplinary team (IDT) developed the proposed action after reviewing all stands within the project area. The IDT used a multi-step process to determine which activities for a particular stand would best meet objectives. The first step considered landscape-scale spatial patterns as a coarse filter, including current (2014) and projected future (2020) large upland patches and Management Indicator Habitats (MIH). This step focused on maintaining large mature patches when those patches contributed high quality interior forest, and regenerating large patches when they were comprised of short lived species, such as aspen, where the interior forest has been lost or is expected to be lost in the short term (within 10-20 years) due to stand age. When stands of short lived species reach the old age classes (60-70 years depending on forest type), overstory trees begin dying and reducing canopy cover. In turn, this reduces the quality of interior forest for those species requiring it. The second step considered multiple factors at the stand scale, including stand age and forest type, tree density, tree species diversity, stand structural diversity, dominant ecological land type, terrain, and access. A third step considered special attributes typically at the sub-stand scale, called inclusions, such as riparian or mast producing areas. Lastly, an integral part of the process was considering potential effects of climate change. While the future climate is still unknown, promoting diverse, healthy, and productive forests should maintain resiliency as they face a changing climate. See Chapter 1 for more information on climate change considerations. All of these factors informed the recommendations regarding optimal treatments to move toward stated objectives. See Appendix A and B for more detailed information on vegetation management activities at the stand level.

3.2.2 ANALYSIS METHODS

The effects analysis for the vegetation resource is tiered to the Forest Plan Environmental Impact Statement (EIS). The Forest Plan EIS considered the role of disturbance, the range of natural variability, ecological classifications, and landscape ecosystems. The Forest Plan EIS disclosed the effects of implementing Forest-wide objectives while the Kabetogama Project effects analysis discloses how each alternative would specifically move the project area toward those objectives and desired future conditions. This document does not repeat the analysis documented in the Forest Plan EIS (Forest Plan EIS pp. 3.1-20 - 3.2-49).

The Forest Plan provides four specific measurable objectives for each LE. These objectives focus on species composition, age class distribution, Management Indicator Habitats (MIH), and within-stand diversity for each LE. Since these objectives are quantifiable they provide a good way to compare how the alternatives would move each LE toward Forest Plan desired conditions. Vegetation composition, age class distribution, and within-stand diversity will serve as indicators for analyzing effects on the vegetation resources. MIH is discussed in section 3.8 of this document.

Indicator 1: Vegetation composition

This indicator describes the change in forest type as a result of implementing each alternative in the project area. Some management activities would change a stand's future forest type. Succession and natural disturbance may also change a stand's forest type. This indicator highlights the differences between alternatives because proposed management activities would produce varying levels of forest types over time.

Indicator 2: Age class distribution

This indicator describes the change in age class distribution as a result of implementing each alternative in the project area. This indicator highlights differences between alternatives because proposed management activities would produce varying amounts of forest ages over time. The amount of forest in different age classes may also have direct implications on wildlife habitat, old age classes, and forest products.

Indicator 3: Within-stand diversity

This indicator describes the change in within-stand diversity as a result of implementing each alternative. This indicator highlights differences between alternatives because different treatment methods would result in different effects to within-stand diversity. For this analysis, within-stand diversity refers to both overall structure and species diversity. Vertical structure is the bottom to top configuration of above ground vegetation within a forested stand and varies with forest type and ages. Stand complexity changes markedly during forest succession, from a relatively simple structure in early-successional stands to more complex structures displayed as stands age (Forest Plan EIS, p. 3.2-33).

3.2.3 ANALYSIS AREA

The analysis area for direct and indirect effects is National Forest System (NFS) land within the Kabetogama Project boundary. The analysis area includes only that portion of the LEs found in the project area even though each LE extends beyond the Kabetogama Project boundary. This analysis area was chosen because it shows how the actions would help to meet the objectives of

the Forest Plan for each particular LE and would disclose the effects on vegetation within those LEs. While LEs span across the entire Superior National Forest, proposed actions for this project are limited to the Kabetogama Project boundary; however, effects of those actions will be reflected for the entire LE.

The Kabetogama Project boundary is used as the boundary for cumulative effects analysis. This area considers all known activities across all ownerships within the Kabetogama Project. This analysis area was chosen because it includes the known activities of other owners within the same project boundary.

The time period selected for the direct, indirect, and cumulative effects analysis is six years into the future. Data used to establish the existing condition is from 2014, which would mean the analysis period would go to 2020. This timeline was chosen because six years is a sufficient amount of time for proposed actions from this project to be implemented and analyze the changes to the age class and species composition. Using six years as a timeline also allows for comparison to Forest Plan goals and objectives for LEs, as 2020 is over the halfway point towards achieving Decade two objectives outlined in the Plan.

Since the existing condition is a very reliable snapshot of past cumulative effects on forest types and age class, the forest type and age class distribution of the project area in the year 2014 would reflect all prior commercial harvests and stand replacement natural disturbances. Thus, this cumulative past as described by the existing condition is well represented under all the alternatives.

3.2.4 AFFECTED ENVIRONMENT

The existing forest is the 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 project area.

Each LE within the project area has specific objectives for species composition, age class distribution, and tree species diversity within individual stands. The Forest Plan established these objectives by considering both the historic composition and structure of the forest as well as the desired future condition.

Vegetation Composition

Each forest stand is identified by a forest type. Vegetation or species composition refers to the different forest types such as jack pine, red pine, aspen, and more. Forested stands in the Kabetogama Project Area are a mix of species. The Forest Plan EIS (USDA Forest Service 2004b) describes some of the limitations in forest typing, recognizing that most forest types are more diverse in species composition than is indicated by their type. For example, many stands identified as aspen actually contain multiple species such as paper birch, white spruce, or jack pine, and may also contain inclusions of lowlands with black spruce or black ash. Forest types are established based on available data and the professional judgment of foresters and silviculturists.

Tables 3.2-1 and 3.2-2 provide both Forest wide and project area vegetation composition information. The first set of numbers shows the percent of each forest type Forest wide. Percentages are shown for the existing condition, the projected condition in 2020 (assumes implementation of Kabetogama Alternative 2), and Forest Plan objectives for Decade two. The second set of numbers is specific to the Kabetogama Project Area. The numbers show the breakdown of forest type by acres and include the existing condition, Alternative 1(no action), and Alternative 2 (the action alternative). The tables show this breakdown for the two dominant LEs that were analyzed for vegetation composition. The lowland LE vegetation composition objectives listed in the Forest Plan are to maintain the current vegetation composition. As such, vegetation compositions for those LEs are not presented here as there would be no change from the existing condition (refer to SNF Forest Plan, p. 2-76, Table LLC-1).

Table 3.2-1 shows the existing condition for the Mesic Birch/Aspen/Spruce-Fir (MBA) LE. The aspen forest type currently dominates making up 45 percent of the LE, followed by spruce-fir at 24 percent. Forest Plan objectives seek a decrease in aspen forest type and an increase in spruce-fir. The next largest component is paper birch, which is at Forest Plan objective. The smaller components are also very close to objectives; however, jack pine and white pine forest types are slightly below Forest Plan objectives and the northern hardwood forest type is slightly above Forest Plan objective. This table also shows that the projected condition in 2020 for aspen forest type will be at the desired objectives based on projects implemented through 2020 and natural succession, a decrease from the current condition. The spruce-fir forest types will be increasing beyond desired conditions due to treatment as well as inactivity as older aspen stands transition to a spruce-fir forest type. Other forest types will have little change, but the paper birch forest type will decrease due to age and converting to spruce-fir.

Table 3.2-1: Vegetation Composition within the Mesic Birch/Aspen/Spruce-Fir LE

Upland Forest Type	Forest-wide (Percentages)[1]			Kabetogama Project Area (Acres)		
	Existing Condition (2014)	Projected Condition (2020)	Objectives for Decade 2[2]	Existing Condition (2013)	Alt 1 (2020)	Alt 2 (2020)
Jack Pine	3	3	4	601	601	625
Red Pine	5	5	5	893	893	893
White Pine	3	3	4	313	313	313
Spruce-Fir	24	29	26	771	771	771
Northern Hardwoods	5	5	4	413	413	413
Aspen	45	42	42	5,840	5840	5816
Paper Birch	14	13	14	295	295	295
Total	**99***	**100**	**99***	**9,126**	**9,126**	**9,126**

1 Percent of NFS land in the Mesic Birch/Aspen/Spruce-Fir LE
2 Superior National Forest, Forest Plan, Page 2-70, Table MBA-1
*Totals may vary slightly due to rounding.

Table 3.2-2 shows the vegetation composition in the Dry-Mesic Red and White Pine LE. Again, aspen forest type dominates the LE at 51 percent of total acres. Most other forest types are between 8 and 13 percent of total acres, except northern hardwoods at one percent. As the table shows, aspen forest type is above Forest Plan objectives by eight percent, and spruce-fir is below

objective by five percent. All other forest types are very close to Forest Plan objectives, with jack pine, white pine, and paper birch being one percent below objectives; while red pine and northern hardwoods currently meet objectives. Both aspen and spruce-fir forest types are projected to move closer to Forest Plan objectives by 2020, from projects being implemented across the Forest and natural succession. Aspen will be reduced to 47 percent while spruce-fir will increase to 13 percent and meet the Forest Plan objective. Both red pine and paper birch forest types are projected to decrease slightly while jack pine and white pine forest types will be stable. Thus jack pine, red pine, white pine, and paper birch forest types are projected to be below Forest Plan objectives by 2020; while the spruce-fir forest type will meet objectives. The aspen forest type is projected to be above Forest Plan objective by five percent. The need exists to reduce aspen and increase jack pine, red pine, white pine, and paper birch on appropriate sites.

Table 3.2-2: Vegetation Composition within the Dry-Mesic Red and White Pine LE

Upland Forest Type	Forest-wide (Percentages)[1]			Kabetogama Project Area (Acres)		
	Existing Condition (2014)	Projected Condition (2020)	Objectives for Decade 2[2]	Existing Condition (2013)	Alt 1 (2020)	Alt 2 (2020)
Jack Pine	9	9	10	450	450	608
Red Pine	13	12	13	1,520	1,520	1,520
White Pine	11	11	12	294	294	294
Spruce-Fir	8	13	13	469	469	503
Northern Hardwoods	1	1	1	171	171	171
Aspen	51	47	43	5,035	5,035	4,840
Paper Birch	8	7	9	358	358	358
Total	**101***	**100**	**101***	**8,297**	**8,297**	**8,294***

1 Percent of NFS land in the Dry-Mesic Red and White Pine LE
2 Superior National Forest, Forest Plan, Page 2-64, Table DRW-1
*Totals may vary slightly due to rounding.

Age Class Distribution

Each forest stand is also identified by an age class. Tables 3.2-3 and 3.2-4 show age classes as represented in the Forest Plan. Age class distribution tables are displayed comparable as the vegetation composition tables. The first set of numbers shows Forest-wide percentages in each age class; while the second set of numbers show acres in each age class, and are specific the Kabetogama Project. Each LE has a different set of age class ranges based on the varying vegetative growth stages that are typical for that LE. Forested stands become two-aged when an understory becomes established prior to the death of the mature overstory. A 80-100 year old aspen stand breaking up due to old age with balsam fir or white spruce saplings dominating the gaps created by dying aspen is one example of this condition. In the age class tables, these stands would be counted under the age of the overstory until it has broken apart and the understory begins to dominate.

Table 3.2-3 shows the age class breakdown for the MBA LE along with projections for the year 2020 and Decade two Forest Plan objectives. The 0-9 age class is below objective and is projected to decrease further by the year 2020. The 10-49 and 100+ age classes are below

objectives but projected to increase by 2020, with the 100+ age class going slightly above Forest Plan objective at that time. The 50-79 and 80-99 age classes are above objectives and are projected to decrease (50-79) or remain stable (80-99) by 2020. The reduction in 50-79 is mainly due to harvest and movement of acres into the 80-99 age class. The three oldest age classes are projected to be above Forest Plan objectives by 2020, with the 80-99 age class being nine percent above.

Table 3.2-3: Age Class Distribution within the Mesic Birch/Aspen/Spruce-Fir LE

Age Class	Forest-wide (Percentages)[1]			Kabetogama Project Area (Acres)		
	Existing Condition (2014)	Projected Condition (2020)	Objectives for Decade 2[2]	Existing Condition (2013)	Alt 1 (2020)	Alt 2 (2020)
0-9	6	5	11	0	0	442
10-49	38	41	48	7,255	6,598	6,579
50-79	17	13	10	409	1,007	1,007
80-99	26	26	17	1,103	582	371
100+	13	15	14	359	939	727
Total	**100**	**100**	**100**	**9,126**	**9,126**	**9,126**

1 Percent of NFS land in the Mesic Birch/Aspen/Spruce-Fir LE
2 Superior National Forest, Forest Plan, Page 2-70, Table MBA-2

Similarly, Table 3.2-4 shows the age class breakdown for the DRW LE along with projections for the year 2020 and Decade two Forest Plan objectives. The 0-9 age class is currently below objective but is projected to increase above objective by the year 2020. The 10-49 age class is below objectives and is projected to increase slightly by 2020, though still below objective. The 50-99 age class is well above objective but is projected to decrease by 2020, though it will still be above objective. The 100-139 age class is at objective and projected to remain stable. The 140 plus age class is slightly below objective and is projected to remain stable. The reduction in 50-99 is mainly due to harvest. The three oldest age classes are projected to be above Forest Plan objectives by 2020, with the 80-99 age class being nine percent above. There is a need to create more young and reduce the older age classes in the MBA LE.

Table 3.2-4: Age Class Distribution within the Dry-Mesic Red and White Pine LE

Age Class	Forest-wide (Percentages)[1]			Kabetogama Project Area (Acres)		
	Existing Condition (2014)	Projected Condition (2020)	Objectives for Decade 2[2]	Existing Condition (2013)	Alt 1 (2020)	Alt 2 (2020)
0-9	6	12	10	0	0	1,686
10-49	40	42	46	5,376	5,234	4,797
50-99	36	28	24	2,565	1,846	1,062
100-139	17	17	17	355	1,169	703
140+	1	1	2	0	47	47
Total	**100**	**100**	**99***	**8,296**	**8,296**	**8,295***

1 Percent of NFS land in the Dry-Mesic Red and White Pine LE
2 Superior National Forest, Forest Plan, Page 2-64, Table DRW-2
*Totals may vary slightly due to rounding.

Within-Stand Diversity

Broad tree species diversity objectives are shown in Table DRW-3 (p. 2-65) and Table MBA-3 (p. 2-71) in the Forest Plan. Quantifying such a broad change in tree species diversity across a landscape is difficult; however, data is available to quantify current tree species diversity within individual stands. With this base data qualitative assumptions regarding future tree species diversity can be made based on information such as species life history traits and typical disturbance mechanisms.

In 2012 many stands within the Kabetogama Project were inventoried for multiple attributes, including tree species present in three stand structural layers (understory, midstory, and overstory). This data describes tree species diversity within these stands and also helps paint the picture of vertical structure. Most inventoried stands in the project area are mature or near maturity (greater than 30 years old) since there has been minimal harvest in the last 30 years and no harvest in the last 10 years. Natural disturbance has also been minimal, especially a lack of fire. Some wind events have created small pockets of blowdown, especially in the older stands, though some younger stands show signs of wind and/or snow damage.

While each stand typically has a dominant species, it can be difficult to make a decision on forest type for many stands given the number of tree species present. For example, while many stands in the project area are aspen forest type, aspen typically makes up 40-60 percent of stand basal area. Some stands are very evenly mixed, while others can be very heavy to one species. In most cases many other tree species are present in the overstory, including paper birch, red maple, white spruce, or white pine. The midstory and understory typically contains balsam fir in addition to many of those same species. Some of the youngest stands in the 30-50 year range, especially aspen and planted red pine stands, have a less developed midstory and understory with fewer species present, though red maple and balsam fir typically occur to some degree. In the older age classes (greater than 50 years old) the overstory in many stands of short-lived species such as aspen, paper birch, or balsam fir are beginning to open up due to disturbance and natural mortality. In many cases, the very oldest stands of aspen and paper birch (greater than 75 years old) may only have portions of the overstory remaining, with either tree species or woody shrubs in the open areas. Stands of longer-lived species such as red pine, white pine, and white spruce develop differently in that the overstory lasts longer, but the midstory and understory exhibit many of the same characteristics and tree species.

The intent of treatments in the Kabetogama Project is to increase within-stand diversity by favoring species other than aspen in aspen dominated stands and reducing less desirable species such as balsam fir and red maple in many forest types. Both balsam fir and red maple are shade tolerant and able to thrive in a wide variety of environmental conditions, so they tend to dominate the midstory and understory of stands in the project area. Historically, fire would have kept their numbers in check and promoted the presence of other species such as red, jack, and white pine, aspen and paper birch, resulting in a diverse mix of tree species. Harvests with secondary treatments such as release of both natural and artificial regeneration, as well as non-harvest treatments to existing stands, are practical surrogates for a natural fire regime given the difficulty of implementing natural or prescribed fire at the scale necessary to move toward Forest Plan objectives. As an example, naturally regenerated aspen stands typically have other desirable species regenerating naturally as well, including white pine and white spruce. A release of those naturally occurring seedlings, whether through mechanical or chemical means

(depending on the site), is an effective way to increase within-stand diversity without the added cost of site preparation and/or planting. If not released, many of those natural seedlings will be overtaken by aspen and die, requiring added cost to reintroduce that species diversity.

3.2.5 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1: NO ACTION

Direct, Indirect, and Cumulative Effects

Indicator 1: Vegetation Composition

Within the project area under Alternative 1 in the next 5-15 years, due to the lack of stands naturally transitioning to spruce-fir forest types, neither the MBA LE, nor the DRW LE would see any change in forest types from the existing condition (Table 3.2-1). In a theoretical sense, stands transition from early successional species to late successional species as the original stand ages and individual trees or groups of trees die or succumb to other disturbance. For example, aspen, paper birch, and jack pine stands in the project area generally transition to spruce-fir types. However, many factors affect the future composition of any particular stand. In some cases, the lack of seed source or existing young trees in the understory would allow aspen stands to transition to woody shrubs. In others, lack of fire or ground disturbance would allow balsam fir or red maple to dominate the future stand. Both balsam fir and red maple are short-lived species and susceptible to insect and disease issues. Balsam fir is highly susceptible to spruce budworm attacks when it dominates a stand or area. Red maple is at the northern edge of its range in the project area and exhibits limited growth and poor form. In limited cases aspen would regenerate in the small openings but generally would be of low quality and susceptible to insects and disease. On rare occasions, with a good seed source or thriving understory trees in place, white spruce or white pine would begin to dominate the future stand. All of these transitions would take place long term (more than 15 years from now) in the project area.

Within the project area, stands of long-lived species like red pine or white pine would take longer to transition to spruce-fir forest types than the short-lived species. In the short term (less than 15 years) under Alternative 1, these stands would not change substantially. Natural disturbance such as wind, snow load, insects, and disease would have minor effects on stands of all ages. Weather related events such as wind, snow, or ice would knock down individual trees or groups of trees, and could cause breakage to tops and branches. In some cases this would create opportunities for understory trees to grow and reach the canopy. When few understory trees are present, openings would enhance growth of herbaceous or shrub species. Insect or disease outbreaks would create similar opportunities but on a longer timescale. In the younger planted red pine and white spruce stands, the dense canopy would likely persist for the next few decades with minimal ability of desirable tree species to grow due to the lack of available resources. Individual canopy trees within these stands would compete with each other for resources as well, resulting in stress that would increase susceptibility to the types of disturbance previously mentioned. Since many of these stands lack desirable trees in the understory, if these disturbances occur, the resulting stand would likely be dominated by poor specimens of short-lived balsam fir or red maple.

Alternative 1 does not contribute to Decade two Forest Plan objectives to decrease aspen and increase spruce, jack pine, or white pine forest types.

Indicator 2: Age Class Distribution

Alternative 1 would not create new acres of young age class within the project area (Tables 3.2-3 and 3.2-4). Stands within the project area are not at the age where they would transition to younger stands through natural succession. Some stands of short-lived species in the older age classes would start to break up and allow for young individual trees or groups of trees to reach the canopy but not at the stand scale. As some stands age, they would move from a younger age class into an older age class. Within the project area, stands between 43 and 49 years old would move from the 10-49 age class into the 50-79 age class. There are no acres in the 0-9 age class to replace those acres.

In the MBA LE within the project area, aging stands under Alternative 1 would contribute to Forest Plan age class objectives. For example, acres in the 80-99 age class would move into the 100 plus age class, reducing the 80-99 by about 520 acres. However, that increase contributes to in the 100 plus age class being projected to go above objective by 2020. In addition, the increase in 50-79 age class would contribute to that age class being over objective by 2020.

Similarly in the DRW LE within the project area, aging stands under Alternative 1 would contribute to Forest Plan objectives by reducing the 50-99 age class and increasing the 140 plus age class. Alternative 1 would increase the amount of 100-139 age class which would contribute to maintaining the projected 17 percent in this age class as per Forest Plan objective. However, about 450 of those acres are aspen stands that would transition to young stands after about 15 years, and would not be available to move further into the 140 plus age class in the future.

Indicator 3: Within Stand Diversity

Since Alternative 1 is the No-Action Alternative, effects to within-stand diversity would be minimal in the short term (next 15 years). Natural disturbance would increase structural diversity in most cases due to openings in the canopy. In some cases tree species would benefit, in others herbaceous and shrub species would benefit. As individual trees die, stands would have increased numbers of snags and increased amounts of down woody debris when trees fall to the ground. (See the narrative regarding Indicator 1: Vegetation Composition for more detail on the results of stand succession by forest type.) Under Alternative 1, within-stand diversity would increase overall. However, in many cases Forest Plan objectives to decrease certain species such as aspen, balsam fir, and northern hardwoods (especially red maple) and increase species such as red pine, jack pine, paper birch, tamarack, and white cedar would not occur under the No-Action Alternative.

ALTERNATIVE 2: ACTION ALTERNATIVE

Direct and Indirect Effects

In Chapter 1, the Purpose and Need for the project identified a need to alter the existing vegetation composition across the LEs within the project area (Chapter 1, pp. 8-14). The following indicators are tied to vegetation indicators from the Forest Plan EIS.

Indicator 1: Vegetation Composition

Within the project area under Alternative 2, the conversion of aspen to jack pine in the MBA LE would increase the amount of jack pine and reduce the amount of aspen. Similarly, conversion of aspen to jack pine and spruce in the DRW LE would increase the amount of jack pine and

spruce and reduce aspen. These actions help move each LE toward Decade two Forest Plan objectives.

Regeneration harvest of paper birch stands within the project area would maintain paper birch forest types, since they would eventually transition to other forest types such as spruce-fir or red maple, or become dominated by shrubs. Stands do not transition to other types in the analysis (Tables 3.2-1 and 3.2-2) since succession rules used in the analysis assume paper birch transitions to spruce-fir at 120 years of age (Table BEIS-1, Appendix B, Final EIS). Older or less vigorous stands of paper birch have reduced capacity for seed production, however retaining sufficient seed trees and proper site preparation should assure regeneration (Zasada and Gilmore, unpublished). About 250 acres of paper birch in the project area between 85-100 years old would be regenerated; which would maintain acres as paper birch.

Preparatory (not final) harvests in red pine and white pine stands between 80-105 years old would maintain those stands as red pine and white pine forest type. By retaining healthy individuals in the midstory and overstory, the resulting stand would be more resistant to insect or disease outbreak and damage from weather events. In addition, the resulting stands would be better suited for shelterwood regeneration harvest in the future, if desired, since they would have vigorous, wind-firm trees producing seed. If the stands are not regenerated in the next few decades these long-lived species would be more resilient to potential changes in climate over that time. Reducing the amount of balsam fir in the understory would lessen the chance of catastrophic wildfire killing all trees in the stand and potentially damaging private property adjacent to NFS lands.

Indicator 2: Age Class Distribution

Comparing the projected Forest-wide condition in 2020 to Forest Plan objectives for the end of the Decade (2024) shows a need to increase the 0-9 age class in the MBA LE (Table 3.2-3). In the DRW LE, Table 3.2-4 shows a projected condition in 2020 of too much young compared to Decade two objectives. This projection takes into account all planned regeneration harvests across the forest. However, due to factors on the landscape such as wetland inclusions, rock outcrops, riparian areas, reserve areas for wildlife, and others, not all acres would be harvest for regeneration. In addition, the 10-49 age class is projected to be well under objective. This age class can be increased in two ways, either through succession of 110-120 year old short-lived species such as aspen, jack pine, and paper birch, or through aging stands in the 0-9 age class. The regeneration harvests in the DRW LE would increase the amount of 0-9 and would then be available for transition to the 10-49 age class in the future, and moving toward that age class objective.

Stands to be regenerated would come from various age classes and in many cases will help reduce age classes that are projected to be over objective. For example, in the DRW LE the 50-99 age class is well above objective as is the 80-99 age class in the MBA LE, so regeneration harvests of stands in these age classes will move toward Decade two objectives.

Indicator 3: Within Stand Diversity

Tree species diversity objectives in the Forest Plan are specific to each LE, and differ from forest type objectives in that they address the desired direction for total percentage of trees, not acres of forest type. While each LE has specific objectives for increasing or decreasing certain tree species, there are some generalities. In both the MBA LE and DRW LE aspen and balsam fir

should be reduced, northern hardwoods should be maintained or decreased, red pine, white pine, white spruce, white cedar, and tamarack should be increased. In the MBA LE jack pine should be maintained; while in the DRW LE jack pine should be increased.

In general, tree species diversity in treated stands would increase under the action alternative. All regeneration harvests would reserve individual trees, groups of trees, or some combination of both depending on the harvest type. In all clearcut and coppice harvests, 6-12 trees per acre would be retained in groups or scattered throughout the harvest opening for reasons such as wildlife habitat, visual aesthetics, or riparian areas. In all clearcut or coppice harvests with an opening larger than 20 acres, a minimum of five percent of the harvest area would be left as a legacy patch, generally larger than one-quarter acre. In shelterwood or seed tree harvests a number of trees are left for either shelter or seed trees respectively, and in most cases would reserve a number of trees for other reasons as above.

Trees reserved during harvest would also increase stand structural diversity by maintaining large trees on site. Some of these large old trees contribute to down woody debris as they succumb to wind throw. Standing snags (dead trees) generally would be maintained during harvest. Some would remain standing for many years, contributing to structural diversity, while others would fall over and contribute to down woody debris.

Post-harvest treatments or non-harvest treatments such as tree release work and riparian improvement would increase tree species diversity in those stands. Planting long-lived conifer such as white pine and white spruce post-harvest, followed by tree release treatments (either mechanical or chemical) would establish those species to create a mixed stand. Riparian treatments are specifically intended to increase diversity. Depending on the existing stand condition, multiple treatments would be used to increase the amount of long-lived conifer within the stand. In cases where existing openings in the tree canopy allow sufficient light to the forest floor but no long-lived conifer exist in the understory, removing the dense midstory of balsam fir, red maple, and woody shrubs, followed by planting would increase tree species diversity. In other cases, long-lived conifer seedlings may exist in the understory but are not receiving enough light due to the dense midstory and would die before reaching the canopy. A similar treatment to remove the dense midstory would be enough to allow those trees to vigorously grow into the overstory and reach maturity.

Cumulative Effects of Alternative 2

The project record contains a list of past federal timber sales that occurred within the project area. These earlier harvests are considered part of the existing condition; therefore, no further analysis on these past actions is necessary. As of 2015, there are no current federal timber sales under contract for harvest within the project area.

Ownership within the project area is mixed, with National Forest System (32 percent), State of Minnesota (27 percent), and Molpus Woodlands Group (24 percent) accounting for most of the land. Non-Industrial private owners have eight percent, Saint Louis County six percent, and Potlatch Corporation the final two percent.

Indicator 1: <u>Vegetation Composition</u>

Within the Kabetogama Project Area, the State of Minnesota Department of Natural Resources (DNR) owns about 20,700 acres. Forest types breakdown as follows: 43 percent aspen types, 18

percent lowland conifer types, 6 percent lowland hardwood types, 6 percent red pine, 4 percent upland spruce fir types, 3 percent jack pine type, 2 percent white pine type, and 1 percent birch type. The rest is either non-forest or non-productive forestland.

The Kabetogama Project Area contains about 4,380 acres of St. Louis County land. Forest types breakdown as follows: 54 percent aspen types, 3 percent upland spruce types, 6 percent red or white pine type, 6 percent jack pine type, and 12 percent lowland forest types; the remainder being small percentage of other forest types and non-forest land.

Lands administered by industrial owners have an unknown breakdown of forest types but can be assumed to be similar to the others listed given land-types and timber markets.

As with federal lands, the existing forest composition is a result of past actions and no further analysis is needed. Changes in composition across other ownerships are expected to be minimal as other agencies and private owners typically regenerate harvested stands to the original forest type. Conversions associated with Alternative 2 would decrease aspen and increase conifer forest types within the project area.

Indicator 2: Age Class Distribution

The current age class distribution on forested State lands within the Kabetogama Project Area, in similar groupings as the forest uses, are as follows: about 4,980 acres (28 percent) is less than 10 years old, about 6,850 acres (38 percent) is 10 to 49 years old, about 3,310 acres (18 percent) is 50 to 99 years old, and about 435 acres (15 percent) is older than 99 years. Based on the DNR Forestry's five-year stand exam list, about 700 acres are being considered for regeneration harvest on upland sites and about 30 acres on lowland sites, with about 780 acres being considered for thinning or partial cuts on mostly upland sites.

The current age class distribution on forested Saint Louis County lands within the Kabetogama Project Area, in similar groupings as the forest uses, are as follows: about 962 acres (25 percent) is less than 10 years old, about 830 acres (21 percent) is 10 to 49 years old, about 1,720 acres (44 percent) is 50 to 99 years old, and about 405 acres (10 percent) is older than 99 years. According to data from Saint Louis County about 740 acres are being considered for harvest, about 690 acres of which would be regeneration harvest.

Current age class breakdown of Molpus lands is unknown but can be assumed to be similar to the State breakdown, with most forested acres in the younger age classes. Molpus provided general locations (Township/Range/Section) and type of harvest (regeneration or thinning) upon request. We used aerial photo interpretation to estimate the acres of each harvest within the general locations. Based on this analysis Molpus plans to regenerate about 600 acres and thin about 120 acres within the next ten years.

Harvest associated with Alternative 2 would offset the loss of young age class within the project area in the next decade due to limited planned harvesting by other ownerships.

3.3 THREATENED AND ENDANGERED SPECIES

A Biological Assessment (BA) has been prepared and submitted to the Fish and Wildlife Service for their concurrence with the determination of effects. Consultation with the Fish and Wildlife Service specific to the Kabetogama Project is documented in the project file. The biological assessment is available at http://www.fs.usda.gov/project/?project=42362.

The Kabetogama Project BA documents potential effects to federally proposed, candidate, threatened or endangered species, and designated critical habitat that could result from proposed vegetation management and other activities as proposed in the Kabetogama Project. The Kabetogama Project BA tiers to the Programmatic Biological Assessment for the revision of the Forest Plan (USDA Forest Service 2004, pp. 6-7) and provides more specific information on site-specific effects of the project to threatened and endangered species.

The findings (determination of effect) of the effects of the alternatives analyzed in detail are summarized in Table 3.3-1.

Table 3.3-1: Determination of Effects for Alternative 2

Species/Habitat	Alternative 1	Alternative 2	Rationale for Determination
Canada lynx	NE	NLAA	Human disturbance factors would be minimal; adequate habitat for cover, connectivity, and prey would be maintained.
Canada lynx critical habitat	NE	NLAA	The Proposed Action would comply with all applicable Forest Plan management direction related to Canada lynx and its habitat.
Gray wolf	NE	NLAA	Human disturbance factors would be minimal, adequate habitat would be maintained, and prey habitat improvements would take place.
Gray wolf critical habitat	NE	NLAA	The Proposed Action would comply with all applicable Forest Plan management direction related to gray wolf and its habitat.
Northern long-eared bat	NE	LAA, No Jeopardy	Individual northern long-eared bats could be killed or injured as a result of tree removal activities during the summer active period. The Proposed Action would maintain suitable summer roosting habitat and protect known roost trees. The loss of summer roosting habitat alone would not likely result in population-level effects. There would be no impacts to known hibernacula.

NE = No Effect, NLAA = Not likely to adversely affect, LAA = Likely to adversely affect, NAM = No adverse modification

3.4 REGIONAL FORESTER SENSITIVE SPECIES

A Biological Evaluation (Be) evaluates effects of the Kabetogama Project on Regional Forester-Listed (R9) Sensitive Species (U.S. Department of Agriculture (USDA) Forest Service Manual Sections 2670.3, 2670.5 (3), 2672.4). The species evaluated in this report include all species on the revised R9 Sensitive Species List (December 14, 2011).

The Kabetogama Project BE is available at http://www.fs.usda.gov/project/?project=42362. The BE describes anticipated direct, indirect, and cumulative effects to Regional Forester Sensitive

Species. Due to the number of species analyzed in the BE, effects of the project are briefly summarized below. Please see the BE for the complete effects analysis.

Terrestrial Wildlife

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

For Alternative 2, proposed activities would have no impact to Freija's grizzled skipper and wood turtle. Proposed activities in Alternative 2 may impact individuals but are not likely to cause a trend toward federal listing or loss of viability for the little brown myotis, tri-colored bat, heather vole, bald eagle, northern goshawk, boreal owl, great gray owl, olive-sided flycatcher, bay-breasted warbler, Connecticut warbler, American three-toed woodpecker, taiga alpine butterfly, and Nabokov's blue butterfly.

Aquatic Wildlife

Alternative 1 would have no impact to ebony boghaunter dragonfly, headwaters chilostigman caddisfly, Quebec emerald dragonfly, black sandshell mussel, creek heelsplitter mussel, northern brook lamprey, lake sturgeon, Nipigon cisco, and shortjaw cisco.

For Alternative 2, proposed activities would have no impact to lake sturgeon, Nipigon cisco, and shortjaw cisco. Proposed activities in Alternative 2 may impact individuals but are not likely to cause a trend toward federal listing or loss of viability for the ebony boghaunter dragonfly, headwaters chilostigman caddisfly, Quebec emerald dragonfly, black sandshell mussel, creek heelsplitter mussel, and northern brook lamprey.

Vascular plants, lichens, and bryophytes

Alternative 1 would have no direct, indirect, or cumulative effects to 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, Appalachian fir club moss, large-leaved sandwort, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, *Cladonia wainoi*, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, *Caloplaca parvula*, *Cetraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Pseudocyphellaria crocata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissimi*, Canada yew, barren strawberry, Canada rice grass, and *Peltigera venosa*.

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

Proposed activities in Alternative 2 may impact individuals of 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, Appalachian fir club moss, large-leaved sandwort, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, *Cladonia wainoi*, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, *Caloplaca parvula*, *Cetraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Pseudocyphellaria crocata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*,

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

Conclusion

This project was designed to minimize impacts to species through protecting important habitat and known occurrences and to produce quality future habitat (reduced fragmentation, meeting landscape ecosystem, and Management Indicator Habitat objectives). There may be direct, indirect, or cumulative impacts to some individuals, but none of the alternatives would lead to a trend toward federal listing or loss of viability for any of the species analyzed.

3.5 MANAGEMENT INDICATOR SPECIES

The Forest Plan designates four Management Indicator Species: bald eagle, white pine, gray wolf, and northern goshawk (Forest Plan, p. 2-34). Impacts to gray wolf are addressed in section 3.3.1 of this EA and in the BA. Impacts to bald eagle and northern goshawk are addressed in section 3.5 of this EA and in the BE.

Bald eagle

The BE discloses effects of the Kabetogama Project to bald eagles and shows that nesting habitat would be protected and stand-specific mitigations would minimize human disturbance. Future nesting habitat would be improved through planting pine in riparian areas. Both alternatives maintain existing habitat and are in compliance with Forest Plan direction.

White Pine

Table NSU-2 on p. 2-59 of the Forest Plan shows a Decade two objective of increasing the amount of white pine by two percent. Alternative 2 of the Kabetogama Project would be expected to increase white pine on the landscape by thinning some existing white pine stands to maintain stand health and vigor, diversity planting white pine in existing stands, and planting white pine along with other species in some harvested stands. There are not expected to be any measurable adverse effects to white pine.

Gray Wolf

Effects of the Kabetogama Project to gray wolf are disclosed in the BA. There are no known wolf dens on or adjacent to federal lands in the project area and suitable habitat for prey species is abundant and widespread throughout the area. Both alternatives are in compliance with the Forest Plan and Gray Wolf Recovery Plan. Alternative 1 would maintain adequate wolf habitat, but young forest would not be created for prey species. Human disturbance levels would not change and unauthorized roads would remain open. Alternative 2 would improve habitat for prey species such as white-tailed deer by creating young forest and planting mixed conifer forest. Human disturbance would increase during project implementation but would decrease in some locations due to closure of unauthorized roads. The overall determination is that Alternative 2 may impact individual wolves but is not likely to adversely affect the gray wolf and its critical habitat.

Northern Goshawk

Effects of the Kabetogama Project to northern goshawks are disclosed in the BE. There are no known nests sites on or adjacent to federal lands in the project area. There is one known territory in the project area on State lands near the southern edge of the project boundary. This site was

last known to be occupied in 2012. Proposed activities in Alternative 2 would not occur within the vicinity of known nests and post-fledging areas and thus would not impact individuals potentially breeding in this territory. Mitigations would be applied to stands to minimize human disturbance and retain sufficient suitable habitat near any additional nests found during implementation of the proposed activities (Appendix C).

Potential effects to goshawk can also be considered in the context of available mature forest, patch size, and stand complexity. Proposed activities under Alternative 1 would increase both the availability of mature forest habitat and the area and number of 100-acre and larger patches. Alternative 1 would maintain current stand complexity. Proposed activities under Alternative 2 would decrease the amount of mature and older upland forest by approximately four percent from existing conditions but would increase stand complexity through planting and conversion. Young forest created would provide habitat for important forage species such as ruffed grouse and snowshoe hares.

Short-term effects to goshawk could occur from the creation of young forest; however, forest management that seeks to increase interior forest and decrease fragmentation would benefit the species in the long term. Project planners aimed to improve existing patches and create future high-quality patches by regenerating older stands that are degenerating and becoming brushy and by consolidating harvest units to create larger patches with less edge and better interior forest conditions. Specifically, the proposed project maintains two out of three upland mature patches greater than 300 acres in size and increases the overall area of large mature patches by 26 percent. In addition, the project creates several 100-acre and larger patches of young upland forest that would eventually grow into mature patches.

The Proposed Action is consistent with the Forest Plan Programmatic Biological Evaluation and with the Forest Plan. The Forest Plan Final Environmental Impact Statement (FEIS) concluded that mature and older forest acres would decrease (USDA Forest Service 2004c, Volume 2, p. D-11) and that sensitive species using these habitats would remain viable and well-distributed (USDA Forest Service 2004c, Volume 1, pp. 3.3.1-26). Although the percentage of mature and older upland forest would remain below Forest Plan objectives in the project area by 2020 under both alternatives, these habitats would exceed 2024 objectives Forest-wide. Proposed activities under Alternative 2 may impact individuals occupying the project area but are not likely to cause a trend toward federal listing or loss of viability on the Forest.

3.6 MANAGEMENT INDICATOR HABITATS

3.6.1 INTRODUCTION

There are thousands of different wildlife species living in the Superior National Forest, each with its own mix of habitat requirements. To provide a simplified, practical, and reasonable approach to evaluate a wide variety of species, Management Indicator Habitats (MIH) were identified in the Forest Plan (2004) as a broad-scale way to represent species. The MIH provide a landscape-level means of monitoring and evaluating effects of management decisions and actions on specific species, communities, habitats, and interrelationships among organisms. Forest Plan objectives for MIH were developed to maintain viable populations of all native and desired non-native species. These objectives were considered in the planning and development of the Proposed Action for this project. The interdisciplinary team identified differences between the existing and desired condition and identified several opportunities within the project area to

contribute to Forest-wide objectives. Specifically, the Kabetogama Project Area is not currently contributing young age class forest types toward Forest-wide objectives. The Kabetogama Project would promote actions to create young age class that would provide wildlife habitat and a diverse functioning ecosystem. Management actions would also seek to promote large forest patches and interior forest and reduce edge (fragmentation). Large patch sizes would be emphasized, including those associated with both mature and young, even-aged vegetation conditions.

Management Indicator Habitats are not directly related to project issues; however, specific indicator habitats may be used to assess the effects to other resources. For this reason, MIH 11-13 are analyzed below. Effects of the Kabetogama Project to MIH 1-10 are disclosed in the BE.

3.6.2 ANALYSIS METHODS

The Forest Plan identifies MIH to represent the major biological communities on National Forest System lands that are most affected by our management activities. Management Indicator Habitats provide a broad-scale assessment. It is assumed that their representation will provide habitat for as many species as possible. Analysis of MIH also provides a practical and efficient approach to assessing effects of management actions to thousands of species that are found on the Forest. The MIH in combination with management and analysis for individual species (such as Management Indicator Species and threatened, endangered, and sensitive species) provide a means for assessing species viability and habitat distribution.

Management Indicator Species are generally divided into two broad groups. Indicators that address the amount of various forest types and ages are indicator habitats one through ten. Those that address habitat spatial patterns are Indicators 11 through 13. Spatial pattern MIH (MIH 11-13) measure the amount of large, mature patches; interior habitat; and the density of edge habitat. These indicators allow us to address the size, shape, and arrangement of habitats. This is important because some species require or benefit from specific spatial arrangements, including large patches of contiguous habitat, linkages of habitat patches, or juxtaposition of patches. A list of the spatial MIH is provided in Table 3.6-1.

Table 3.6-1: Management Indicator Habitats (MIH)

MIH #	MIH Name	Measure
Forest Spatial Pattern Indicators		
11	Upland Edge Habitat (management induced)	Miles/Square Mile
12	Upland Interior Forest Habitat	Acres
13	Large Patches of Upland Mature Forest	Acres

The Forest Plan provides objectives for all MIH and assumes that moving toward them will achieve long-term desired conditions for the amount, quality, and distribution of habitats along with their associated species. A more complete description of each MIH and its associated suite of wildlife species can be found in the Forest Plan FEIS Volume I, pp. 3.3.1-1 to 3.3.1-62 and 3.3.2-1 to 3.3.2-8, and Volume II, Appendix D, pp. D-1 to D-70. In addition, documentation of the selection process is described in greater detail in Forest Plan FEIS Volume II, pp. B-24 to B-31.

3.6.3 ANALYSIS AREA

Site Level

The analysis area for direct, indirect, and cumulative effects is the Kabetogama Project Area boundary. This scale is appropriate because it encompasses habitat for multiple wildlife species and allows us to measure the site-specific effects of management actions. Effects analysis and comparison of each alternative is described for the year 2020 to compare with Forest Plan Decade two objectives. This time scale is chosen because it is reasonable to assume that all proposed projects would be implemented within this time frame and expected effects would have occurred. This is also an appropriate time scale for cumulative effects because it allows for the most realistic prediction of projects in the reasonably foreseeable future.

Cumulative effects take into account past, present, and reasonably foreseeable future projects on all ownerships. See Appendix E for a list and discussion of actions accounted for and/or considered.

Landscape Level

This analysis scale allows for comparison to Forest Plan predicted effects and movement toward objectives for the first decade of Forest Plan implementation. For spatial pattern MIH, the landscape-level analysis area is Zone 1 as described by the Forest Plan (see Forest Plan p. 2-25 for map). This spatial zone of analysis is appropriate because the Kabetogama Project proposed actions fall entirely within Zone 1. The time scale used for landscape-level analysis is the year 2020, which allows for direct comparison with objectives and predicted effects from the first decade of Forest Plan implementation. The Forest Plan states that the MIH objectives are for National Forest System lands only, outside the Boundary Waters Canoe Area Wilderness. The objectives were developed considering the conditions of the wilderness and the conditions of other ownerships (Forest Plan p. 2-55 – see also Forest Plan FEIS Appendix D).

3.6.4 AFFECTED ENVIRONMENT

The existing mix of forest types, ages, sizes, shapes, and arrangements are the result of past land management practices (primarily timber harvest) and natural processes (such as vegetation succession, fire, wind, insects, and disease) over the past 100 years.

Site Level (see Tables 3.6-2 and 3.6-3)

Large, mature forest patches are abundant and well-distributed on uplands in the project area. There are currently nine mature patches over 100 acres each, comprising approximately nine percent of federal lands within the project boundary. In addition, two patches exceed 300 acres. Goshawk, black-throated blue warbler, bay-breasted warbler, boreal owl, Canada lynx, and three-toed woodpecker are some of the species that benefit from large patches of habitat occurring in the Kabetogama Area.

Large patches of young forest are not available on federal lands within the project area, although they occur to some extent on other ownerships where previous timber harvests have occurred. Minimal amounts of large, young patches in the project area mean that habitats for species such as olive-sided flycatcher, white-tailed deer, moose, red fox, and ruffed grouse are not currently well-distributed. The project area does contain over 3,000 acres of lowland habitat. Lowland mature patches vary in size and distribution.

Priority needs and opportunities were identified by the Kabetogama Area Mid-level Assessment to address Forest Plan desired conditions. These needs and opportunities were used in the development of the alternatives. One proposal was to create patches of young forest greater than 100 acres by harvesting smaller, adjacent stands. Since large, mature patches are relatively abundant on uplands in the area, another proposal was to maintain and enhance the amount of existing upland patches throughout the project area.

Landscape Level (see Table 3.6-4)

At the landscape level, Forest spatial patterns have been changed by past land use. Primarily due to the harvesting of small blocks, lands have a high degree of forest fragmentation resulting in high levels of forest edge and smaller amounts of large patch and interior forest habitat. This has created an abundance of habitat conditions favoring wildlife species that use edge habitat such as white-tailed deer, heather vole, woodcock, red fox, American robin, rose-breasted grosbeak, brown-headed cowbird, olive-sided flycatcher, American redstart, and chestnut-sided warbler. In turn, habitat for species that require large patches of mature forest such as goshawk, boreal owl, black-throated blue warbler, bay-breasted warbler, three-toed woodpecker, Connecticut warbler, and various other species is less well-distributed and is under-represented on the landscape.

The desired Forest Plan condition is that Forest spatial patterns emulate landscape-scale patterns that would result from natural disturbances and other ecological processes. Forest Plan objectives are to provide habitat connectivity, as well as large mature and older patches that provide interior forest habitat. In addition, the Forest Plan calls for the creation of temporary forest openings that range in size from one to 1,000 acres, to maintain young forest on the landscape for those species that require it, and to reduce forest fragmentation. Forest Plan objectives are to increase the average size of temporary openings and reduce the amount of forest edge. Spatial Zone 1 also has an objective to minimize the decrease in large, mature patches and interior habitat.

In general, since implementation of the Forest Plan began in 2004, the amount of management-induced edge has decreased, interior forest has increased, and the acreage of large, mature patches has increased. In other words, movement toward the desired condition for Forest spatial patterns is occurring.

3.6.6 ENVIRONMENTAL CONSEQUENCES

Site Level: Direct, Indirect, and Cumulative Effects

Under the No Action Alternative, forests in the Kabetogama Area would continue to mature and no new management-induced edge would be created. The amount of mature interior forest as well as the number and acres of mature, upland forest patches would increase (see Tables 3.4-2 and 3.4-3), although the quality of some patches of mature forest would decrease as old birch and aspen decline. Existing, mature red and white pine patches would also increase. Effects of these changes would be additional habitat for wildlife species that use interior forest, connected habitats, and patterns that emulate natural disturbances such as black-throated blue warbler, goshawk, boreal owl, three-toed woodpecker, and Connecticut Warbler.

In the absence of measurable natural disturbance, young forest patches on federal lands would remain rare under no action. Habitat for species that use young forest and edge, including many game species, would remain limited on federal lands in the project area. Continued timber

harvesting on other ownerships would likely provide sufficient habitat for these species in portions of the project area. Without the creation of large, young forest patches however, high-quality, mature interior forest would become less available in the project area within a few decades.

Under Alternative 2, over 2,000 acres of young upland and lowland forest would be created, leading to an increase in edge habitat and a decrease in the amount of mature interior forest (Table 3.4-2). Over 500 acres of mature interior forest would remain in the project area under this alternative, providing sufficient habitat for interior forest-associated species. In addition, this alternative would create large patches of young forest, effectively reducing fragmentation and providing large patches of mature interior forest in the future. The project was designed to consolidate harvest units when possible to minimize the amount of forest edge created through vegetation management in accordance with Forest Plan guidance.

Table 3.6-2: Kabetogama Project Area Upland Edge and Upland Interior Management Indicator Habitats (MIH)

MIH #	Indicator	Existing Condition	Alternative 1 (No Action)	Alternative 2 (Proposed Action)
11	Upland Edge Habitat (miles/square mile)	0	0	12
12	Upland Interior Forest Habitat (acres)	715	1,140	575

Upland edge habitat is derived from miles of upland edge of young forest from 0-9 years of age divided by square miles of young forest. Interior forest was derived by buffering mature forest patches inward 100 meters.

Although the Proposed Action would reduce mature forest conditions as compared to no action, it would create an adequate amount of habitat on federal lands for species that benefit from edge and forest fragmentation such as white-tailed deer, heather vole, woodcock, red fox, American robin, rose-breasted grosbeak, brown-headed cowbird, olive-sided flycatcher, American redstart, and chestnut-sided warbler. These effects are consistent with Forest Plan desired conditions.

Both alternatives would result in greater amounts of mature patches larger than 300 acres by 2020 compared to the existing condition (Table 3.6-3). The increase would be greater under Alternative 1. Under Alternative 1, both the number of mature patches and the total acres of mature patch habitat would increase. The total acres of mature patch habitat would also increase under the Proposed Action, but the total number of mature patches would not change from current conditions. Mature upland forest patches greater than 300 acres would remain well-represented and above the current existing condition in the project area for both alternatives. Although the amount of upland interior forest would decrease under Alternative 2, negative impacts to species that require this type of spatial arrangement of habitat would be minimal because the total acreage of patch habitat would increase and thus be available for species that require mature stands.

Table 3.6-3: Kabetogama Project Area Number and Acres of Large, Mature Forest Patches on Uplands				
MIH #	**Indicator**	**Existing Condition**	**Alternative 1 (No Action)**	**Alternative 2 (Proposed Action)**
13	Mature, Upland Patches ≥ 300 Acres	2 patches 750 acres	3 patches 1,766 acres	2 patches 942 acres

Currently in the Kabetogama Project Area, upland patch sizes on non-federal lands are generally small due to the intermixed ownership pattern. Young forest would be added to the landscape by regeneration harvesting of approximately 2,000 acres on private, State, and county lands, although the patches created would be relatively small and dispersed. Mature forest patches would also continue to occur on non-federal lands to some extent. The Proposed Action seeks to reduce forest fragmentation by consolidating harvest units; thus, creating larger patches with less edge and better interior forest conditions. The result would be an overall increase in patch size and a more realistic emulation of natural disturbance in the project area. This should have a beneficial cumulative impact to species requiring that type of spatial configuration of habitat. Overall, cumulative effects are expected to be minor due to the relatively small change in spatial patterns on both federal and nonfederal lands.

Other proposed activities would unlikely contribute to cumulative spatial effects because these activities do not propose to change vegetation spatial patterns. In particular, minerals use activities in the project area could result in a total of 49 acres of tree clearing on federal lands for the expansion of 20 existing gravel pits and one undeveloped pit, depending on future gravel needs. Minimal use of sand and gravel also occurs on private lands. Such activities typically result in some habitat loss and temporary fragmentation; however, the primary impact is human disturbance. These projects are not expected to contribute cumulative effects to forest spatial patterns because of their relatively small area of expansion and their current distribution across the landscape. With the exception of the South Kinmount and Kinmount pits, which include clearing up to 10-35 acres each, the pit expansions would not exceed a couple of acres.

Landscape Level: Direct, Indirect, and Cumulative Effects

Table 3.6-4 displays Forest Plan spatial pattern MIH objectives within Zone 1 and how the Kabetogama Project helps move them toward those objectives are compared to the Forest existing condition (2014). The 2008 Annual Monitoring and Evaluation Report analyzed edge density and interior forest at the Forest level.

Table 3.6-4: Forest-wide (Spatial Zone 1) Number and Acres of Large, Mature Forest Patches on Uplands				
MIH #	**Indicator**	**Existing Condition**	**Alternative 1 (No Action)**	**Alternative 2 (Proposed Action)**
13	Mature, Upland Patches ≥ 300 Acres	77 patches 48,648 acres	91 patches 57,800 acres	86 patches 53,524 acres

Forest Plan direction for Spatial Zone 1 is to maintain a minimum of 44,700 acres of mature and older upland forest in patches of 300 acres or greater. Both alternatives would allow for continued positive movement in exceeding Forest Plan objectives for Forest spatial patterns in this zone; the total number and acreage of large mature and older patches would increase from Forest Plan 2004 conditions and 2014 existing conditions. This means that both alternatives would generally contribute to forest conditions that emulate landscape-scale patterns that would have resulted from natural disturbances and other ecological processes. These changes would be beneficial for species that require large, mature patches and interior habitat such as goshawk, boreal owl, Canada lynx, black-throated blue warbler, bay-breasted warbler, three-toed woodpecker, Connecticut warbler, and various other species.

Moose

Alternative 1 proposes no management activities; therefore, it would do less than the other alternative to create forage for moose. Approximately zero percent of the existing landscape is young forest, resulting primarily from the lack of disturbance in the last 10 years. Without management actions or natural disturbance events, foraging habitat is expected to remain under represented.

Alternative 2 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, 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.

Natural tree regeneration is planned for approximately 1,200 acres in Alternative 2. Regeneration would be dominated primarily by quaking aspen but would also include aspen-white spruce/balsam fir, black spruce, jack pine, bigtooth aspen, paper birch and upland black spruce. Thermal cover would continue to be available to moose under both alternatives. Diversity planting of conifer is planned on 664 acres to increase stand complexity and provide long-term thermal cover for moose. Habitat improvements on 269 acres would open up the canopy to increase oak and/or blueberry species favored by a variety of wildlife species.

Conclusion: Direct, Indirect, and Cumulative Effects

Overall, project alternatives would create and maintain a mosaic of habitat types and ages in the analysis area. Habitat for some species would increase and for others would decrease. As stated in the 2008 Superior National Forest Monitoring and Evaluation report (p. 9b-4): “Conclusions of the Forest Plan EIS about the effects of management on these MIHs and their associated species also remain valid: the amount and distribution by Landscape Ecosystems of MIHs is adequately representative of those habitats that would have been expected under the range of natural variability of Superior National Forest ecosystems and therefore, current implementation of the plan is expected to maintain the desired diversity and variability of native and desired non-native species.”

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 Kabetogama 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 effects of the alternatives on NNIP.

3.7.2 ANALYSIS METHODS

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

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

This indicator is useful for distinguishing among alternatives because currently most of the 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 AREA

The area covered by the analysis of direct and indirect effects includes all lands administered by the Superior National Forest within the Kabetogama 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 Kabetogama 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 Kabetogama Project boundary 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 3.7-1 displays 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, Siberian peabush, and Tatarian honeysuckle can thrive in the understory of mesic native plant communities. None of these three species are present in the Kabetogama 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 (less than 3 percent of analysis area) mapped ELT 18 in the analysis area.

In general, the analysis area has a low level of NNIP infestation (Table 3.7-1). 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. Two high ecological risk species, spotted knapweed and Canada thistle, are much less abundant, totaling approximately 1.6 acres of infestations, but are still found throughout the project area. Moderate ecological risk species include wild parsnip and tansy; occupy approximately 0.05 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 3.7-1: Non-native Invasive Plants known in the Kabetogama 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)	1.5	High
Canada thistle *Cirsium arvense*	P	Perennial, spread by seed and rhizome, occupies disturbed sites (Lym and Christianson 1996)	0.1	High
Bull thistle *Cirsium vulgare*	No status	Biennial, spread by seed, occupies disturbed sites (Lym and Christianson 1996)	0.02	Low

Table 3.7-1: Non-native Invasive Plants known in the Kabetogama Project Area

Species	MN Status*	Life History/ Habitat Summary	Acres	Ecological Risk**
Orange hawkweed *Hieracium aurantiacum*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Callihan et al. 1982)	43.5***	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)	43.5***	Moderate
Oxeye daisy *Leucanthemum vulgare*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Krueger and Sheley 2002)	43.5***	Moderate
Wild parsnip *Pastinaca sativa*	No status	Tap-rooted perennial, spread by seed; only flowers once; wide range of disturbed habitats (Czarapata 2005)	0.03	Moderate
Common tansy *Tanacetum vulgare*	P	Herbaceous rhizomatous perennial, spread mostly by seed; disturbed uplands (LeCain and Sheley 2011)	0.02	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, Indirect, and Cumulative 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, 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.

ALTERNATIVE 2: PROPOSED ACTION

Direct and Indirect Effects

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

Approximately 3.5 miles of new upland temporary road 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 3.7-1). These species can out-compete 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 and wild parsnip 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 nearly all of the new roads proposed in the Kabetogama Project Area are temporary roads and would be decommissioned after use. As native forbs, shrubs, and trees start to revegetate 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 0.1 acres (36 sites) and 0.02 acres (9 sites) of weed treatments conducted in 2013 and 2014, respectively; similar acreage is expected to be treated in 2015. 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.

Table 3.7-2: Indicators for NNIP Analysis

Indicator	Alt. 1	Alt. 2
1. Miles of new upland road construction on NFS lands	0	3.5
2. Acres of treatment units within 50 feet of NNIP occurrence.	0	154

Indicator 2: <u>Acres of treatment units within 50 feet of NNIP occurrence</u>

Approximately 154 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.

Herbicide use for releasing desirable tree species from competition proposed under Alternative 2 has a very low risk of causing an increase of NNIP. These proposed treatments would be spot applications centered on the target tree or shrub species. They would involve no ground disturbance, so for that reason there is little risk of spreading NNIP.

Cumulative Effects of Alternative 2

Based on analysis of past, present, and reasonably foreseeable actions (Appendix E), the cumulative effects of the Kabetogama Project on NNIP would be negligible. 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 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 lands under other ownership in the project area. Effects of NNIP would continue to be concentrated in developed areas (e.g. roadsides, trails, and power lines) and not undeveloped forestlands. Some road construction is likely on State and county lands in the analysis area. For example, some new roads could be built in connection with State or county timber harvest, and this could result in a small amount of NNIP spread. Overall, road or trail construction and use of existing roads or trails 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 Alternative 2.

Timber harvest on non-federal ownership, such as future vegetation management on State and county lands, would also make a small contribution to the spread of NNIP. 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.

On April 27, 2006, Forest Supervisor Jim Sanders signed a decision to implement a Forest-wide NNIP management project, which would provide for treatments of NNIP in the project area (USDA Forest Service 2006) under all alternatives. In the Kabetogama Project Area 0.1 acres (36 sites) and 0.02 acres (9 sites) of weed treatments were conducted in 2013 and 2014; a similar amount of acreage is expected to be treated in 2015. This is a beneficial effect with respect to NNIP spread which would minimize impacts from NNIP 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 0.008 acres of NNIP infested 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 (less than one percent) of NNIP on high risk sites Forest-wide, which further demonstrates that Kabetogama Project activities would pose minimal risk of cumulative effects of weed spread.

Monitoring of a sample of Kabetogama Project activities for NNIP spread 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 EA. 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 Kabetogama Project on NNIP would be negligible.

Projected climate change in the project area is also likely to contribute to cumulative effects. Projected warmer temperatures and elevated carbon dioxide in the project area might allow current invasive species to expand their range and new species to colonize the project area. These effects would be long term and take place gradually over time.

3.8 WATER RESOURCES

3.8.1 INTRODUCTION

Background

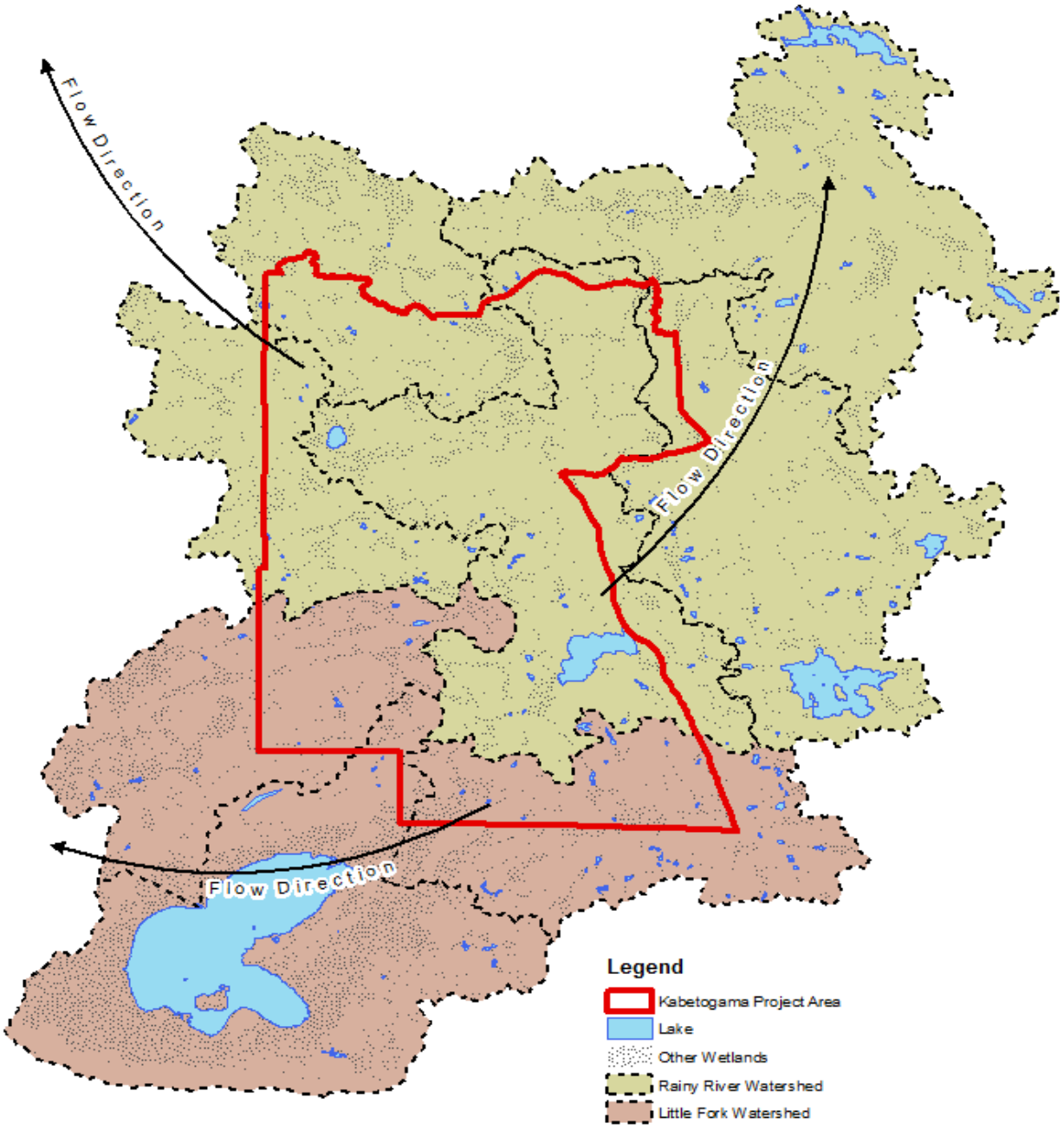
The Kabetogama Project Area includes a portion of the remote area northwest of Orr, MN in the Kabetogama Purchase Area. The area is a forested environment that contains several lakes and numerous headwater streams. Water resources and watersheds within the project area generally exhibit excellent water quality and watershed health. None of the watersheds are within the Boundary Waters Canoe Area Wilderness (BWCAW) or flow to the BWCAW. Rivers within most of the project area are part of the 4th-order Rainy River Watershed, which flow generally north; the southern quarter of the project area lies within the 4th-order Little Fork Watershed, which flows west before turning north (Figure 3.9-1). All or parts of eight 6th-order watersheds intersect the project area, including the Lower Ash, Black Duck, Upper Ash, East Branch Rat Root, Rat Root Headwaters, Lost River Watersheds, and the Nett Lake and East Fork Nett Lake Watersheds.

Past management activities on both federal and non-federal lands (to the extent known) include timber harvest, long-term special use permits associated with private property access and utility lines, non-native invasive plant management, use of gravel pits, and road decommissioning. These activities are expected to continue in the future. Reflecting its remote location, the project area does not contribute to municipal water supplies.

Water resources within the Kabetogama Project Area have the following characteristics:

- Wetlands including lakes, rivers, and other types of wetlands cover approximately 23 percent of the project area, except in the Nett Lake watershed where wetlands comprise almost two-thirds of the land surface (61 percent).
- Lakes (e.g., Ash Lake) within the project area are included on the impaired waters list for the Statewide Mercury in Fish Tissue listing. No other waters within the project area are identified as impaired under the Clean Water Act.
- The project area does not host trout lakes but numerous trout streams are present, generally in the east and north sections of the project. Trout streams include the Ash River, the Lost River, Kinmount Creek, Beauty Creek, Black Duck River, and numerous unnamed streams.
- Rivers flowing through the project area are not included in the Eligible Wild and Scenic River or Riparian Emphasis Management Areas of the Forest.
- According to the National Heritage Information System, there are no instances of aquatic Regional Forester Sensitive Species within the project boundary. For additional information regarding impacts to biological life, refer to the Kabetogama Project Biological Evaluation.
- The project area lies within Minnesota groundwater province six, a region of limited general availability of groundwater from either surficial or bedrock sources. Reflecting this limited groundwater availability, there are no vulnerable aquifers in the project area.
- According to Minnesota Department of Natural Resource geographic information systems (GIS) data, no lakes or rivers hosting wild rice are present within the project area.

Figure 3.8-1: Kabetogama Watersheds and Project Area



Proposed Activities

Stand-level timber harvest treatments (such as clearcut and coppice cut), expansion of gravel pits, non-harvest treatments (such as wildlife habitat improvement and riparian forest restoration), changes to road maintenance levels, and reconstruction and construction of temporary roads to provide access for both short- and long-term vegetation management and for access to federal and other lands are all activities that are proposed in the Kabetogama Project. Sources of potential adverse effects to water quality related to these activities include the construction of road, construction of stream crossings, timber stand improvement (TSI) activities, and harvest (creating young forest) that exceeds a watershed threshold. Beneficial effects on water quality could result from decommissioning roads.

3.8.2 ANALYSIS METHODS

Three indicators related to water quality and watershed health were analyzed to evaluate effects associated with two Kabetogama Project alternatives: the No Action Alternative (Alternative 1) and the Proposed Action Alternative (Alternative 2). These indicators help measure the potential direct, indirect, and cumulative effects to water quality and watershed health.

Indicator 1: Miles of temporary road construction; miles of road decommissioning and road density

Roads are needed to access proposed vegetation management units. Although the existing road system provides adequate access to most of the project area, some new temporary roads are needed. The construction of temporary roads can impact water quality; therefore, effects of the new roads on the water resources of the Kabetogama Project Area will be evaluated.

For Indicator 1, the analysis calculated miles of road construction, miles of road decommissioning, and road density proposed within the project area for each alternative or as data were available (Tables 3.8-1 and 3.8-2). Effects of roads and trails are described in detail in Section 3.6.1.b (pp. 3.6-11 and 3.6-12) of the Superior National Forest Land and Resource Management Plan Final EIS. As road salt is not used on Superior National Forest System roads, road effects to water resources are generally associated with chronic input of fine to coarse sediment and corresponding alteration of stream geomorphology. Stream burial and barrier to fish passage may occur in the event of road failure/washout.

A threshold applicable to Superior National Forest conditions for road-related impacts to water quality, especially in terms of effects on aquatic habitat and biota, is difficult to quantify. In general higher road density is associated with the potential for or a realized reduction in water quality and may influence frequency, timing, and magnitude of disturbance to aquatic habitat. Research by DeCatanzaro *et. al.* (2009) identified a relationship between road density and water quality degradation for watersheds near Georgian Bay, northeast of Lake Huron on the Ontario Canadian Shield, where a watershed with 16.1 m/ha (21.4 feet/ac) had "moderately degraded water quality" and an increase in density of 11.6 m/ha (15.3 feet/ac) resulted in a negative impact on water quality. These threshold values likely cannot be strictly applied to changes on the Superior but may provide insight into the magnitude of impact one could expect from the Proposed Action (Alternative 2). Along with a description of changes to the transportation system, the analysis will also quantify road density for the project area.

Differences between alternatives will be discussed in terms of potential soil disturbance, erosion, and sediment input into local streams as well as the potential for change to watershed, riparian, stream, and wetland hydrologic functions.

Indicator 2: Number of new stream crossings

For Indicator 2, the analysis identified the number of new stream crossings resulting from new permanent and temporary roads constructed within the project area (Table 3.8-3). The analysis assumes effects to water quality from new stream crossings, including inputs of sand and other fine sediments, may be observed up to one mile downstream any given site (Verry et. al. 2000). As with Indicator 1, it is difficult to identify a quantitative metric for crossing-related impacts to water quality, especially in terms of effects on aquatic habitat and biota. In general, an increased number of crossings is associated with the potential for or a realized reduction in water quality and may influence frequency, timing, and magnitude of disturbance to aquatic habitat.

Indicator 2 provides differences between alternatives through a discussion of likely effects to:

- Aquatic ecology: In-stream and riparian habitat and aquatic organisms (such as reduced egg and juvenile survival resulting from sedimentation, degraded in-stream and riparian habitat, fish migration barriers, and loss of stream connectivity).
- Physical and chemical hydrology: Potential erosion and sediment transport/input, potential effects to stream flow and water quality (such as unnaturally confined stream channels with increased flows, reduced stream flood flow capacity, and reduced floodplain function during high flow events).

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

Indicator 3 is a cumulative effects indicator. Research from upper Midwestern forests identifies a watershed-based water quality threshold using the area of upland newly cut ("open") land or upland with "young" trees (under 16 years of age) (Verry 2000). When the amount of "young and open" land is greater than 60 percent of the total 6th-level watershed area, that watershed is identified to be at risk for water quality impacts associated with erosion (such as fine sediment and nutrient loading).

Wetland (such as non-upland) is considered to be "old" regardless of the state of the vegetation on it. Wetland is a natural sponge and acts to slow down water, reduce erosion, and promote water infiltration; therefore, wetland inhibits sediment and nutrient transport to streams and lakes in a wide variety of harvest conditions and is appropriate for exclusion from the "young and open" group.

The analysis assesses the forest condition in three states: existing (2014), future (2029) under the No-action Alternative, and future (2029) under the Proposed Action Alternative. For existing condition, young and open upland areas included:

- Stands aged less than 16 years - identified via attributes of GIS layers from USFS, State, and county sources.
- Forest, State, and county roads and trails – area included roads identified in GIS data buffered 16 feet on center and trails buffered 10 feet on center.

- "Change detection" – a State-generated GIS layer that uses computerized comparisons of aerial photos to identify newly cut areas on privately-owned land. Production of the change detection layer was discontinued by the State in 2010. Estimates of young and open land generated in the intervening years (2011-2014) were estimated by extrapolating open land generation rate for the available data (2001-2010) across the four years without data. In general across 6th-level watersheds intersecting the Kabetogama Project Area, new creation of open lands was observed to decrease.
- Ecosystem land types (ELTs) mapped as non-forested upland – such as open fields and gravel pits.

Not applicable for the Kabetogama area, although also checked for inclusion in young and open upland, included GIS layers Burn Area Reflectance Correlation (BARC; or burned area) and blowdown.

The same layers were considered to model future condition, although future plans for road building, and harvest of State, county, or private lands were sometimes unknown. To model the likely future change, a rate of new young and open upland area generation was calculated based on historical rate of change over the last 10 years or as data were available.

The Indicator 3 analysis identifies the proportion of upland open and upland young forest within each 6th-level watershed that occurs within or intersects the Kabetogama Project Area with three percent or greater coverage across the project area. Less than three percent coverage is considered negligible and is not included in the analysis. For the Kabetogama Project Area, 95.5 percent was assessed as part of the young and open analysis.

Upland open and upland young forest on all ownerships of less than 60 percent for each 6th-level watershed is considered acceptable to protect water quality and watershed health (see Forest Plan direction on p. 2-13; S-WS-1). Some impacts, such as those related to natural events (including fire and blowdown) cannot be known in advance and their occurrence is random enough to preclude modeling. Expectation of fire or blowdown in either future area analysis was not included.

3.8.3 ANALYSIS AREA

Indicator 1: <u>Miles of temporary road construction; miles of road decommissioning and road density</u>

The analysis area for direct, indirect, and cumulative effects for the miles of temporary road construction and miles of road decommissioning components of Indicator 1 (Indicators 1a and 1b, respectively) extend to the project boundary (Figure 3.8-1) and includes the known activity on other ownerships. The analysis area was chosen because any measurable effects to water resources are expected to be localized to areas where roads and water resources interact, primarily on small scales and adjacent to riparian areas.

To identify the analysis area for the road density component of Indicator 1 (Figure 3.8-2) each watershed area within the Kabetogama Project was calculated. Impacts associated with road density were considered negligible in watersheds where the project area covered less than three percent of the watershed area. Based on this criterion, the Lower Ash River was not analyzed for road density (<0.003 percent project area in watershed; Table 3.8-2).

The timescale selected for the direct, indirect, and cumulative effects for all components of Indicator 1 is ten years. Effects from road construction/decommissioning and associated changes in road density are generally expected to diminish over time; after ten years effects would no longer be measurable.

Indicator 2: Number of new stream crossings

The analysis area for direct, indirect, and cumulative effects includes one mile downstream of new stream crossings within the project area. This includes stream reaches within the project area and within one mile outside the project area. This analysis area was chosen because effects to water quality from stream crossings, including inputs of fine sediments, may be observed up to one mile downstream from stream crossing sites (Verry et. al. 2000).

The timescale selected for the direct, indirect, and cumulative effects for Indicator 2 is ten years. All construction is expected to be completed within this time and subsequent effects would no longer be measurable.

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

The analysis area for direct, indirect, and cumulative effects for Indicator 3 includes all ownerships within each of the 6th level watersheds that occur within or intersect the Kabetogama Project Area, cover at least three percent of the project area, and contain more than 40 percent wetland or lowland (Figure 3.8-1). The analysis area was chosen because potential effects from proposed vegetation activities and other projects and actions occurring in each watershed should be evident at the watershed scale. The 6th-level watershed measure is also consistent with Forest Plan direction.

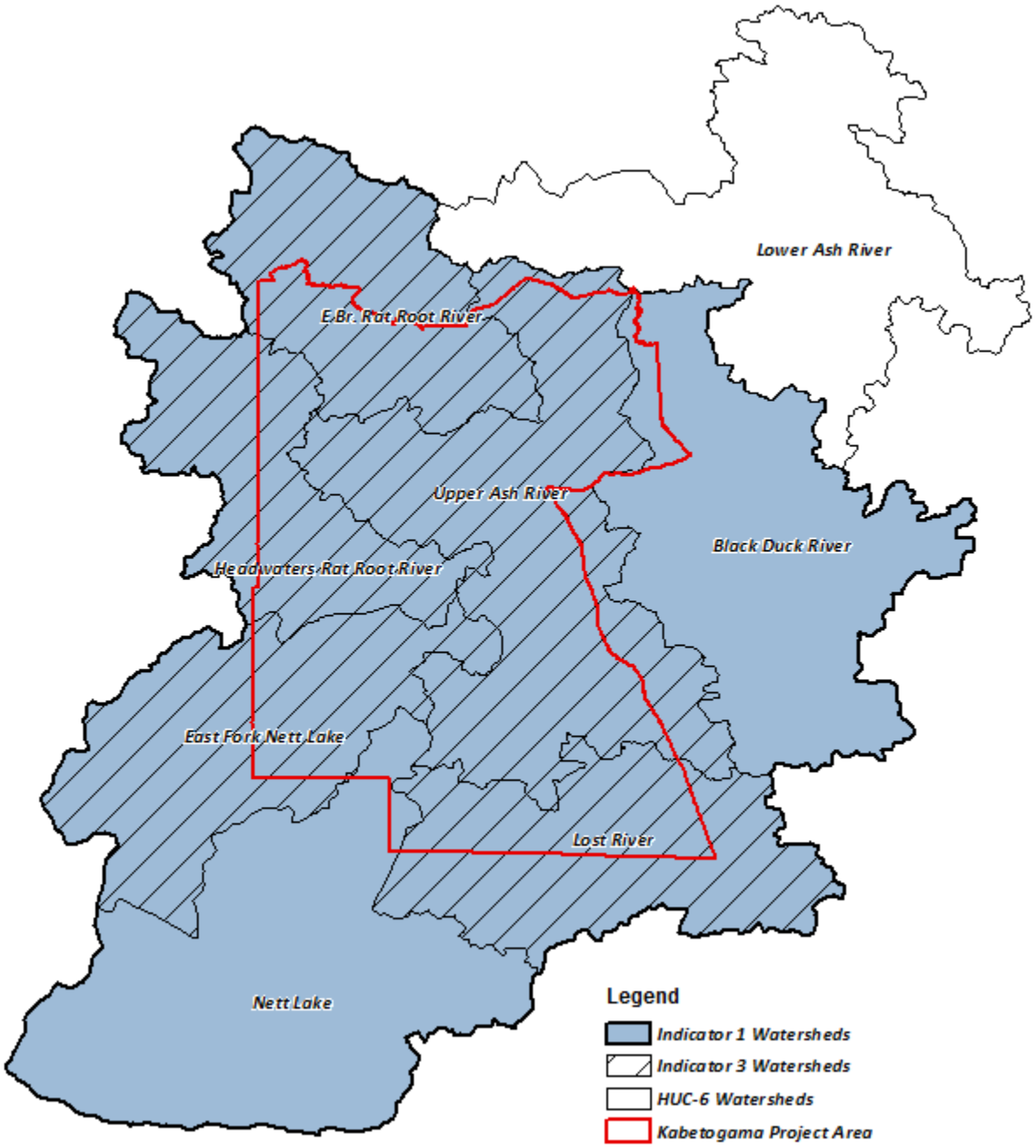
The timescale selected for the direct, indirect, and cumulative effects for Indicator 3 is fifteen years. This length of time was selected to reflect the impact of on-going harvest on non-federal lands. New open areas associated with the project are modeled as completed in 2015/year one. The timescale assumes a constant rate of new young and open upland creation on State and county lands and applies the rate of change indicated by the "change detection" layer to future harvest on private lands.

3.8.4 AFFECTED ENVIRONMENT

Indicator 1: Miles of temporary road construction; miles of road decommissioning and road density

There are currently 200 miles of permanent system road within the Kabetogama Project Area. Existing roads within the project area are maintained at various levels for different uses and transportation needs. Road design, construction, density, and removal affect watershed, riparian, stream, and wetland hydrologic functions such as soil water infiltration, increased surface runoff, removal of stream-side vegetation and riparian habitat, and disruption of natural wetland flow. A description of potential geomorphic, hydrologic, aquatic habitat and soil displacement effects from roads and trails is contained in the Superior National Forest Land and Resource Management Plan Final EIS, pp. 3.6-11-12 (USDA Forest Service 2004d).

Figure 3.8-2: Kabetogama 6th Order Watersheds and Water Resource Indicators Analysis Areas. Analysis area for Indicators 1a, 1b and 2 is the Kabetogama Project Area.



Indicator 2: Number of stream crossings

GIS data analysis indicates seventy-three road-stream crossings across all ownerships within the project area. Stream crossings occur on all-season, seasonal, winter roads, non-jurisdictional drivable roads, and system trails. Winter roads and snowmobile trails crossing smaller streams typically do not require installation of road-fill or culverts. Generally, vehicles cross on the ice without damage to the resource. Winter roads and roads closed to public motorized use are not likely to cause substantial road erosion since they are used during frozen soil conditions, and are used very infrequently for administrative purposes. Beginning in 2002, the SNF surveyed the condition of stream crossings on 1,387 sites in all major project areas within the Forest (including 45 crossing surveys in the Kabetogama Project Area between 2003 and 2013). This work focused on larger stream crossings, crossings owned by the Forest (such as crossings on Forest Roads) and on the Forest's more heavily traveled roads due to the greater potential for impact to water resources. The stream crossing surveys show that approximately 99 percent of stream crossings do not exhibit problems with erosion and 93 percent do not exhibit problems with aquatic organism passage. Based on the surveys of road crossings within the project area, few National Forest System roads had existing crossings in need of rehabilitation or replacement, and all existing crossings have low potential for affecting aquatic organism passage or water quality. Those crossings warranting replacement are remediated on a Forest-wide basis, outside of the scope of the Kabetogama Project, through the Forest-wide Travel Management Project.

Indicator 3: Proportion of upland open and upland young forest within each watershed

The proportion of upland open and upland young forest within 6th-level watersheds influences the hydrologic function of watersheds in several ways. In recently-harvested or open areas, losses from transpiration and interception/evaporation are low, leaving more water available for stream flow. Water that reaches the soil surface is likely to infiltrate to groundwater, which has the potential to contribute to increased water yield and peak flows (Verry 2000). Changes in forest vegetation (such as cover from a mature forested area to young forest or open area) can cause snow to melt faster and rainfall to reach streams faster. The impact threshold occurs when Indicator 3 is greater than 60 percent young and open upland. For the Kabetogama Project, selected watersheds were included in the young and open analysis based on their characteristics:

- If a watershed contained more than 40 percent lowland/water/wetland, the watershed was eliminated from analysis, reflecting the ability of water and lowland environment to buffer any changes in runoff. The Nett Lake Watershed, one of three 6th-order watersheds in the project area contributing to the Little Fork River, contains 61 percent wetland and was not analyzed.
- Watersheds with less than three percent coverage of the Kabetogama Project Area were also eliminated from the analysis, reflecting the small effect of Kabetogama Project activities on that watershed. Watersheds excluded from analysis under this criterion included Black Duck River (2.3 percent coverage of Kabetogama) and Lower Ash River (0.0014 percent coverage of Kabetogama). In total 95.3 percent of the Kabetogama Project Area was assessed under this indicator.

There are five 6th-level watersheds occurring within or intersecting the Kabetogama Project Area that comprise the analysis area for Indicator 3. These watersheds range in size from 17,563 to

35,643 acres (Table 3.8-4). Two of the five watersheds have more than half of their area inside the Kabetogama Project boundary.

3.8.5 ENVIRONMENTAL CONSEQUENCES

This section evaluates potential impacts to water quality and watershed health based on proposed actions. Potential direct, indirect, and cumulative effects to water quality and watershed health are described.

ALTERNATIVE 1: NO ACTION

Direct, Indirect, and Cumulative Effects

Indicator 1: Miles of temporary road construction; miles of road decommissioning and road density

Alternative 1 would maintain the existing road transportation system and road density on National Forest System (NFS) land within the Kabetogama Project Area (Table 3.8-1 and Table 3.8-2). No new system or temporary roads would be constructed on NFS land. As a result, there would be no increased potential for negative effects to water quality or watershed health and no increase in road density on NFS land. There would also be no road decommissioning, resulting in no potential improvements to existing water quality and watershed health conditions from road decommissioning activities and pursuant decrease in road density. Continued motorized use of these roads would:

- Result in no new disturbance.
- Maintain current levels of erosion into streams.
- Maintain current level of watershed, riparian, stream, and wetland function.

Table 3.8-2 indicates the road density existing condition. Watersheds in the DeCatanzaro *et. al.* (2009) study were found to exhibit "moderately degraded water quality" at 16.1 m/ha (21.4 feet/acre). Existing road densities in the Kabetogama Project Area range from 0.00528 to 14.8 feet/acre, below the moderate degradation value documented in the literature. While the study results are not directly transferrable to road density on the Superior National Forest, these values suggest that the existing road density may not pose a threat to water quality. Under the No Action Alternative, no new roads would be constructed or decommissioned and road density on NFS lands would remain the same. Road construction and decommissioning and associated change in road density on non-federal lands are expected to continue at the existing rate and degree of impact.

Indicator 2: Number of new stream crossings

Alternative 1 would maintain all existing stream crossings within the project area; no stream crossings would be constructed or decommissioned on NFS land (Table 3.8-3). Continued motorized use of these crossings would:

- Maintain current quality of in-stream and riparian habitats and number/diversity/biomass of aquatic organisms. Egg and juvenile survival is likely to remain constant. Riparian habitat and stream connectivity is likely to continue at current levels and no new fish barriers are likely.

- Potential new erosion is unlikely and sediment transport should be maintained. No change in stream morphology flow capacity or floodplain function is likely.
- Stream crossing construction on non-federal lands is expected to continue at existing rate and degree of impact.

ALTERNATIVE 2: PROPOSED ACTION

Direct and Indirect Effects

Indicator 1: Miles of temporary road construction; miles of road decommissioning and road density

Alternative 2 proposes new temporary and permanent system road miles within the project area as shown in Table 3.8-1. Under Alternative 2, newly-constructed temporary roads would be decommissioned after all use is completed (USDA Forest Service 2004d, p. F-9).

Approximately 38 percent of proposed temporary roads are restricted to winter use (2.3 of 6 miles). Winter road use provides for greater protection to water quality and watershed health than roads that allow use outside of "frozen" conditions since travel over ice or snow has far less chance to create erosion or contribute sediment to receiving water bodies. Disturbances to riparian vegetation within project area may occur on sites not protected by snow. Negative impacts to water quality and watershed conditions within the analysis area from the use of temporary winter roads are not anticipated since use is restricted to "frozen" conditions.

Impacts to water quality from soil disturbance and erosion may occur from some roads as they are constructed and/or maintained to standard; however, with implementation of MFRC guidelines and Forest OSGs, impacts to watershed, riparian, stream and wetland functions are likely to be minimal.

Alternative 2 also includes decommissioning of existing roads. Road decommissioning would render each road unusable by motorized vehicles, remove any stream crossings and fill from flood prone and wetland areas, and require revegetating exposed soil surfaces (USDA Forest Service 2004b, p. 2-50). By eliminating a potential sediment source, decommissioning may improve existing water quality and watershed conditions within the analysis area, decrease potential surface erosion and run-off; as well as decrease sediment input into local streams, lakes, and wetlands.

The road density analysis conducted for Alternative 2 suggests that the road miles added as part of the Proposed Action may not have a negative impact on water quality. An increase in road density of 11.6 m/ha (15.3 feet/acre) was linked to a decline in water quality in the literature (DeCatanzaro *et. al.*, 2009). Road density increases in the Kabetogama Project Area range from no change to 1.1 feet/acre, below the degradation value documented in the literature. While the threshold value noted in the study is not directly transferrable to road density on the Superior National Forest, the calculated change in road density associated with the Proposed Action suggests that the proposed road density increase may not pose a substantial threat to water quality.

Table 3.8-1: Kabetogama Transportation System Management		
	Alt 1: No Action (Miles)	**Alt 2: Proposed Action (Miles)**
Length of road to be decommissioned	0	1.4
Length of new temporary road	0	6
Length of new OML 1 road to be added to the system	0	2
Length of new OML 2 road to be added to the system	0	<0.1
Length of new long-term special use roads	0	<0.1

Table 3.8-2: Analysis Results: Road Density			
6th Order Watershed Name	**% Watershed in Kabetogama Project**	**Existing Condition**	**Alt 2 – Proposed Action**
		Road Density (feet/acre)**	**Road Density Increase (feet/acre)****
Lower Ash River *	0.003	NA	NA
Upper East Branch Rat Root River	45.8	7.4	0.1
Headwaters Rat Root River	53.5	12.1	1.1
Upper Ash River	81.9	14.8	0.3
Black Duck River	4.9	-13.2	0.01
Lost River	38.3	5.3	0.4
Nett Lake***	4.3	0.005	0
East Fork Nett Lake	39.1	5.8	0.5

* Watershed not analyzed (<3% of watershed in Kabetogama project)
** Compare with DeCatanzaro et. al. (2009)
Road Density linked to "Moderately Degraded Water Quality = 21.6 feet/acre (existing condition comparator)
Road Density increase linked to "negative impact" =15.3 feet/acre (Alternative 2 comparator)
*** No new roads proposed in the Nett Lake watershed
NA = not analyzed

Indicator 2: <u>Number of new stream crossings</u>

Alternative 2 would add four new permanent and four new temporary stream crossings (Table 3.8-3). The crossing structures added on both permanent and temporary roads would be removed; permanent road crossings would be removed upon placement of the road into storage (OML 1) and temporary road crossings would be removed upon decommissioning of the road.

Table 3.8-3: Kabetogama Project Stream Crossings		
	Alt 1: No Action	**Alt 2: Proposed Action**
Number of new stream crossings to be added on permanent system roads	0	4
Number of new stream crossings to be added on temporary roads	0	4
Number of stream crossings to be removed from permanent system roads	0	4*
*Note: Permanent roads are Objective Maintenance Level 1; culverts will be removed as part of road storage preparation procedures.		

Aquatic ecology is likely to be unimpacted by the proposed action. Although eight new road-stream crossings are proposed, the overall impact in concert with Forest Plan, National, and MFRC guidelines is likely minimal. No observable impact to fish survival, aquatic habitat, or stream connectivity is expected. Proposed crossings may affect stream morphology in the short term; although together with Forest Plan and MFRC guidelines these impacts would be minimized. Crossings are unlikely to affect flood flow capacity or floodplain function.

CUMULATIVE EFFECTS

Past, present, and reasonably foreseeable future projects considered for cumulative effects are identified in Appendix E. Of the projects listed, those that could affect watershed health and water quality and are considered in this analysis include timber harvest and travel management projects.

Indicators 1 and 2: <u>Miles of temporary road construction; miles of road decommissioning and road density and number of new stream crossings</u>

Potential contributions to negative cumulative effects associated with new road construction and stream crossings from federal, State, county, and private road construction projects associated with timber harvest, private development and special use permits, as well as routine road maintenance and transportation activities, were assessed. The analysis area has mixed ownership with roads crossing from one landowner to the next and includes multiple jurisdictions. Special use road access needs for State and county were addressed through the proposed actions. Potential effects for these actions were also discussed under the direct and indirect effects. It can be assumed that the various non-federal landowners in the analysis area would continue to maintain their roads in their existing condition.

The Forest-wide Travel Management Project (TMP) made decisions on the future uses of known unauthorized roads across the Forest. See Appendix C: Past, Present, and Reasonably Foreseeable Future Actions for information on specific actions occurring in the project resulting from travel management.

No new stream crossings on non-federal lands were identified within the stream crossing analysis area. The relatively short length of new road, together with Forest Plan and MFRC best management practices and design guidelines, is unlikely to create additional impact in the project

area. Additionally, proposed road decommissioning may result in improvements in water quality within the project area.

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

Indicator 3 considers new young and open upland created through timber harvest activities outside federal lands as well as changes to the travel management system. As noted in Appendix E, approximately 1,510 acres on State land, 740 acres on county land, and 720 acres on private land is proposed for harvest.

The results of the Indicator 3 analysis under the No Action Alternative suggest water quality and watershed health is likely to remain high. Implementation of Alternative 2 results in total young and open upland (federal and nonfederal ownerships) ranging from 9 percent to 23 percent in analyzed watersheds. The action alternative is not expected to produce substantial negative cumulative effects to water quality and watershed health as measured by Indicator 3.

Figure 3.8-3: Percent Upland Watershed in Young and Open Condition in the Kabetogama Project Area by 6th level watershed under existing conditions (2014), the No Action alternative (2029), and the Proposed Action (2029)

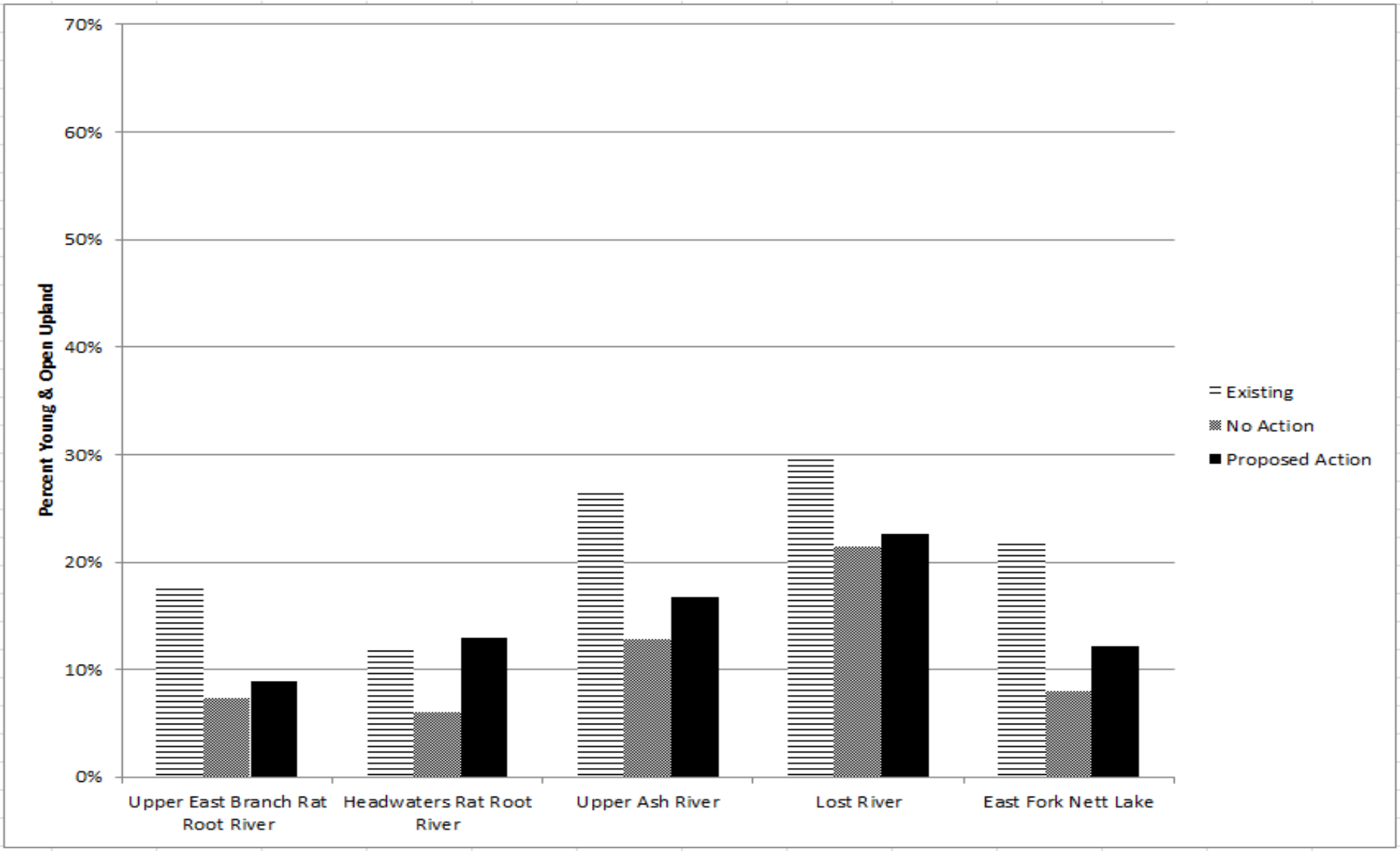


Table 3.8-4: Results of Indicator 3 Analysis for 6th Order Watersheds in the Kabetogama Project

6th Order Watershed Name	General Watershed Statistics				Indicator 3: Young and Open Upland		
	Area (acres)	Upland (acres)	Kabetogama project in watershed (acres)	Watershed in Kabetogama project (%)	Existing Condition: 2014 (%)	Alt 1 - No Action: 2029 (%)	Alt 2 - Proposed Action: 2029 (%)
Lower Ash River*	33,579	26,976	1	0.0014	NA	NA	NA
Upper E. Br Rat Root River	19,213	14,046	8,805	45.8	17.8	7.4	8.9
Headwaters Rat Root River	17,563	14,026	9,400	53.5	12.2	6.0	12.9
Upper Ash River	35,643	28,529	29,208	81.9	26.7	12.9	16.7
Black Duck River*	32,044	25,828	1,571	2.3	NA	NA	NA
Lost River	22,043	16,557	8,449	38.3	29.9	21.5	22.6
Nett Lake*	37,222	14,488	1,608	2.4	NA	NA	NA
East Fork Nett Lake	23,478	16,001	9,179	39.1	21.8	8.0	12.2

* Watershed not analyzed (<3% of Kabetogama project in watershed), NA = not analyzed

3.8.6 PROJECT-SPECIFIC CONSIDERATIONS

3.8.6.1 HERBICIDE

Hand herbicide application is proposed for use within the Kabetogama Project. Treatments would be executed through three application techniques designed to minimize herbicide use and damage to non-target resources. Hand treatment techniques include:

- Spot-foliar application: a three-foot sprayed radius around a desired tree.
- Basal bark application: herbicide applied around the circumference of the stem of a 2-5 inch diameter tree and 18 inches high from the base of the tree.
- Hack and squirt application: 1-2 milliliter(s) of concentrated herbicide applied directly to an incision made by a hatchet 4-5 feet above the ground on a 2-5 inch diameter tree.

The USDA Forest Service contracted with Syracuse Environmental Research Associates (SERA) to evaluate toxicological data based on Environmental Protection Agency (EPA) studies and other current peer-reviewed scientific literature to understand potential impacts to human health and the environment associated with use of various types of herbicide. Detailed toxicological analysis and literature review for each herbicide are found in the SERA risk assessments (SERA 2011a, SERA 2011b, and SERA 2004) located in the project record. Herbicides proposed for use include:

- **Glyphosate** (N-[phosphonomethyl] glycine): a non-selective, broad spectrum, systemic herbicide with no soil residual activity that is used to control many annual and perennial plants. Glyphosate by itself is of relatively low toxicity to birds, mammals, and fish, but the surfactants in some formulations are highly toxic to aquatic organisms (Tu et al. 2001).
- **Triclopyr** ([{3, 5, 6-trichloro-2-pyridinyl} oxy] acetic acid): a broad-leaved selective systemic herbicide used to control woody and herbaceous broadleaf plants along right-of-ways, in forests, and in grasslands and parklands. It has little or no impact on grasses. The Garlon 3A formulation (Triclopyr TEA) would be used.

The type of surfactant used is another important consideration. A surfactant or emulsifier is a chemical adjuvant designed to break up the surface tension of a liquid. Also known as a “wetting agent”, surfactants are used to break up the natural resistance of a plant’s leaves to whatever chemical is being applied , reaching the intended target more quickly and thoroughly than if it was applied by itself. Use of a surfactant increases the effectiveness of the selected herbicide without changing its effects or chemical structure. To protect aquatic life, only non-ionic surfactants, such as Liberate™, Entrée™ or Activator90™, would be used.

3.8-5: Proposed Herbicides and Treatment Methods			
Common Chemical Name	**Example of Trade Names**	**Application**	**Target**
Glyphosate	Rodeo, Roundup, Accord	Stump treatment, foliar treatment, hack/squirt	Non-selective
Triclopyr	Garlon 3A, Tahoe3A, Element 3A	Stump treatment, foliar treatment, hack/squirt	Broadleaf selective

Herbicide would be prepared and applied in conformance with label directions, MFRC guidelines for herbicide application, Forest Service Manual 2150 (Pesticide Use Management and Coordination), Forest Service Handbook 2109.14 (Pesticide Use Management and Coordination Handbook), the Forest Service Health and Safety Code Handbook Chapter 22.1 and all federal, State, and local regulations.

Pursuant to these guidelines, best management practices, and regulations:

- All formulations of herbicides used would be approved for aquatic use. To protect terrestrial adult frogs and toads and honey bees, formulations of glyphosate which contain polyethoxylated tallow amine (POEA) surfactants would not be used.
- No herbicides, even those labeled for aquatic use, would be applied to streams, lakes, wetlands, or vernal pools.
- No usage of herbicide within filter strips and riparian management zones of streams, lakes, or open water wetlands (MFRC guidelines).
- Herbicide application would only occur when wind speeds are less than 10 mph or according to label direction to minimize herbicide drift.
- Weather forecasts would be obtained prior to herbicide treatment and would not be conducted if forecast is unfavorable (such as during high winds or impending storms).
- Treatment activities would be halted during rain events.

Herbicide (for example, triclopyr) has also been used to eliminate non-native invasive plant species Forest-wide. Herbicide use has been approved in the Pelican, Skibo, and Pearl EAs. Approximately 70 acres of herbicide treatments have been implemented in the Pelican areas. To date, herbicide implementation has not occurred in the Skibo areas. Past, ongoing, and reasonably foreseeable future actions include the use of herbicide by MN DNR (110 acres over the past three years and a proposed additional 32 acres in 2014). Monitoring on the Forest to assess the impacts of herbicide on water or other resources has not been conducted to date. No water resources-related monitoring by State agencies is known at this time. However, toxicity of both herbicides on aquatic life has been studied in detail as part of the EPA registration process. Judgments about the potential hazards of herbicides to aquatic life are based, in large part, on the results of standard acute and chronic bioassays on fish, aquatic invertebrates, and in some cases amphibians. The SERA reports provide the following information on the specific formulations proposed for use in this project area:

Glyphosate:

- Glyphosate's impact on a variety of natural settings and habitats is well characterized. Scientists report with high confidence that glyphosate is generally considered to have low toxicity for aquatic life.
- See Tables 28 and 29 (SERA 2011a) information regarding acute and longer-term toxicity concentrations for amphibians, fish, and invertebrates: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Triclopyr/Garlon 3A:

With the exception of aquatic plants, substantial risks to non-target species associated with the contamination of surface water are low, relative to risks associated with contaminated vegetation (SERA 2011b).

3.8.6.2 BEST MANAGEMENT PRACTICES

Impacts can often be minimized or avoided by following all required guidelines, project design features, and mitigation measures during and after project implementation. Monitoring data collected by Superior National Forest and MFRC scientists supports this conclusion.

Design Features and Mitigation Measures

During development of the Kabetogama Project, the interdisciplinary team, including watershed and fisheries specialists, cooperated in developing design features that avoid or minimize adverse effects to water quality and watershed health during project implementation. Project implementation includes proposed treatment activities listed in Table A-1 (Appendix A). Implementation of vegetation management activities under Alternative 2 would follow applicable standards and guidelines in the 2004 Forest Plan (USDA Forest Service 2004b), and applicable MFRC guidelines. Design features and mitigation measures as well as Forest Plan standards and guidelines have been developed to maintain or restore riparian ecological function within near-bank and remainder riparian zones. Under these design criteria, no harvest of trees would occur within riparian areas except for the explicit purpose of maintaining or restoring riparian ecological function. Remainder riparian management zones would also be established adjacent to near-bank zones depending upon floodplain and shoreline slope conditions where vegetative management would favor extended rotation of site appropriate tree species. These criteria would serve to protect and enhance both riparian and within-stream channel habitat conditions as well as water quality and watershed health in the analysis area. Monitoring has shown that timber harvest within near bank riparian zones was completed with good compliance with relevant standards and guidelines (2006 Superior NF Monitoring Report p. 12). Forest Plan standards and guidelines, and applicable MFRC guidelines have been effective in the past and will continue to protect water quality and watershed health in the future.

Riparian areas, lakes, and streams are protected using site-specific design criteria determined at the site (stand) level. The functional riparian area is delineated based on site conditions, and timber management is permitted in the riparian area to restore or improve riparian function (for example, planting long-lived conifers along a lakeshore) and enhance scenic integrity. Management activities may also include increasing the amount of light to the forest floor and reducing competition from dominant aggressive species such as balsam fir, hazelnut, and other shrubs. Harvested species typically include aspen, balsam fir, birch, and jack pine. No more

than 60 percent of the stand's tree canopy would be removed following MFRC guidelines and no more than 50 percent of the shoreline would be harvested. From the water body, treatments would be visible in some areas as some of the gaps created would be placed down to the shoreline. To create conditions for the long-lived conifers, brush saws would be used to fell midstory trees and shrubs to increase light levels on the forest floor. Stands that do not have a natural seed source for long-lived conifers would be planted and protected from deer browse. Natural and artificial regeneration would need to be released after the initial treatment.

Mitigations on State and Private Land

Adherence to MFRC guidelines, Shoreland Rules (Minnesota Department of Natural Resources; MNDNR, 1989), as well as other Minnesota Public Water Works rules and State wetland regulations also contribute to minimizing negative cumulative effects from State, county, and private landowners in the analysis areas. For example, the State of Minnesota and counties have made substantial improvements in the design and correct placement of stream crossings that maintain fish passage and sediment transport.

Monitoring and Compliance

Based upon monitoring information collected by the SNF (2004-2006, 2014) pursuant to Forest Plan and National BMP requirements and MFRC guidelines (2000-2002 vs. 2004-2006), there is evidence that these BMPs, project area design features, and mitigation measures have been successfully implemented to help protect water quality and watershed health. Furthermore, there is evidence that these mitigation measures are effective at reducing impacts to water quality and watershed health. Monitoring shows that mitigation measures on National Forest System, State, county, and private land have been consistently applied and are effective at reducing impacts to water quality and watershed health. Audits of Minnesota BMPs on federal, State, county, and private land that have shown the BMPs to be effective at protecting water quality in 99 percent of situations when correctly applied (US EPA 1994).

Possible Remnant Impacts

While impacts to aquatic resources from general forestry practices would be greatly reduced by implementation of State and federal BMPs, impacts may still be observed. These effects could include:

- Minor sediment input at stream crossing sites during summer or "frozen ground" conditions
- Fine sediment and other debris input associated with grubbing and clearing activities.
- Soil and riparian vegetation compaction associated with the use of temporary winter roads on "frozen ground", which could potentially affect stream, lake, and wetland shoreline habitats
- Alteration of surface water flow in wetlands during "frozen ground" conditions associated with ice and snow compaction

3.8.7 SUMMARY OF DIRECT, INDIRECT AND CUMULATIVE EFFECT

The results of analysis of Indicator 1 (miles of temporary road construction, miles of road decommissioning and road density) and Indicator 2 (number of new stream crossings) indicate

Alternative 1 (no action) has a somewhat lower potential to negatively affect water quality, aquatic life, and watershed health than the action alternative (Alternative 2).

- The No Action Alternative creates no new roads, while the proposed action alternative creates 2.1 miles of permanent road, less than 0.1 miles of long-term special use road, and 6 miles of temporary road. Decommissioning of 1.4 road miles is also proposed as part of the Kabetogama Project. A preliminary analysis based on work near Lake Huron indicates road density does not appear to be at a level above which water quality impacts would occur.
- Alternative 2 creates four new stream crossings, which would be removed upon project completion.

The cumulative effects indicator, Indicator 3, suggests that erosion and fine sediment impact to streams is likely to remain low. With Forest Plan and MFRC best management practices in place, overall impact from Alternative 2 to watershed health and aquatic life and habitat is not likely to be substantially different than if the proposed action alternative was not implemented.

Past, present, and reasonably foreseeable future projects within the analysis area create the possibility of additional exposure of water resources to sediment. Historical harvests on which applicable BMPs were used are expected to produce minimal long-term negative impact within the watershed given the application of design features, mitigation measures, standards, and guidelines (including MFRC guidelines that apply to State, county, and private ownerships).

There may be some minor direct or indirect negative effects to water quality and watershed health as a result of implementing the action alternative. Potential short-term negative effects associated with new roads and decommissioning roads including erosion, run off, and stream flow and flood plain manipulation. However, these are expected to be minimal. The greater the distance the stream or water body is from the road, the less impact the road has on these resources. All required project design features and mitigation measures referred to previously would be followed during project implementation. For example, Forest Plan standards, guidelines, and objectives require that road crossings of wetlands and riparian areas adjacent to lakes and streams be minimized, that hydrologic and riparian functions be maintained or improved when roads or trails are constructed across wetlands, that temporary roads be stabilized and effectively closed to motorized traffic following all use, and that vegetation is established on these roads within 10 years after termination of all contracts, leases, or permits (USDA Forest Service 2004b pp. 2-47 to 2-50).

Based on a review of the information presented in the SERA reports (2004, 2011a, 2011b), with MFRC and Forest Plan protections in place, herbicide is unlikely to result in acute or chronic impacts to aquatic life or habitat. Surfactant should be selected carefully, keeping in mind potential impact to water quality and follow all directions, guidelines, and mitigations; as noted in the Kabetogama Project Herbicide Proposal, no SOEA surfactants would be used.

From a water resources perspective, the difference between alternatives for vegetation management in the Kabetogama Project Area is moderate. Alternative 1, the No Action Alternative, would result in maintenance of current high water quality and watershed health. Alternative 2 adds little permanent road and four new crossings; and both alternatives meet the cumulative impact threshold for young and open. Implementation of applicable BMPs and

Forest Plan guidance would help avoid and reduce cumulative impacts associated with the proposed action, the Travel Management Project, and timber harvest on other ownership.

3.9. SOILS

3.9.1 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 C in this EA summarizes the Forest Plan Standards and Guidelines (referred to as Operational Standards and Guidelines) for soil and other resources that would be mitigated during implementation. Forest Plan standards and guidelines for the soil resource comply with Region 9 Soil Quality Standards (USDA Forest Service 2005). Additionally, Appendix C incorporates the Best Management Practices (BMPs) referenced in this document. The BMPs are also outlined in Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines (Minnesota Forest Resource Council 2012) and are used by other landowners and agencies. Minnesota Forest Resource Council (MFRC) BMPs are mitigations used to minimize impacts to the environment that can occur during management activities. Forest Plan standards and guidelines are expected to provide equal or greater protection to the resources addressed by the MFRC guidelines. Forest Plan direction would take precedence in any situation where MFRC BMPs appear to be in disagreement with standards and guidelines.

3.9.2 ANALYSIS METHODS

Indicator 1: Acres proposed for mechanical treatment for timber harvest

This indicator could also include fuel reduction and acres of prescribed fire or associated skid trails and landings. This indicator analyzes the differences between alternatives related to the influence of mechanical treatment used for timber harvest herbicide application, and prescribed fire. The difference between the action alternative and the no-action alternative relates to the potential impacts for erosion, compaction, displacement, and nutrients.

Indicator 2: Miles of road being added to the system and miles of road being decommissioned

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 amount of road being decommissioned, resulting in land being returned to a productive status.

3.9.3 ANALYSIS AREA

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 Kabetogama 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 SNF. 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. This would 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 effects of the management actions would diminish over time and would not be measurable fifteen years from the time the management activity has occurred.

3.9.4 AFFECTED ENVIRONMENT

The classification system used for the Kabetogama Project is discussed in the National Hierarchical Framework of Ecological Units in Ecosystem Management 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 with short, warm summers and long, cold winters. Accordingly, within the province there are increasingly smaller ecological units called sections, subsections, LTAs, and ELTs.

Almost all of the Kabetogama Project Area is in the Northern Superior Uplands section (212L), and the Border Lakes (212La) subsection. A very small area in the southwest corner of the project area is in the Littlefork-Vermillion Uplands subsection (212Ma), which is within the Northern Minnesota and Ontario Peatlands section (212M) (USDA Forest Service, 1998).

More detailed information concerning project area LTAs and ELTs can be found in the project record.

3.9.5 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 Kabetogama Project and no impacts from those treatments. No temporary roads would be constructed and no existing roads would be decommissioned. Some roads would not be upgraded. These roads would remain open for motor vehicle traffic in their current condition, and any existing resource damage, such as erosion and rutting, would persist. Areas of road that would not be decommissioned would remain unproductive.

No treatments for oak-blueberry would occur, including stand improvement cutting and prescribed burning. If a wildfire occurs, the soil would be severely burned, causing detrimental impacts to the soil. Soil erosion could occur on steep slopes.

ALTERNATIVE 2: PROPOSED ACTION

Direct and Indirect Effects

Indicator 1: Acres proposed for mechanical treatment for timber harvest

Alternative 2 would result in future vegetation management activities. By following Operational Standards and Guidelines described in Appendix B and Appendix C, these treatments would result in minimal impacts to the soil. For example, the 2009 monitoring report (USDA-FS, 2009 Monitoring and Evaluation Report, p. 3.1-2) concluded that the standards and guidelines have been adequate in protecting the soil resource.

As such, "The results of past monitoring indicate that Forest Plan guidelines are providing adequate protection to the soil resource. This meets Forest Plan objectives." (2009 SNF Monitoring Plan, p. 3.2-Soils).

To determine overall impacts to soil quality, the amount of area impacted and the degree of impact was analyzed. Table 3.9-1 shows the acres of harvest, and mechanical site preparation that would occur on harvested sites. As well as herbicide application acres that could be treated on harvest sites and wildlife oak-blueberry treatment on non-harvest sites.

Table 3.9-1: Acres of Treatment on Harvest and Non-Harvest Sites for the Kabetogama Project

Treatment Type	Alternative 1 Acres	Alternative 2 Acres
Harvest[1]	0	4,692
Wildlife Oak-Blueberry[2]	0	269
Site Preparation	0	357
Herbicide Application[3]	0	2,249

[1]Acres shown are stand acres. Actual treated acres would be less than the acres shown to account for legacy patches, reserve areas, and other resource protection measures.

[2]Acres of oak and/or blueberry habitat improvement could include release and weeding and/or prescribed fire to open up the canopy to favor oak and/or blueberry species.

[3]Acres herbicide application could occur.

Much of the impact to 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; therefore, reduced water infiltration and an increased potential for erosion could occur. 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 3.9-2.

Management activities could also include biomass removal, which refers to the utilization of fine woody debris, brush and non-merchantable limbs, stems and branches. It would not include stumps or existing coarse woody debris. 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; therefore, they would not likely be susceptible to detrimental nutrient loss as a result of biomass harvest. However, biomass harvesting would also be allowed if long-lived conifers are the prescription on the lower nutrient sites, such as ELTs 7, 11, 16 and 17 (see 2004 Superior National Forest Plan, Table G-WS-8a, Activity Code F) and the Minnesota Forest Resource Council Guidelines for biomass harvesting are followed. ELT 11 is the primary low-nutrient soil type in the Kabetogama Project Area.

Nutrient removal associated with harvest activity 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 Elioff 1998). Impacts to site productivity associated with harvest activity in the Kabetogama Project Area are expected to be minimal by following guidelines from tables G-WS-8 and 8a (see Appendix C and Forest Plan). These guidelines state that nutrients will be retained by maintaining or converting the pine/conifer type, allowing slash to remain on the ground and/ or extending the rotation age.

The potential impact from prescribed fire for ecological purposes is a decrease in site productivity as a result of nutrient loss. Nutrient loss could occur as a result of volatilization or a loss of organic matter on nutrient sensitive soils. This impact would be eliminated or minimized by following Forest Plan guideline G-WS-10. Following this guideline would take into account the amount of fuel, along with ignition timing and patterns. Other factors that would influence fuel conditions include vegetation type, number of days since precipitation, weather conditions, and fuel moisture. If dozer lines are constructed as fuel breaks, BMPs regarding soil erosion and compaction would be implemented. Natural and human created fuel breaks, such as roads, would be used when possible. Depending on the soil conditions, pile burning could cause severe burning of the soil; however, the area burned would be isolated to the area beneath the pile, thus minimizing the impacts in other areas.

The proposed herbicide application has low potential to affect the groundwater (see Water Resources section, 3.9.1) by leaching through the soil. The amount and type of herbicide, the timing of application, the soil type, and the method of application would minimize that effect. A risk assessment for the Forest Service has been conducted for the proposed herbicides – Glyphosate and Triclopyr (SERA, 2003a and SERA 2003b respectively). Glyphosate has a very high soil adsorption coefficient, which means it binds very tightly to the soil so there is little chance for leaching or runoff. Glyphosate also has very low movement rating, which means it degrades quickly and binds very well to soil so there is a low risk of delivery to ground or surface waters. Triclopyr has a moderately low soil adsorption coefficient, which means it does not bind as tightly to soil so there is a higher chance for leaching. However, triclopyr degrades relatively quickly in the soil. For both herbicides - when applied in conjunction with herbicide label instructions, project mitigations, MFRC Guidelines, and the fact that the area being treated in the stand is relatively small, there a low risk of delivery into ground or surface water (see Appendix H for more information).

Indicator 2: Miles of road being added to the system and miles of road being decommissioned

Some existing roads within the project area are not needed for management activities or there are concerns about resource damage. These roads would be decommissioned under the action alternative. Road decommissioning would allow for that land to be returned to a productive status. These roads would be constructed to a standard to minimize impacts to other resources. The amount of road that would be added to the system and decommissioned through the implementation of each alternative is shown in Table 3.9-2. Roads that are added as shown in Table 3.9-2, are not newly created roads, but already are in existence.

Table 3.9-2: Transportation Activities by Alternative for the Kabetogama Project[1]

	Alt. 1		Alt. 2	
	Miles	Acres	Miles	Acres
Roads added to the system	0	0	2.1	5.1
Roads being decommissioned	0	0	1.4	3.4
New temporary roads	0	0	6	14.5

[1]Acreage calculated using a 20 foot road width

Impacts of temporary road construction include compaction and displacement of soil, and potential sediment delivery to nearby wetlands and waterways. However, impacts would be minimized by using existing corridors where possible. Impacts would also be greatly reduced through the use of BMPs along with Forest Plan standards and guidelines (S-TS-3, G-TS-13). Most of these impacts would be short term (less than fifteen years). Temporary roads totaling six miles need to be constructed to facilitate resource management. Some logging access roads would be winter roads over frozen soil, due to the need to cross wetlands. All temporary roads would be decommissioned after use. Once treatment activities are completed, the road would be rehabilitated and revegetated. Also, see Water Resources (3.8) in the EA for additional information on sediment delivery from temporary roads.

Conclusion – Direct and Indirect Effects all Alternatives

The No Action Alternative would result in no impacts from vegetation management activities. Land that would have been converted back to a productive status through road decommissioning would remain in an unproductive condition under this alternative.

The vegetation management and road management activities proposed in the action alternative would result in minimal impacts to the soil resource. Effects to soil resources would be minimal since MFRC Site-level and Forest Plan guidelines would be followed for prescribed fire treatments. If a wildfire did occur, Alternative 2 would reduce the impact to soil resources compared to the No Action Alternative. The amount of land affected by landings and skid trails (Table 3.9-2) would be minimized by following MFRC Site-level and Forest Plan guidelines. Actions taken to decommission existing roads in Alternative 2 would eliminate impacts caused by their current use, returning those areas of land to a productive status.

CUMULATIVE EFFECTS

Effects from past action have been considered in the existing condition. From a soil perspective the area would be detrimentally impacted, but the amount would be minimal. While there are other timber sales and actions in the project area, they do not overlap the proposed treatment units therefore their effects are not additive or cumulative.

Potential effects to the soil resource are logically confined to the soil directly beneath where the activity takes place; therefore, no impacts are anticipated to soils in the Boundary Waters Canoe Area Wilderness or Voyageurs National Park.

Minimal impacts are anticipated from management activities on State and county lands through the implementation of BMPs. Pile burning could detrimentally impact the soil, but since the affected area is directly beneath each pile, the affected area is minimal. 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 percent and 0.5 percent, respectively. Rutting from management activities was detected in 11.3 percent of 6,147 locations assessed for rutting. Of those locations where rutting was observed, 64 percent had less than 5 percent of the surface area in ruts. Also, on 88.7 percent of the sites the rutting was limited to roads, skid trails, and landings (Dahlman 2008). Minimal cumulative effects are anticipated through the use of Forest Plan standards and guidelines and the use of BMPs.

No discernible impacts to long-term soil productivity have been identified as a result of past management activities within the Kabetogama Project Area. Grigal (2004) recently 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.

3.10 TREATY RIGHTS

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, statues, 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 System lands are protected through various statues. 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 these 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) has confirmed this right to hunt, fish, and gather without regulation by the State of Minnesota.

All three bands, Fond du Lac, Bois Forte, and Grand Portage were consulted with and were provided an opportunity to assist in the development of the proposed action for the Kabetogama Project. Cover letters and preliminary proposed action maps were mailed to all three bands, along with scoping materials.

The Bois Forte Band submitted comments on cultural resource surveys and updating the Band on work in this area. Response to these comments may be found in Appendix F, comment KS-008-1. Should Alternative 2 be selected, additional heritage resource survey would be completed in the project area.

The Kabetogama Project proposes to change the vegetation age class distribution and species composition which could result in a change to available habitats for game species.

Alternative 1-No Action would not be responsive to tribal interests such as improving moose habitat, maintaining or increasing Forest access, or planting long-lived conifer species in riparian areas and adjacent to wild rice lakes.

Under Alternative 2, moose habitat and browse would increase by implementing harvest activities creating young stands. Oak and/or blueberry species would be favored on 269 acres that regenerates oak and blueberry and increases mast production for a variety of wildlife species.

3.11 OTHER DETERMINATIONS

3.11.1 HERITAGE RESOURCES

INTRODUCTION

Forest Plan direction for heritage resources includes: to identify, evaluate, monitor, and preserve heritage resources (O-HR-1) for, “the qualities for which they have been deemed significant” (D-HR-1); to promote heritage values in public education and outreach (O-HR-2); and to contribute relevant historical and cultural perspectives to natural resource management (O-HR-3). These desired conditional and objectives can be found in the Forest Plan on pp. 2-38 and 2-39. This project is managed for heritage resources as outlined in the Heritage Resource Standards and Guidelines in the 2004 Superior National Forest Plan and in the 2015 Programmatic Agreement with SHPO allowing for site-specific heritage surveys as needed prior to implementation. These

agreements are in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (36 CFR 800). 36 CFR 800 can be found on the web at http://www.achp.gov/regs-rev04.pdf.

As outlined in 36 CFR 800 Protection of Historic Properties, federal agencies are responsible for the management of historic properties. Historic properties are defined as, "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior" [36 CFR 800.16 (1)(1) Historic property:15]. This also includes properties of traditional religious or cultural importance to Indian tribes that meet eligibility requirements for the National Register of Historic Places. For purposes of this analysis, historic properties will be termed heritage resources. Heritage resources management on the Superior National Forest includes evaluation of heritage resources to determine eligibility for listing on the NRHP. Unevaluated resources are treated as eligible until such time as they can be formally evaluated. Therefore, eligible and unevaluated resources are typically excluded from project activities, pursuant to S-HR-9 of the Forest Plan (p. 2-39), which places a buffer around heritage resources to ensure their protection and avoidance from project activities.

To satisfy the Forest's responsibilities under Section 106 of the NHPA to consider the effects of undertakings, a heritage resource inventory was conducted for the project area. The goal of this inventory was to identify historic properties to protect them from project activities. Results of this inventory will be documented in the Kabetogama EA Cultural Resources Reconnaissance Report (CRRR) 1506003 and reported to the Minnesota State Historic Preservation Office (MN SHPO) in the FY2015 Superior National Forest Heritage Annual Report.

ANALYSIS METHODS

The indicator for this analysis is the presence of known and recorded heritage resources within or immediately adjacent to treatment units and proposed temporary roads. This indicator identifies the number of heritage resources per alternative that have the potential to be adversely affected by proposed management activities and identifies site type (prehistoric, historic, and multi-component).

ANALYSIS AREA

Spatially, the analysis area for heritage resources includes all proposed treatment units and proposed temporary roads to treatment units. All areas that have the potential to create ground disturbance within the project boundary were analyzed. Because heritage resources are a static resource, a buffer placed around each resource ensures adequate protection from ground disturbance. The temporal boundary is the duration of the activities. These boundaries are adequate because areas outside the units are not expected to undergo any ground disturbing activities, and when activities are completed, there would be no additional ground disturbance.

AFFECTED ENVIRONMENT

Within and immediately adjacent (20 meters) to treatment units in the project area, there are 10 heritage resource sites, all historic, located within the units for Alternative 2. The 10 known historic sites consist of logging camps, homesteads/farmsteads, and rail road remnants. No prehistoric sites have been previously identified in the proposed project area. Historic use of the Ash River area by Bois Forte Band members has been noted and the Forest fully anticipates

conducting additional heritage resource survey in the project area. The Forest will be amendable to additional consultation to fully address potential heritage resource concerns prior to project implementation.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1: NO-ACTION

Direct, Indirect, and Cumulative Effects

There would be no direct, indirect, or cumulative effects under Alternative 1 because there would not be any new ground disturbing activities.

ALTERNATIVE 2: PROPOSED ACTION

Direct and Indirect Effects

Alternative 2 includes treatment units that contain, or are adjacent to, known heritage resources. Actions associated with this alternative all present potential direct effects to heritage resources. Ground disturbing activities associated with timber harvest, hazardous fuel removal, and road treatment activities have the potential to adversely affect heritage resources through surface and subsurface artifact and feature displacement. Potential indirect effects from timber harvest activities, fuel reduction, and construction of temporary roads into units could occur as a result of increased access to and visibility of heritage resources, increasing the likelihood of artifact looting.

Heritage resources within or adjacent to these ground disturbing activities will be given a minimum one chain buffer (66 feet) from the treatment unit boundary. Where the opportunity exists, efforts would be taken to incorporate these "within unit" heritage resources into reserve tree or legacy patch areas. Any flagging used for buffering these areas would not be marked differently than any other flagging use for unit boundary identification. These mitigation measures would help minimize the potential of looting and would eliminate direct effects to the heritage resources. Post-treatment monitoring of site buffers and non-disclosure of site locations would effectively eliminate post-treatment impacts; therefore, heritage resources would experience no indirect effects under Alternative 2. Should any heritage resources be discovered during implementation, all treatments within the site vicinity would stop and the Heritage Program Manager would be notified to assess the condition and implement protection measures.

CUMULATIVE EFFECTS

As all heritage resource sites would be avoided through project design from current activities to predictable future project activities; it is anticipated there would be no cumulative effects from either alternative.

3.11.2 RECREATION

The Kabetogama Project Area receives a variety of dispersed recreational use primarily during the fall hunting seasons. Some of the most common activities that occur in the project area include bird and deer hunting, ATV riding, berry picking, ice fishing, and snowmobiling. Most of these activities take place on forest roads, trails, and one lake-Ash Lake.

Recreation opportunities within the Kabetogama Project Area include the National Forest road system, one moderate sized lake used for fishing and motor boating, and a segment of the Arrowhead State Snowmobile Trail.

Alternative 2 would not change the recreation setting nor the amount or pattern of recreation use occurring. This is based on the knowledge that the current setting includes sights and sounds of human activity. In addition, similar types and amounts of vegetation management have occurred in this area in the past (and on other public lands) and are expected in the area by many recreational users.

Operational Standards and Guidelines and site-specific mitigation measures provide reasonable assurance that there would be no substantial impacts to recreation in the project area.

3.11.3 SCENERY

The Kabetogama Project Area scenery resources can be described as a forest setting which includes a variety of tree species and a variety of ages but is characterized by mature white pines, red pines, jack pines, and to a lesser extent, hardwood species such as maple, oak, aspen, and birch. This forest setting also includes a diverse understory composed of shrubs, ground cover, and patches of young trees. Fairly flat topography usually only allows scenic vista view sheds across open areas like lakes, rivers, wetlands, and vegetation management openings. Some of the most common activities that occur in the project area include bird and deer hunting, ATV riding, berry picking, ice fishing, and snowmobiling. Most of these activities take place on Forest roads, trails, and Ash Lake.

Vegetation management activities located within the High and Moderate Scenic Integrity Objectives areas would be implemented following the Desired Future Condition and Standards and Guidelines for Scenery as outlined in the Land and Resource Management Plan (Forest Plan pg. 2-45 to 2-47). Vegetation management activities would:

- Enhance views, create vistas, and feature natural openings
- Retain canopy over travel routes
- Encourage vegetation diversity and seasonal color contrast
- Enhance big-tree appearance

Alternative 2 would not substantially change the scenery resource in the project area. This is based on the knowledge that the current setting includes sights and sounds of human activity. In addition, similar types and amounts of vegetation management have occurred in this area in the past (and on other public lands) and are expected in the area by many visitors.

Operational Standards and Guidelines and site-specific mitigation measures provide reasonable assurance that there would be no substantial impacts to scenery in the project area.

3.11.4 WILDERNESS

The Forest Service has the responsibility to protect the wilderness character of the Boundary Waters Canoe Area Wilderness (BWCAW). The Kabetogama Project Area is not adjacent to the BWCAW. However, each of the resource sections has considered how the proposed actions outside the Wilderness boundary would affect the Wilderness. This consideration is either

included in the analysis sections or stated in the Kabetogama Project Record that there will be no effect on the BWCAW from the standpoint of that particular resource.

Alternative 1 would have no impacts to the Boundary Waters Canoe Area Wilderness. Alternative 2 would have no impacts to the BWCAW due to the distance between the project area and the BWCAW. The Kabetogama Project boundary is approximately 19.5 miles from the BWCAW, at its closest point; however, the closest proposed treatment is approximately 20.5 miles from the BWCAW. Existing conditions would remain unchanged and impacts to wilderness visitors in the form of sound from roads, vegetation management activities, and other sources outside the BWCAW would continue to exist in their current state.

3.11.5 AIR QUALITY

INTRODUCTION

Prescribed burning can affect air quality through the release of particulates and pollutant gases; however, it is only a temporary source of air pollution. Prescribed fire activities are proposed as a way to control understory vegetation for wildlife habitat improvement.

Data from permanent, EPA-certified air pollutant monitors were examined to get the most accurate picture of the existing air quality. The air pollutant of focus for this analysis is particulate matter smaller than 2.5 micrometers in aerometric diameter, known as PM2.5. Combustion sources of all types are the major sources of PM2.5. Furthermore, PM2.5 is a major cause of visibility degradation due to its ability to absorb and scatter light.

The Minnesota Pollution Control Agency (MPCA) operates a monitoring network Statewide to measure PM2.5. This network is used to determine if Minnesota is in attainment with the PM2.5, National Ambient Air Quality Standard (NAAQS). Current monitoring data indicates that the entire State of Minnesota meets the PM2.5 NAAQS of thirty-five micrograms per cubic meter. The current overall condition of the air resource in northern Minnesota (as represented by the monitor located in Virginia), in reference to PM2.5, is the best in the State compared to the other monitors throughout the State (Biennial report to the Legislature, PR).

The area in and around the Forest is currently subject to air pollutants from internal combustion engines (e.g., vehicles, snowmobiles, outboard motors, and chain saws) and industrial sources (e.g. taconite plants and power plants). Because of the low level of emissions by these sources and/or dispersion of these emissions by wind over long distances, the reference above shows that pollutants from these sources typically do not attain high enough concentrations to exceed the PM2.5 standard.

ALTERNATIVE 1

Alternative 1 does not include any proposed burning activities so there would be no new emissions from prescribed fire. However, emissions would be more severe if a wildfire started. Wildfires are expected to produce greater emissions than prescribed burns. Wildfires generally burn under more extreme dryness and heat conditions with lower fuel moistures than prescribed fires, leading to greater consumption of fuels. In a crown fire, the needles and smaller branches of the tree canopy, as well as the surface fuels, are consumed producing even greater emission than a surface fire. When conditions are very dry, larger diameter downed woody fuels and duff can be consumed as well. They are rarely consumed in flaming phase but often smolder after the main fire has passed, and have a higher potential to emit large amounts of residual smoke.

ALTERNATIVE 2

Alternative 2 would utilize prescribed fire to dispose logging slash at the landings and meet ecological objectives. Alternative 2 would burn approximately 269 acres on 7 units for ecological purposes. There is no estimate on the number of logging slash piles that would be burned either within the unit or at the landings after mechanical site preparation. Most logging operations have gone to processing the trees within the unit. The logging slash remains at the site where the tree is severed from the stump. Even whole tree operations hauls slash back to the unit and scatters it throughout the unit. The number of slash piles is expected to be very small. Even if there were many piles to be burned, it would create limited impacts because slash pile burning exhibits more complete combustion (hence producing fewer emissions) since more of the burning happens in the flaming phase than the smoldering phase (NWCG 2001).

None of the proposed burning is expected to generate smoke emissions at levels that could cause adverse health impacts based upon direction in the Forest's Dispersion Index screening analysis for prescribed burns (MN Smoke Mgmt. Plan, 2007). Prescribed burns can utilize wind vectors that do not blow in the direction of structures within close proximity of the burn. Also, burning on days with a smoke dispersion index of "fair or better" and reducing acreage burned per day helps to mitigate the effects of smoke and emissions to the sensitive receptors downwind. Larger burn units could be broken into several smaller units and burned over several days. All prescribed burning would follow the Minnesota Smoke Management Plan that was developed to prevent adverse smoke impacts. In addition, prescribed burning would occur over a ten year period. Subsequently, fire emissions from the project would be released over a number of years versus a few days with a wildfire.

Effect of smoke from the burning activities associated with this project would be negligible to people around these burns. The public may see a smoke column and smell smoke until combustion of material has been completed. They may also smell a strong odor of smoke during the night and early morning following ignition as the smoke settles into low lying areas near the burn. Any wind occurring during the night should help disperse smoke and prevent smoke settling into the low areas.

Prescribed burns would not impact the air quality or exceed any health standard in the Voyageurs National Park or BWCAW. Most of the units proposed for burning would occur over five miles from the Park's boundary and over 20 miles from the boundary of the BWCAW. Smoke management techniques, burn unit size and short duration (usually 1-2 days) of ignition would mitigate smoke impacts on the Class 1 Airsheds. Transport winds would dilute and disperse smoke emissions before it reaches these areas. People may smell smoke from the prescribed burns but would not be subject to emissions exceeding any health standard due to the distance from the burn and the small size of the burns which would emit less particulates matter into the air. If visibility is affected, it would only occur for a very short duration (usually 1-2 days when unit is being ignited).

CUMULATIVE EFFECTS

Prescribed burning activities in Alternative 2 would not add to cumulative impacts from other on-going prescribed burning projects in the project area due to timing and logistics. Pile burning usually occurs from early October to mid-November when other types of burning cannot occur because of typical wet weather patterns. Underburns usually occur in the spring to achieve the

best results. As these prescribed burns would be implemented by Forest Service personnel, the implementation of any of these burns would be highly coordinated. Consequently, the likelihood of emissions impacting the same area simultaneously would be very low. Likewise, the limited amount of prescribed burning and emissions released from prescribed burning on State, county, and private land would be coordinated and would not cumulatively impact air quality.

Under all alternatives, levels of pollutants would fall within the ranges currently experienced. Previous analysis by the Superior National Forest indicated that the combined emissions of all snowmobile, OHV, and logging equipment in the four northeastern counties of Minnesota contributes to about 0.005 percent of the degradation to visibility in the Class I Airshed in the BWCAW (Travel Management Project Supplemental EA, project file). None of the alternatives would contribute to adverse effects to visibility in the BWCAW.

3.11.6 SPECIAL USES

INTRODUCTION

The purpose of this section is to provide additional information on the special use proposal that is needed to access other ownership. No other requests were received to access State, county or private timber management lands. Any requests received after scoping will be handled as an individual project. No special use authorizations would be issued under Alternative 1. Under Alternative 2, one long-term special use would be issued. This would impact approximately 0.21 acres of federal land by a long-term permit.

BACKGROUND

Under authority of the Organic Administration Act (OOA) of June 4, 1897, and the Federal Land Policy and Management Act (FLMPA) of October 21, 1976, the use of National Forest System land for access to nonfederal land can be granted under the auspices of a special use authorization (Title V of the FLMPA). The landowner's statutory right of access is limited to that which is adequate to secure for the owner the reasonable use and enjoyment of the subject non-federal lands. The right of access is also subject to the rules and regulations of the Secretary of Agriculture (36 CFR 251). The primary purpose is to provide the most reasonable access to non-federal land in accordance with the FLPMA and Alaska National Interest Lands Conservation Act (ANILCA) of December 2, 1980.

The desired future condition for the Superior National Forest is for non-federal landowners to have reasonable access to their land (Forest Plan, p. 2-47). The Kabetogama Project Purpose and Need included the need to improve forest transportation system. During the evaluation of the special use request the Forest Service identified the preferred route as the route that would serve the most landowners, encumber the least amount of NFS land, and have the least environmental impact.

Current and Proposed Special Use Authorizations

There are three existing private special use authorizations with the Kabetogama Project Area. These authorizations have been administrated over the past 20 years and will likely to continue into the foreseeable future. In general, these authorizations provide road access to private land. The approximate length of the existing authorizations is 2.5 miles, which covers about 5.9 acres

of NFS land. Currently, no temporary road special use is authorized in the Kabetogama Project Area.

There are currently two private accesses that have been identified but deferred from this project. These request and any future right-of-way requests that involve crossing NFS land with the project area will be analyzed in a separate analysis.

The existing transportation system would also receive use from Road Use Permits issued to State of Minnesota and private landowners. These permits are issued for short-term use of existing classified roads.

As required by 36 CFR 251.112, the following items were analyzed for each proposed special use route:

- Intended mode of travel
- Uses of the nonfederal land for which the special use authorization is needed
- Historic access to nonfederal land (if any)
- Rights of access that may exist over non-federally owned land
- Reasons why these means of access do not provide adequate access

Table 3.11.6-1 provides a summary of the proposed special use authorization in Alternative 2. No new special use road authorizations would be issued under Alternative 1.

The intended mode of travel for the one proposal is full size vehicle or ATV/snowmobile. The term of the authorization would be for five years. After five years the authorization would be subject to review and can be renewed for five to ten years. The long-term access proposal would use an existing road to access the private property. No new construction would occur but there may be opportunities to do general maintenance, which could widen the existing access routes. The proposed authorization is shown on the project map.

Table 3.11.6-1: Proposed Special Use Authorizations (estimated miles)

Name	Owner	Legal Description	Season	Miles	Closure Measures
S1	Perkins	T66N, R21W, section 12	All season	0.11	Long-term access
Total Miles				0.11 miles	

The special use authorizations would meet the requirements of the laws and regulations that apply to National Forest management. Forest Service regulations require the applicant to:

- Conform to plans, specifications, and written stipulations based on this environmental analysis prior to construction or improvement of access route
- Pay any necessary fees
- Post any necessary bond
- Secure any State or federal permits or authorizations required by law

Special use routes would be monitored to ensure compliance with the terms and conditions set forth in the special use authorization. The authorizations to private property would not be maintained for public use.

3.11.7 GRAVEL

INTRODUCTION

All saleable material from gravel pits are referred to collectively as mineral materials. They encompass common varieties of sand, gravel, and rock. Aggregate from gravel pits produce materials that are used in road construction and maintenance; trail construction and maintenance; site development for both public and private facilities. Minnesota Trunk Highway 53 cuts the Kabetogama Project Area in half. Several pits in the project area have been used in the past for construction and reconstruction of this main artery road to Canada. There are also private land with year-round homes and recreational cabins that creates a demand for aggregate within the project area. The project proposes to approve the extraction of gravel from the twenty existing gravel pits and one undeveloped pit. These gravel pits are in various locations within the project area as shown in Table 3.11.7-1.

BACKGROUND

The 2004 Superior National Forest Land and Resource Management Plan desired condition and standards and guidelines for minerals are as follows:

Exploration and development of mineral and mineral material resources is allowed on National Forest System land, except for federally owned minerals in designated wilderness (BWCAW) and mining Protection Area (MPA) (D-MN-1).

Ensure that exploring, developing, and producing mineral material resources are conducted in an environmentally sound manner so that they may contribute to economic growth and national defense (D-MN-2).

The removal of more than 5,000 cubic yards of mineral materials per year from any one source requires and approved development and reclamation plan (S-MN-2).

The analysis methods indicator for gravel is acres of new disturbance. The proposed 10 year expansion or acres of new disturbance is shown in Table 3.11.7-1 and is based on past and anticipated needs. The twenty-one pits in the project area encompass 14.61 acres. Implementation of the proposed action alternative would increase that area by 48.99 acres for a total of 63.6 acres.

Most of the glacial deposits in the Kabetogama Project Area are associated with the Rainy Lobe and the St. Louis Sublobe of the Wadena Lobe of the Laurentide Ice Sheet that advanced and retreated over the area during the late Wisconsin Age (approximately 14,000 to 10,000 years ago). The gravel pits are located within various types of ice contact glacial deposits; mainly ground, stagnation, and terminal moraines that formed during this time-frame and were subsequently re-worked in areas by glacial meltwater. These types of glacial deposits, along with eskers, deltas, and outwash fans, are typical geomorphic features that contain the greatest potential for the extraction of mineral material. These deposits generally contain large volumes of gravel of varying qualities suitable for road construction and crushing material.

Current and Proposed Gravel Needs

There is a demand for sand and gravel from the existing pits within the project area. Most of the demand has been for large projects in and around the project area. Several large projects on Minnesota Trunk Highway 53 and the Neutrino Plant in Ash River have relied on mineral materials to complete projects. There is also demand for small volumes of material for construction, reconstruction, and maintenance of roads and trails. There is also some demand for small construction projects for the development of private land: septic systems and driveways. The demand for this type of material is less than 500 yards annually.

The Forest Service collects a minimum fee of $1.10/cubic yard from the pits within the project area and some material can cost more if the material is of high quality. A portion of the fee ($0.15/cubic yard) from all gravel sales goes into a resource recovery fund that is managed by the Superior National Forest. These funds can be used for further development of material sources or for rehabilitation of depleted gravel pits.

Under the proposed action alternative, the twenty-one gravel pits would be approved for extraction of mineral material. Pit management plans would be developed per manual direction to provide direction for pit development, expansion, and rehabilitation. Some pits may not be needed for several years. Specific mitigations would be included in the pit management plan and implemented at each pit based on relevant environmental analysis documentation and information from resource specialists. Extraction of mineral material from the pits would occur in an orderly fashion. Some pits may not be developed at this time depending on future needs of material and location of other pits in the area. See Table 3.11.7-1 for information on the estimated size for expansion and material available for each pit.

The demand for gravel for projects on private land will more than likely stay the same. Historic use of the pits in the Kabetogama Project Area has averaged approximately 3,000 to 3,200 cubic yards per year. The demand for gravel will increase in the next several years as the need to resurface existing Forest Service System roads is addressed. The projected increase in the Kabetogama Project area is 15,000 to 20,000 cubic yards in the next five years for internal use of material. The increase however, is very small compared to the amount of gravel available from the known sources with the project area. Pit Management Plans will address the most efficient use of large scale gravel removal.

Use of gravel in regards to implementation of the Kabetogama Project would be minimal. Most of the roads proposed to access stands for land management activities would be temporary and not gravel surfaced.

As gravel use is on-going activity in the Kabetogama Project Area the continued use associated with the pits would not noticeably increase during this time. A limited amount of equipment including dump trucks and loaders would continue to occur at the existing and potential new gravel pit over the next ten years. The existing twenty pits have been in operation for at least 10 years. One pit (Coy Pit) is undeveloped at this time and may or may not be developed in the next ten years, depending on future gravel needs. Besides the anticipated need for gravel for administrative use there are no other foreseeable future projects that would require a large amount of gravel. If the need arose, there would be adequate gravel available in the existing pits.

Table 3.11.7-1: Gravel Pits in the Kabetogama Project Area				
Pit Name	**Current Size (Acres)**	**Potential Size (Acres)**	**Pit Type**	**Proposed 10-year Expansion (Acres)**
Arrowhead	0.4	1.18	Continuous	1.0
Ash Lake	0.35	1.27	Continuous	1.0
Ash River	0.1	0.5	Continuous	0.5
Black	0.5	1.4	Continuous	0.8
Cobble	0.14	4.5	Continuous	1.0
Cold Springs	0.38	3.0	Continuous	2.0
Darby	0.2	0.77	Continuous	0.5
Deer	0.03	1.4	Continuous	0.5
Emily	0.17	6.0	Continuous	1.0
Gary	0.09	1.1	Continuous	0.5
Johnson Farm	0.8	5.0	Continuous	2.0
Kabetogama	0.6	4.5	Continuous	1.0
Kinmount	8.0	75.0	Continuous	35.0
Hill	0.4	1.1	Continuous	1.0
Coy	0	5.0	Continuous	0.5
Bab	0.3	10.0	Continuous	1.0
Popple	0.22	1.1	Continuous	1.0
Popular Bluff	0.38	40.0	Continuous	2.0
South Kinmount	0.25	72.0	Continuous	10.0
West Pearl	1.1	5.0	Continuous	3.0
Winter	0.2	4.0	Continuous	1.0

3.11.8 CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE

Civil rights in the Forest Service incorporate fair and equitable treatment to all agency customers and employees to facilitate efficient program and project success (FSH 1909.17, 33.26). It is Forest Service policy that employees conduct official business so that: "1) The Forest Service eradicates all forms of discrimination from its programs and activities, and employment; 2) All levels of the organization are supportive of affirmative employment and recruitment; 3) There are no economic or social barriers limiting program participation; and 4) Programs and services are equally available to all persons, without exception" (Forest Service Manual 1703).

Executive Order (EO) 12898 of February 11, 1994, requires each federal agency to, "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (EO 12898, Section 1-101). None of the alternatives would result in any disproportionately high and adverse human health or environmental effects on minority population or on low-income populations based on information provided below.

American Indians are the largest group of minority residents, approximately 11.6 percent of the total population in the three Arrowhead counties (Cook, Lake, and St. Louis Counties combined) (US Census Bureau 2013 data, document updated February 5, 2015). When the Black, Asian, and individuals of Spanish origin groups are combined, they total 2.2 percent of the total population in the tri-county area (Forest Plan FEIS, p. 3.1-12).

Bois Forte is an Ojibwe or Chippewa reservation near the project area. American Indians use the forests differently than the general population. Many rely on the forests to provide resources for traditional practices, and a greater percentage of the population relies on its resources for a portion of their livelihood. The activities proposed in this project would not disproportionately adversely affect their traditional way of life, and the project area would continue to provide traditional benefits.

The average median income for the three counties is $ 48,577 approximately $11,279 below the State's median income (USDA Economic Research Service 2013, Data set 2009-2013). Poverty is defined as the number of people below the poverty level as a percentage of the population as a whole. The poverty level in St. Louis County from 2009-2013 (16 percent) is similar to the poverty level for the State of Minnesota (11 percent). Effects of the proposed activities that may impact people, such as changes in visual quality of well-traveled roads, would not disproportionately adversely affect low-income people.

CHAPTER 4: LISTS AND REFERENCES

4.1 LIST OF PREPARERS AND CONTRIBUTORS

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

Terri Thomas, Project Team Leader
Craig Merriman, Silviculturist
Tara Anderson, Wildlife Biologist
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John Galazen, Forester (West Zone Fuels Planner)
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Heather Hoffman, Archaeologist
Emily Creighton, Hydrologist
Elizabeth Youngstrom, Resource Specialists

This is a list of the extended IDT. Some assisted with only a portion of the Kabetogama Project and others served in a review or ad hoc role.

Marty Rye, Forest Hydrologist
Eric Wirz, Geologist
Jason Butcher, Forest Fisheries Biologist/Aquatics Ecologist-Mid level
Peter Taylor, Environmental Coordinator
Jon Van Alstine, Geologist

4.2 DISTRIBUTION LISTS

Scoping Package

In July 2014, a scoping letter requesting comments was mailed to 344 individuals, groups, and agencies who either own land within or adjacent to the project area or who have expressed an interest in these types of projects. The scoping package was also available on the Superior National Forest webpage at http://www.fs.usda.gov/project/?project=42362. The mailing lists contain the names for the Kabetogama scoping letter is in the Kabetogama Project Record.

Environmental Assessment

The following individuals and organizations provided scoping comments or requested to keep their names on the mailing list for the Kabetogama Environmental Assessment and will receive either a copy of this document or notification of its publication:

Greg and Nels Lundin
Dick Artley
Chuck Perkins
Val Cook
Wayne Johnson
Terrance Skraba
Bruce Barrett
Robin Twite
Bradley Sagen and Annah Gardner-Sierra Club
Bill Latady- Bois Forte Band of Ojibwe
Lori Dowling-Hanson and Darrell Schindler-MN DNR
Mike Boraas
Penny Backman- MN DNR
John Perko
James Crego
Fred Wolff
Dan Klocek
Kenneth Westlake and Kathleen
Kowal-US EPA
Daniel H. Mundt

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 cites as "Forest Plan ROD" and "Forest Plan Final EIS" respectively. Documents that support the Forest Plan Final EIS, such as the biological evaluation, are cited conventionally. The Forest Plan and Forest Plan Final EIS and ROD are the Superior National Forest website: www.fs.fed.us/r9/forests/superior, under "Land and Resource Management" then "Planning."

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