United States Department of Agriculture

Forest Service

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Environmental Assessment

Mesabi Project

Laurentian Ranger District, Superior National Forest
St. Louis County, Minnesota

Townships 59-61 North, Ranges 16-21 West

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CHAPTER 1: PURPOSE AND NEED

1.1 INTRODUCTION

The purpose of the Mesabi Project is to implement the 2004 Superior National Forest Land and Resource Management Plan (forest plan-FP). 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.

Key objectives of the Mesabi Project are to promote diverse, productive, and healthy native vegetation communities; improve habitat for sensitive plants; enhance wildlife habitat for threatened, endangered, and sensitive species; introduce fire into fire dependent ecosystems; reduce hazardous fuels; improve riparian function; improve water and soil resource health; improve recreational opportunities; designate gravel pits; provide sustainable forest products; and improve forest health and productivity. Other objectives are described further in this document.

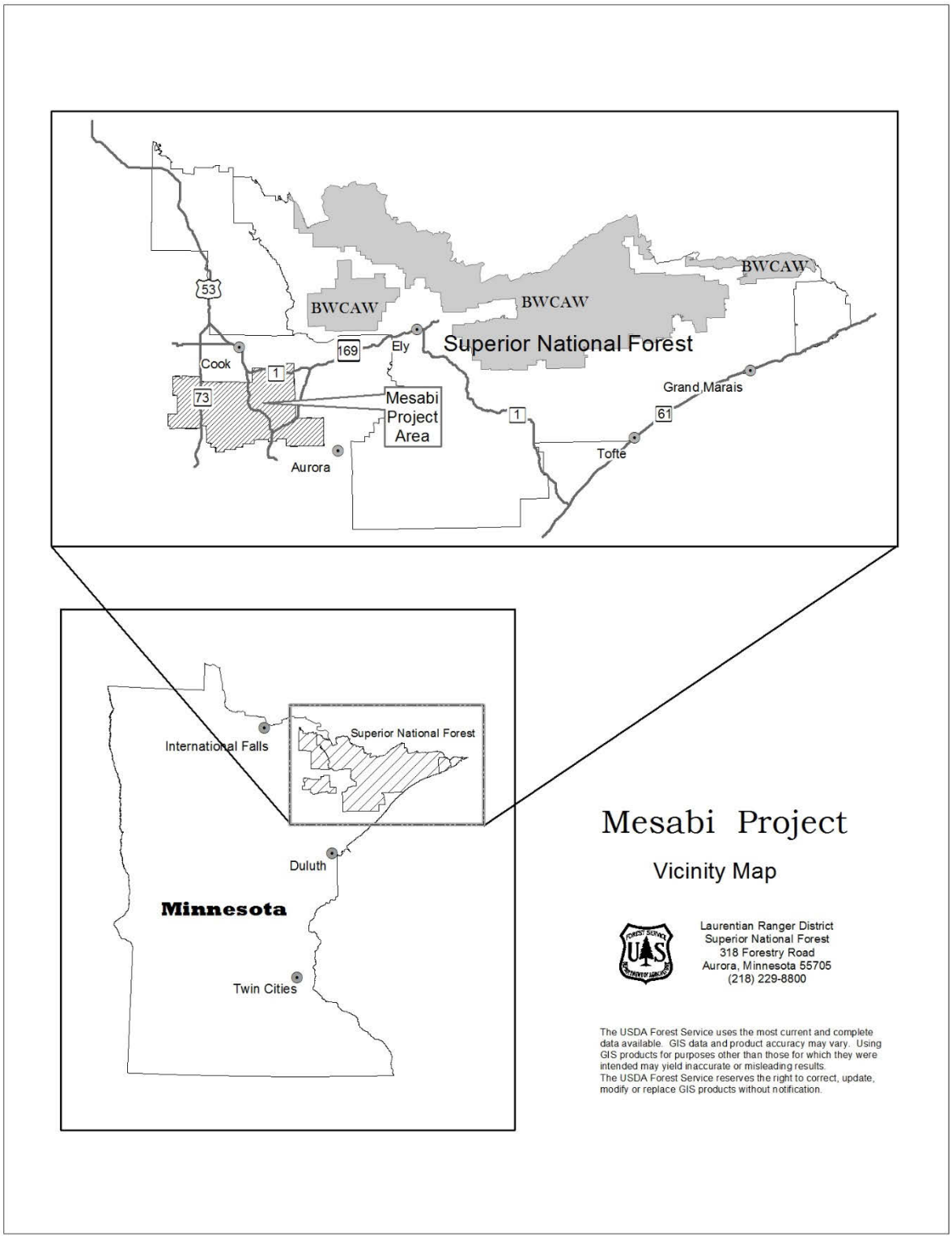
Activities proposed to accomplish these objectives include harvesting (such as thinning, clearcut with reserves or shelterwood), hazardous fuels reduction, a full suite of reforestation activities (such as site preparation, seeding, planting (figure 1.1), timber stand improvement (TSI), prescribed burning, and understory fuel reduction. Additional proposed actions include constructing and decommissioning temporary roads to access units, decommissioning roads no longer needed, and designating federal gravel pits needed for projects and public use.

The Mesabi Project Area is located in St. Louis County, approximately three miles north of Virginia, Minnesota (figure 1.2). Townships include 59 North, Ranges 16, 17, 18, 19, 20, and 21 West; Township 60 North, Ranges 17, 18, 19, 20, and 21 West; and Township 61 North, Ranges 17, 18, 19, 20, and 21 West. The Mesabi Project Area encompasses approximately 256,984 acres of land with mixed ownership; approximately 101,599 acres (40 percent) are National Forest System land.

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

Figure 1.1: An example of diversity planting with oak, pine, and spruce.

Figure 1.2: Mesabi Project Area Vicinity Map.



1.2 ORGANIZATION OF THE ENVIRONMENTAL ASSESSMENT

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

- **Chapter 1: Purpose and Need.** This chapter provides introductory material that explains the purpose and need for the proposed action, provides background information about the project area, presents pertinent laws and regulations, and describes issues to be addressed.
- **Chapter 2: Alternatives**. This section describes the no action alternative and the action alternatives, all of which are analyzed in detail in chapter 3. Chapter 2 also includes mitigation measures and monitoring procedures that would be used in implementing an action alternative. A summary comparison of the environmental effects for each alternative is also provided.
- **Chapter 3: Affected Environment and Environmental Effects.** This chapter describes the affected environment and the direct, indirect, and cumulative effects likely to occur with the implementation of each alternative.
- **Chapter 4: References.** This chapter provides names of the preparers and contributors to this environmental assessment, a distribution list, and literature cited.

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

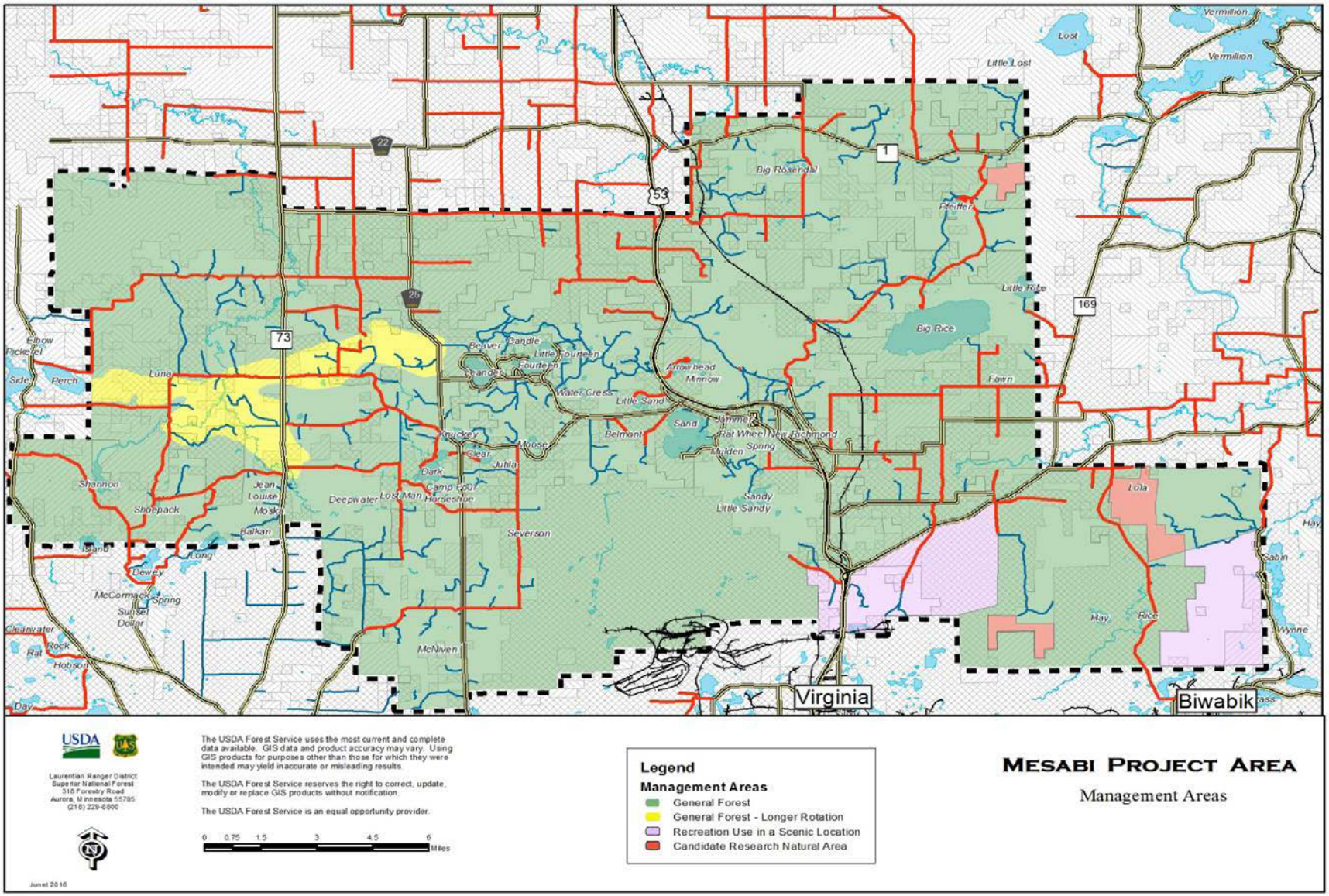
This environmental assessment is tiered to the Forest Plan Revision Final Environmental Impact Statement (FEIS). Relevant analysis from the Forest Plan Revision FEIS was incorporated by reference rather than repeating the information.

1.3 FOREST PLAN DIRECTION FOR THE MESABI PROJECT AREA

The forest plan divides the Superior National Forest outside the Boundary Waters Canoe Area Wilderness (BWCAW) into ten management areas. Chapter 3 of the forest plan (FP) includes the desired conditions, objectives, standards, and guidelines for each management area. The project area overlaps four forest plan management areas (MAs): General Forest (FP pp. 3-5 to 3-8), General Forest-Longer Rotation (FP pp. 3-10 to 3-11), Recreation Use in a Scenic Landscape (FP pp. 3-36 to 3-37), and Candidate Natural Research Areas (FP pp. 3-24 to 3-26). Figure 1.3 displays these management areas.

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

Figure 1.3: Management Areas in the Mesabi Project Area



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

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

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

In the Recreation Use in a Scenic Landscape Management Area, emphasis is on conditions that provide a scenic landscape for recreation activities in natural-appearing surroundings. This management area also provides wildlife habitat to enhance recreational wildlife watching opportunities. Concentrated recreation use is common. Facilities and access may be highly developed, resulting in a high degree of user interaction. Low-density recreation is also offered in areas with remote character.

Candidate research natural areas (CRNA) are managed the same as fully established research natural areas which emphasize preserving and maintaining areas for ecological research, observation, genetic conservation monitoring, and educational activities. There are no proposed actions within the three candidate research natural areas located in Mesabi; however, there is a slight overlap where approximately four acres of Unit 66 are within the Lehtinen CRNA. Any portion of this unit or other units which fall within a CRNA would be excluded.

Landscape Ecosystem Objectives

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

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

The project area has a number of different landscape ecosystems including Mesic Red and White Pine (22 percent of the project area), Dry Mesic Red and White Pine (21 percent of the project area), Lowland Conifer A & B (18 percent of the project area), Jack Pine Black Spruce (11 percent of project area), and Mesic Birch Aspen (10 percent of project area) (table 1.1 and figure 1.4). Desired vegetation composition, age-class, tree species diversity, and management indicator habitat objectives are specified for each landscape ecosystem on the Superior National Forest (FP pp. 2-55 to 2-78).

Figure 1.4: Landscape Ecosystems in the Mesabi Project Area

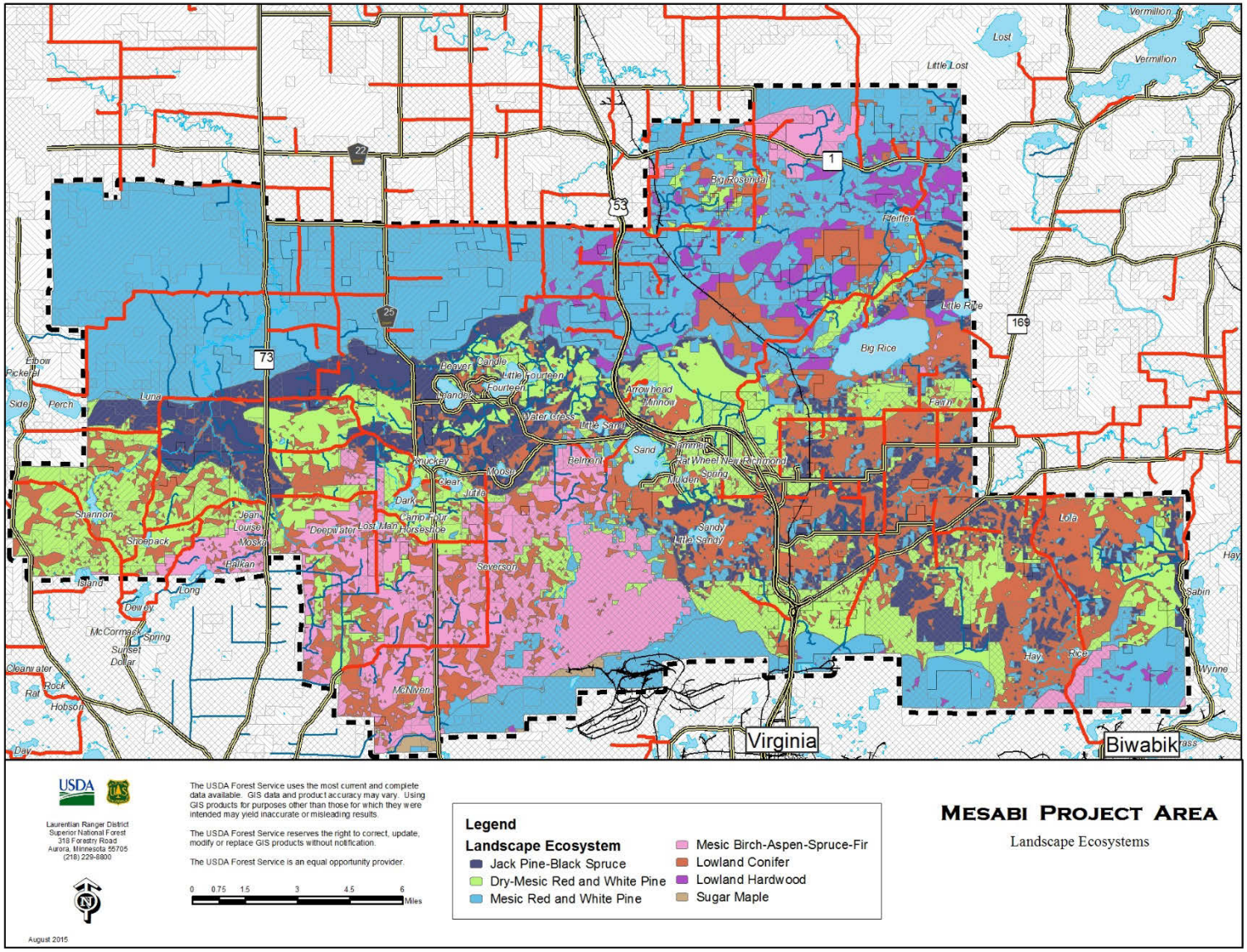


Table 1.1: Manageable Landscape Ecosystems in Mesabi Project Area		
Landscape Ecosystem	**Acres**	**%**
Mesic Red and White Pine (MRW)	22,163	22
Lowland Conifer A & B (LLC)	17,991	18
Mesic Birch-Aspen-Spruce-Fir (MBA)	10,857	11
Jack Pine-Black Spruce (JPB)	10,672	11
Dry Mesic Red and White Pine (DRW)	20,913	21
LHW, CED, & LNF	17,504	17
Sugar Maple (SMA)	279	0
TOTAL	101,379	100
Data Source: Mesabi Mid-level Report. These acres include only National Forest System land. Total may be slightly off due to rounding.		

Forest plan objectives are applicable to an entire landscape ecosystem, and therefore, are not directly applicable to smaller project areas. However, management actions in project areas, such as the Mesabi Project Area, contribute to meeting Forest-wide objectives based on opportunities in the specific area. Opportunities to move the existing condition of the Mesabi Project Area closer to the desired condition were used to develop the purpose and need. See chapter 3.3-Vegetation for further analysis of the project area's landscape ecosystems.

1.4 PURPOSE OF AND NEED FOR ACTION

The Mesabi mid-level assessment considered all resources (vegetation, recreation, wildlife, watershed, etc.) and recommended possible opportunities to move the project area toward desired conditions. The following purpose and need items were developed by the interdisciplinary team to move the project area closer to desired conditions and objectives in the forest plan and are listed below.

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

D-VG-1: Native vegetation communities are diverse, productive, healthy and resilient (FP p.2-22).

O-VG-13 and O-VG-16: Increase young forest in aspen dominated and lowland black spruce/tamarack communities while decreasing the overall acres of aspen dominated stands (FP p. 2-24).

O-VG-2: Decrease mature and old aspen (FP p. 2-23).

O-VG-6: Restore the diversity of tree species within stands to conditions more representative of native vegetation communities by increasing the component of white pine, jack pine, red pine, and birch (FP p. 2-23).

D-WS-3, O- WS-1, O-WS-9, & O-WS-10: Maintain and restore long-lived and/or conifer species on nutrient sensitive soils (FP pp. 2-10 and 2-12).

O-VG-6: Maintain and increase, where possible, tree species diversity (for total percentage of trees, not total acres of forest type) (FP p. 2-22).

O-VG-21: Create larger patches of young forest which would provide future mature/old patches (FP p. 2-26).

S-VG-6: Maintain a minimum of 44,700 acres of mature and older upland forest patches of greater than 300 acres in spatial zone 1 (FP p. 2-26).

O-VG-17 & O-VG-18: Promote mature forest patches and interior forest patches to meet species needs for well distributed habitats and ecosystem needs (FP pp. 2-24 – 2-26).

O-WL-35 & O-VG-21: Continue to reduce forest edge and increase young forest patches where appropriate (FP pp. 2-26 and 2-35).

Some existing vegetation conditions in the project area do not meet forest plan desired landscape ecosystem conditions for species composition, age class, or spatial distribution. Generally, aspen and mature/old forests exist in abundance, while birch dominated stands are in decline and young forest conditions are in short supply. In addition, current spatial landscape patterns (primarily the size of young and mature/old patches) are smaller than patches occurring as a result of natural disturbances and other ecological processes. Opportunities identified include: increasing the amount of young forest, restoring birch dominated stands, restoring jack pine dominated stands, increasing the abundance of white pine, managing existing red pine stands, and increasing the size of young patches; while, "restoring landscape scale vegetation patterns for healthy ecosystems" (FP D-VG-7b and c). There is also a large amount of red pine dominated stands within the project area which would provide opportunities to improve individual tree growth, enhance old growth characteristics, and improve the health and resiliency of those stands. Forest health issues, driven by current and future insect and disease issues, also provide opportunity to treat lowland hardwood stands dominated by black ash to increase within-stand diversity and build resilience to future impacts such as the emerald ash borer. Opportunities for treating upland stands severely impacted by defoliators, such as spruce budworm, also exist within the project area.

Table 1.2: Proposed Action: Vegetation Management

Proposed Action	Acres
Increase acres in the 0-9 age class	7,096
Increase acres of lowland conifer in the 0-9 age class	402
Decrease amount (acres) of aspen through stand conversion	1,370

1.4.2 Improve Habitat for Sensitive Plants

O-WL-30: Enhance or restore high-quality habitat on a minimum of 20 (average of two sites per year) known sites of sensitive plants. Priority for habitat improvement will generally be for those species and habitats for which proactive management is needed to maintain species, and coarse filter management does not provide adequate maintenance or restoration.

D-WL-18: Maintain viable populations for all existing native and desired non-native species.

There are two known locations of sensitive plants in the project area where habitat conditions have been adversely impacted by encroaching shrubs and/or saplings. At the first location, least moonwort (*Botrychium simplex*) and ternate grapefern (*Botrychium rugulosum*) are growing in a forest opening near Idington. These two species prefer open, sunny conditions; however, shrubs and saplings are encroaching in the forest opening and creating more shade than is desirable for

these plants. To improve habitat for these species, there is a need to reduce the encroaching shrub and sapling cover by cutting encroaching species.

At a second location near Lake Leander, dense hazel is encroaching on a population of the sensitive plant barren strawberry (*Waldsteinia fragarioides*). This species also requires more open conditions, and there is a need to reduce encroaching hazel cover by cutting hazel in the barren strawberry population. Each project would use hand tools and brush saws and would occur on approximately one acre each.

1.4.3 Enhance wildlife habitat for threatened, endangered, and sensitive species

Forest plan objectives for most wildlife species is included in landscape ecosystem objectives and management indicator habitat objectives. Most wildlife habitat needs would be met by implementing actions that meet landscape ecosystem objectives as described above. Habitat would be maintained and improved for a variety of species, including but not limited to, lynx, northern long-eared bat, goshawk, and other species where opportunities and needs are present. Opportunities include maintaining existing large patches of mature forest for those species needing interior forest habitat, harvesting adjacent to recently harvested areas to provide larger blocks of similar aged forest, not harvesting areas with known populations of threatened or rare species, and enhancing habitat for some species.

1.4.4 Introduce Fire into Fire Dependent Ecosystems

D-ID-5: Fire is present on the landscape, restoring or maintaining desirable attributes, processes, and functions of natural communities.

Some forests such as jack pine, red pine, and white pine have adapted under certain fire regimes and rely on fires to reproduce and maintain themselves. In earlier years, fires were suppressed more heavily compared to more recent approaches that recognize the positive ecological benefits of fire to various species. As a result, a buildup of fuels has accumulated in parts of the project area where fire has not been allowed to play its natural role in the management of ecosystems that depend on it.

Following direction from the forest plan, the project proposes to underburn in older red and white pine forest to reduce the potential risk of high-intensity crown fires and to allow for an increase in structural and species diversity in these stands. Some burning would occur as a secondary treatment after the stands are thinned.

Also, broadcast burns and secondary site preparation burns would be used in jack pine stands. Jack pine forest is the model of a fire dependent ecosystem with serotinous cones that need intense heat to open. Introducing fire into these systems helps to maintain and increase this forest type on the landscape.

1.4.5 Reduce Hazardous Fuels

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

D-ID-4: Accumulations of natural and activity fuels are treated to enhance ecosystem resilience and to maintain desired fuel levels.

The area between National Forest System land and private homes, cabins, camps, and other human development is called wildland urban interface (WUI). In the project area there are four

primary WUI areas: Britt, Cook, Hibbing, and the Flats. Many of the older forest stands in these areas have a high percentage of dead and downed trees with a high density of young balsam fir growing within them. Left untreated, this condition creates an accumulation of hazardous fuels near private structures. If a forest fire was to start, these fuels would make it very difficult to control.

There is a need to reduce fuels within WUI in the project area. By breaking up continuity and reducing concentrations of hazardous fuels, the potential for extreme fire behavior is lessened. This creates more defensible space around private property or other values at risk in the event of a wildfire. Fuel treatment methods include cutting of understory trees by hand or mechanical, removing biomass off site, chipping on site, pile burning on site, and potential underburns to maintain the fuels reduction.

1.4.6 Improve Riparian Function

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

Some riparian areas in the project area are comprised of old aspen, birch, and jack pine forest. These stands of older trees are beginning to die and are being replaced by balsam fir and brush. There is a need to improve the condition of these riparian areas by maintaining and promoting longer-lived conifer such as red pine, white pine, and white spruce. Activities could include hand cutting woody vegetation to favor regeneration of long-lived conifer, timber harvest (if appropriate and within forest plan direction and best management practices), and tree planting. Herbicides would not be used in riparian areas.

1.4.7 Improve Water and Soil Resource Health

D-WS-12: Soils recover from natural disturbance and absorb the effects of human disturbances without reducing productivity and function. Soils contribute to ecosystem sustainability. Soil-hydrologic function and productivity is protected, preserving the ability to serve as a filter for good water quality and regulation of nutrient cycling. Soil exposure is minimized. There is minimal compaction, displacement, and puddling.

G-WS-13: Wetland impacts will be avoided whenever possible. Where impacts are unavoidable, minimize and compensate for loss when undertaking projects.

G-WS-15: Wetlands will be managed to prevent the reduction of their water quality, fish and wildlife habitat, and aesthetic values. Management actions will not reduce water quality within a wetland, or upstream or downstream of a wetland, unless restoration of natural conditions is the primary goal of the activity.…

As a high use recreational area, some water and soil resources within the project area have sustained impacts (such as rutting and the introduction of fine sediment contamination) associated with ATV or other recreational vehicle traffic. There is a need to address these resource impacts through creative, interdisciplinary means, as each site of resource damage will likely require a unique solution. Activities could include working with nonfederal landowners to

find appropriate alternate locations for activities, providing public education and/or temporarily or permanently blocking particular routes (road decommissioning) to prevent further resource damage, and increased and/or focused law enforcement efforts.

1.4.8 Improve Recreational Opportunities

D-RWA-1: The forest provides a range of water access sites with related recreation opportunities on lakes and river segments. Levels of facility development are appropriate to the lake and river classifications and recreation opportunity spectrum (ROS) class objectives. Some lakes and river segments do not have any developed water access sites.

The current access to Sandy and Little Sandy Lakes is causing some resource impacts; however, the user developed access is not on National Forest System lands. To accommodate current use patterns, address resource damage, and enhance water access opportunities, the proposed action is to attempt to obtain an easement to officially recognize, designate, and manage this site as water access. Improvements to this site could include converting an existing user-created trail to a designated trail. If an easement is not obtained there would not be any improvements to the trail, nor to create a backcountry campsite.

D-GF-8: Dispersed recreation facilities such as campsites and trails (day use, backpacking, portaging, bicycling, horseback riding, hunter walking, snowmobile, ATV use, and interpretive) may be provided for public use. Other dispersed recreation opportunities that may not be associated with facilities includes orienteering, hunting, fishing, berry picking, and bird watching.

Moose Lake is a wild rice and waterfowl hunting lake that receives a moderate level of use. This site is currently not a managed recreation site; therefore, resource damage is occurring. To accommodate current use patterns and to address resource damage, the Mesabi Project proposed action is to designate and manage this is a backcountry campsite.

D-RTL-1: The forest trail system provides a range of activities and experiences necessary to accommodate recreation users while minimizing environmental and social impacts.

There is an opportunity to build upon and expand a new partnership and trail experience with single-track mountain bike trails at Lookout Mountain. In partnership with local volunteers five miles of single-track mountain bike trail was constructed in the summer of 2016, adding to the existing five miles of trail built in 2014-2015. There is interest and an anticipated demand for additional single-track mileage. To accommodate increased use and enhance trail opportunities, the Mesabi Project proposed action is to plan and designate an additional seven miles of single-track mountain bike trail in the Lookout Mountain Trail area. Improvements to this site would include trail corridor and tread construction and maintenance.

1.4.9 Designate Gravel Pits

D-MN-1: 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 the mining protection area (MPA).

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

S-MN-9: The Forest Service will provide sand and gravel for public and private use.

G-MN-1: Land disturbed by mineral development activities or facilities will generally be reclaimed as soon as practical. Reclamation work will generally reflect the landscape. Reclamation measures will generally be implemented so that the mining project area would meet the pre-project scenic integrity objectives (SIO) as soon as practical.

There are thirty-seven (37) existing pits throughout the project area with proposed changes (see table 1.8: proposed action-mineral materials.). There is a need to ensure the gravel pits are maintained to meet land management objectives (D-TS-1 and O-TS-1 FP pp. 2-47 and 2-48). Six of these pits are no longer needed and will be closed and reclaimed, while 30 of these pits would be classified as continuous or administrative use. Some pits may not be needed for several years and may not be developed at this time depending on future needs of material and location of other pits in the area. See table 3.12.4-1 for information on the potential estimated size for expansion and material available for each pit. Additionally, the Jammer Lake Pit is designated as a preference right pit to Seppi Brothers Concrete Products. Seppi Brothers has proposed to conduct mineral material exploration on approximately 360 acres of land around the current pit area (D-MN-1).

1.4.10 Provide Sustainable Forest Products

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

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

D-SE-1: The forest provides commodity resources in an environmentally sustainable and acceptable manner to contribute to the social and economic sustainability and diversity of local communities.

Vegetation management in the 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 14,000 acres of forest within the project area have been identified as needing some type of treatment to create young age class or improve stand condition. Timber harvest on suitable forestlands within the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

1.4.11 Improve Forest Health and Productivity

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

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

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.

TRANSPORTATION SYSTEM

The transportation system needed for long-term vegetation management and access to federal and other public lands is also addressed in the project proposal. The forest plan desired conditions for transportation systems specify that National Forest System roads provide for safe and affordable administrative and public access while maintaining the minimum road densities needed (FP D-TS-1, D-TS-2 p. 2-47). The interdisciplinary team identified that the primary needs for changes within the project area involves modifying the transportation system for short-term timber access, providing long-term access to other ownerships, and decommissioning roads no longer needed for management.

1.4.12 Unauthorized Roads

The Superior National Forest made a concerted effort to identify all existing unauthorized roads on the Forest during the 2009 Travel Management Project. Roads addressed in that project decision are included in this project. Recently however, district staff identified several additional unauthorized roads. This project assesses whether to decommission these roads or add them to the National Forest System.

There are numerous unauthorized roads that have been identified in the project area which will require a decision to decommission or add to the system. Some of these unauthorized roads will be evaluated to determine if recreational motor vehicle (RMV) use is appropriate.

1.4.13 Motorized Travel Routes Including Roads and Trails

D-RMV-1: The forest provides RMV road and trail riding opportunities with experiences in a variety of forest environments, while protecting natural resources and;

D-RMV-2: Allowed, restricted, and prohibited RMV uses are clearly defined to the public. Where practical, RMV policies are consistent with adjacent land management agencies.

The project area contains numerous roads. There are known RMV use issues occurring in two locations: Forest Road 257BA is a system road that is open to RMV use but does not provide for connections; and RMV users are making connections to other routes. The second RMV use location accesses the Big Aspen Trail system on a short section of an old road and the power line from county road 302. There is a need to identify and develop solutions to these road use situations to and prevent further resource damage.

The FR 278 Dual Use Safety Analysis has been completed. Dual use would allow motor vehicle and OHV/ATV mixed use on this segment of road. There is a need to identify and make this change and update the motor vehicle use map.

1.4.14 Special Use Authorizations

The interdisciplinary team has identified 11 special use roads accessing private land or leased sites that would be analyzed and authorized in the project. Also, State and county land managers were contacted during the internal planning process to identify their access needs. One temporary access request from the Minnesota Department of Natural Resources (MN DNR) was received. Finally, the continued use and any future uses of four existing communication sites which all have an approved site plan is proposed for Lookout Mountain, Virginia, Sand Lake, and the Laurentian Divide sites.

1.5 PROPOSED ACTION

The interdisciplinary team identified potential actions to accomplish the purpose and need for the Mesabi 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.

Tribal representatives from 1854 Authority and Grand Portage, Fond du Lac, and Bois Forte Bands of the Lake Superior Chippewa were consulted during the development the proposed action. The interdisciplinary team also consulted with and reviewed data from the MN DNR and St. Louis County personnel. The focus of the discussions was to coordinate forest management activities that would occur across ownership boundaries and share data.

A scoping report that described the proposed action was distributed to the public in August 2015 and the public was invited to submit comments. The proposed action was modified based on review of comments received from public scoping, further evaluation of the existing condition, and a review of the resource values in the proposed treatment stands. The intent of the proposed action remained intact with some modifications. Primary modifications are:

1. Acres of proposed herbicide treatment were reduced from 2,502 acres to 538 acres. This was done after further analysis revealed some stand acres did not meet the criteria for herbicide treatment such as proximity of the unit or part of units to water, stands were proposed for hazardous fuels reduction and access. Additionally, proposed herbicide treatments were removed from units 299 and 308 as requested by the water resources specialist. Mechanical site preparation prior to planting would be used in lieu of herbicide for unit 299.
2. Added unit 551 (red pine thinning, 31 acres) and unit 552 (fuels treatment, 106 acres).
3. Changed units 91 (aspen, 11 acres) and 99 (aspen-white spruce/balsam fir, 26 acres) from clearcut with reserves to non-harvest restoration with an underplant and added a secondary treatment of broadcast burn to enhance oak-blueberry within the units.
4. Dropped unit 303 because it is a wet area and the initial forest type was incorrect in our database.
5. Units 130 and 131 were dropped due to presence of sensitive plant species.
6. Unit 45 (aspen, eight acres) changed from clearcut with reserves to nonharvest restoration with an underplant due to low basal area in the stand.
7. Unit 292 (mixed pine, 41 acres) changed from clearcut with reserves to a shelterwood harvest. Changed unit 318 (open, seven acres) from an underburn to a site preparation burn and planting of red pine, with possible conversion to a jack pine stand.
8. Changed units 7 (open, one acre), 74 and 477 (open, three acres each), and 492 (open, two acres) from underburn to site preparation burn and plant to convert to red pine. Additionally, units 311 and 313 (open, five acres each) would change from an underburn to site preparation burn with planting to convert to red pine and white pine.
9. Pfeiffer Lake road reconstruction. Utilizing the State-wide White Cedar Restoration Project, the Mesabi Project would include culvert installation and road reconstruction.

10. Added unit 553 (lowland shrubs, eight acres), which would include a nonharvest restoration treatment to underplant cedar.
11. Forest Road 270G would be split near units 551 and 552. From this location to the end of the road it would be converted to an OML 1, which would be closed to motorized traffic.
12. Continued and future uses of four existing communication sites which all have an approved site plan – Lookout Mountain, Virginia, Sand Lake, and Laurentian Divide.

A detailed listing of changes in the proposed action is in the project record. The proposed action as presented in the Mesabi scoping report was considered briefly and eliminated from further study (see section 2.4 for the rationale). The EA analyzes the modified proposed action (alternative 2) as described below.

A summary of the acres proposed of each treatment and reforestation type are shown in tables 1.3 and 1.4. 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 1.3: Summary of Proposed Action: Vegetation Management Primary Treatments

Treatment Description	Acres	
Create young forest with harvest		7,498
Clearcut with reserves	6,560	
Shelterwood	938	
Improve stand condition with harvest		4,846
Two age cut	247	
Thinning	4,599	
Restore stand condition without harvest		391
Nonharvest restoration underplant	306	
Site preparation broadcast burn	85	
Reduce/remove hazardous fuels		1,507
Fuels treatment	537	
Underburn	970	
Total Acres Treated	14,242	

Table 1.4: Summary of Proposed Action: Vegetation Management Secondary Treatments and Reforestation		
Treatment Description	**Acres**	
Secondary Treatment		13,732
Diversity Planting	277	
Pile Burn*	7,498	
Site Preparation Broadcast Burn	2,486	
Site Preparation Using Mechanical Equipment for Natural Regeneration	290	
Site Preparation Using Mechanical Equipment for Planting	170	
Underburn	2,472	
Site Preparation Herbicide	538	
Release for Sensitive Plant Species (RFSS)	2	
Reforestation		3,113
Conversion	1,918	
Diversity Planting	288	
Seeding	907	
*Pile burn as an optional secondary treatment is identified on units with clearcut with reserves or shelterwood as the primary treatment.		

Improved recreational opportunities would include designation of two backcountry campsites and additional single-track trail mileage. A new backcountry campsite would be added at Sandy/Little Sandy Lakes if access issues can be resolved; while another would be added at Moose Lake. An additional seven miles of single-track mountain bike trail would be planned and constructed in the Lookout Mountain Trail area.

Table 1.5: Proposed Action: Recreation	
Proposed Action	
Backcountry campsite	2 Sites
New single-track mountain bike trail	7 miles

TRANSPORTATION SYSTEM

The transportation system proposed action is summarized in table 1.6. The interdisciplinary team proposes several changes with regard to the current transportation system in the project area.

Table 1.6: Proposed Action: Transportation System Management		
Proposed Action	**Miles**	**Map ID**
Existing road miles to be added to the system	18.1	A1 to A64; A70 to A74
Existing road miles to be decommissioned	30.1	D1 to D125; D130
Existing road miles to be reconstructed	0.2	RC1
Special use road authorization (permanent)	2.02	SUP1-5 and SUP7-11

Table 1.6: Proposed Action: Transportation System Management		
Proposed Action	**Miles**	**Map ID**
Special use road authorizations (temporary)	0.3	SUP12
Existing road to be converted to trail	5.2	AT1 to AT4

One temporary use permit (SUP 12) would be issued to the State of Minnesota. This road would be used for short periods of time and would not become a permanent forest transportation system road. The road would be closed after all management activities are completed on the State lands. Additionally, there are 11 proposed accesses to private land would become special use authorizations, decommissioned, or designated as nonjurisdictional roads.

Some temporary roads would also be needed for accessing USFS stands to carry out forest vegetation management activities. Temporary roads would not become part of the permanent forest transportation system and would be closed after all management activities have been completed. Some temporary roads would use existing road corridors and some temporary roads would be new construction.

Table 1.7: Temporary Road Use	
Existing corridors	18.6 miles
New construction	3.1 miles

GRAVEL PITS

All saleable material from gravel pits is referred to collectively as mineral materials, encompassing common varieties of sand, gravel, and rock. Mineral material sources would be approved for future use and expansion, depending on administrative and public needs. Twenty-six sources or gravel pits within the project area would be classified as 'continuous use' pits. Continuous use pits are considered a large deposit that is continuously mined by many users over a long period of time. Disposals are by administrative, free use, or sales. All users including the Forest Service contribute to the reclamation fund. Four pits within the project area would be classified as 'administrative' pits. Administrative pits are considered a deposit used exclusively by the Forest or cooperating agency for administrative uses. Restoration is the responsibility of the Forest or the cooperator.

Six pits would be slated for closure and reclamation. One pit, Jammer Lake, is considered a 'preference right[1]' pit. The permit is held by Seppi Brothers Concrete Products Inc. Prospecting of mineral materials would also occur on 360 acres around the Jammer Lake Pit. Seppi Brothers would access nine, 40 parcels of land through a 10 foot wide path with a 225 CAT excavator. They will be excavating several 15 to 20-foot deep holes in each of the parcels to ascertain the quantity and quality of mineral material present. Once the material is characterized, all test pits would be immediately backfilled and reclaimed with extracted materials.

[1] A Preference Right pit is a deposit discovered by the holder of a Forest Service prospecting permit; negotiated sales from this source occur with the execution of a preference right mineral material permit. Sale price is determined by materials appraisal and reclamation is the responsibility of the permit holder.

Table 1.8: Proposed Action: Mineral Materials	
Proposed Action	**Number of Pits**
Existing project area gravel pits proposed designation	
To be classified as 'continuous use'	26
To be classified as 'administrative use'	4
'Preference right' pit	1
To be closed and reclaimed	6
Total number of gravel pits	37

Forest Plan 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 are designed to minimize adverse effects (appendix c). These practices are adhered to while designing the treatment boundaries, administering contracts, and implementing activities. Additional specific mitigation measures were developed based on public comment or further effects analysis (see "MES" mitigations in appendix c.)

Additional Information

V. CLIMATE CHANGE CONSIDERATIONS

No single project can mitigate all 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 continued climate change. The best available information on observed and projected climate trends, as well as anticipated climate change impacts to forests was used to identify some adaptation actions. The team worked closely with researchers from the Northern Institute of Applied Climate Science and utilized two main sources of information in their work to consider climate change. First, the team considered information in the Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers (Swanston and Janowiak 2012, 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 changing climate. It provided the interdisciplinary team a framework for considering the impacts of climate change to forest in the project area.

The second resource used by the team is the Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler, et al, 2014, URL: 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, local knowledge, and key stressors that contribute to the vulnerability of major forest systems. The team used this document to understand major stressors and threats to forest ecosystems based on a range of climate scenarios.

With these resources the team developed a proposed action that includes climate change adaptation strategies and approaches. Table 1.9 summarizes the synthesis and strategies for selected forest types in the project area.

Generally, in most climate change projections:

•Boreal species such as quaking aspen, paper birch, tamarack, and black spruce are likely to experience reduced suitable habitat and biomass across the assessment area.

•Species with ranges that extend to the south such as American basswood, black cherry, northern red oak, and eastern white pine may experience increased suitable habitat and biomass across the assessment area.

•Many species currently common in northern Minnesota may decline under the hotter, drier future climate scenario.

•Forest productivity will likely be dictated by a combination of factors such as CO_2 fertilization, water and nutrient availability, and species migration.

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 Mesabi Project Area		
Forest Type	**Regional Projections and Mesabi Project Considerations**	**Adaptation Actions Applied To the Proposed Action**
Red pine	Regional projections for the red pine forest type in Minnesota are uncertain. Current climate models for both low emission and high emission scenarios do not indicate a trend toward increasing or decreasing suitable habitat of red pine (i.e. some models predict increases, while others predict decreases and or no change at all for suitable habitat under the two emission scenarios). Red pine is abundant within the Mesabi Project and much of the area is suitable for red pine production. Stand ages range from <20 years to >100 years' old, existing plantations have withstood periods of drought and the species has been relatively resilient on the landscape. Younger stands (30 to 70 years old) tend to be less diverse in the project area due to previous management objectives. Red pine is commonly found on sandier soils in the lake states and is abundant in the middle of the project area where sandy, droughty soils are more prevalent. Forest health related concerns for red pine include diplodia shoot blight and this should be taken into consideration when regenerating trees near mature red pine. Deer browse is less of a concern for this species versus eastern white pine and jack pine. Hazardous fuels (balsam fir) are a concern for some stands within the project area. Shade tolerant hardwoods (beaked hazelnut) are a concern for species diversity when considering regeneration on red pine stands.	Variable density thinning as an option to all commercial entries to improve structural and species diversity. Remove balsam fir and ladder fuels within red pine stands to prevent stand replacing fires. Diversity plant new species (jack pine, eastern white pine, northern red oak, etc.) within red pine stands to improve species diversity (done within gaps and openings). Budcapping planted seedlings if planting in these areas. Retain aspen, white spruce, tamarack and upland black spruce in these stands. Use herbicide to control understory hazel competition.

Table 1.9: Regional projections, local considerations, and adaptation actions applied to proposed action for selected forest types in the Mesabi Project Area		
Forest Type	**Regional Projections and Mesabi Project Considerations**	**Adaptation Actions Applied To the Proposed Action**
Aspen	Regional projections for quaking aspen in Minnesota are predicting declines under both a low emission and high emission climate change scenario with a substantial decline of suitable habitat under a high emissions scenario. However, bigtooth aspen suitable habitat is uncertain due to disagreement among models (i.e. some models predict increase, while others predict decreases and or no change at all for suitable habitat under the two emission scenarios). Aspen stands are relatively abundant in the project area and regeneration has been successful following previous harvesting on this landscape. Bigtoothed aspen is present especially on drier hardwood sites on the project. Young aspen stands are generally less diverse in the project area while older stands normally have a mix of maple and paper birch. Some aspen stands include a diversity of other species including sugar maple, red maple, yellow birch, American elm, basswood, bur oak, northern red oak, and eastern white pine. Quaking aspen appears to be struggling on some of the sandier, droughty sites in the central portion of the project area with some areas of dieback present. Aspen will continue to struggle in this portion of the project area under projected climate change scenarios. The western portion of the project area may be less vulnerable to stress where clay and calcium rich soils are more abundant. Other stressors to this species include forest tent caterpillar and gypsy moth.	Manage for aspen refugia in areas that might be long-term suitable habitat (northwest and northeast portions of the project area) by cutting these areas now for successful regeneration. On drier, sandier sites convert aspen to desirable conifer and hardwood species that may be less susceptible to impacts from climate change. Promote big-toothed aspen through winter harvest. Leave desirable species other than aspen during a clearcut (eastern white pine, northern red oak, basswood, sugar maple, etc.)

Table 1.9: Regional projections, local considerations, and adaptation actions applied to proposed action for selected forest types in the Mesabi Project Area		
Forest Type	**Regional Projections and Mesabi Project Considerations**	**Adaptation Actions Applied To the Proposed Action**
Black Ash	Black ash, a species already facing forest health related issues in Minnesota, is predicted to have small declines of suitable habitat under a high emission climate change scenario. Under a low emission climate change scenario it is uncertain as to what the impacts will be to the black ash forest type due to disagreement among models (i.e., some models predict increases while others predict no change at all for suitable habitat under the two emission scenarios). There is approximately 3,000 acres of black ash typed stands within the project. Emerald ash borer (EAB) is a concern for this area due to the high amount of urban interface, campgrounds, and day use areas. There are lower risk ash stands that are isolated within the project based on having restricted access to human traffic. Some stands have a mix of other species including aspen, red maple, yellow birch, American elm, white spruce, tamarack, balsam fir, and black spruce. Dieback already occurs on these stands due to heavy rainfall and extended droughts. Drier black ash sites may provide for more opportunities for more opportunities for adaptation because of existing tree species diversity.	Plant disease-resistant American elm, bur oak, yellow birch, hackberry, swamp white oak, or other species in treated gaps that will be less susceptible to drier conditions and insects and disease. Identify and protect vernal pools during harvest. Look for stands that are less susceptible to EAB and do not manage these areas.

Table 1.9: Regional projections, local considerations, and adaptation actions applied to proposed action for selected forest types in the Mesabi Project Area		
Forest Type	**Regional Projections and Mesabi Project Considerations**	**Adaptation Actions Applied To the Proposed Action**
Paper birch	Paper birch is predicted to have substantial declines of suitable habitat in Minnesota under a high emission climate change scenario. Under a low emission scenario it is uncertain as to what the impacts will be to the paper birch forest type due to disagreement among the models (i.e., some models predict decreases while others predict no change at all for suitable habitat under the two emission scenarios). The project area is located on the southern edge of the boreal forest; therefore, there is not as much of a component of paper birch here as compared to other project areas on superior national forest. Being a boreal species on the southern edge of its range this species will likely have more of a struggle when considering climate change versus other forest types mentioned here. Drought is a concern for this species during all phases of its development and into maturity. The sandier, droughty soils of the central portion of the project area are likely not good areas to consider managing for paper birch. The project area does have a few mid-rotation stands of paper birch but most of these types are 74 – 100 years old. This species does have cultural significance in this region and forest plan objectives call to maintain or increase across all landscape ecosystems.	Utilize shelterwood methods of harvesting to maintain shade and reduce drought stress on regenerating birch. Use prescribed fire as a site preparation method to regenerate birch. Regenerate low quality birch sites with coppice cutting to maintain paper birch component. In stands with low amounts of birch or aspen, consider conversion to long-lived conifer or northern red oak.

1.6 DECISION TO BE MADE

Based on the purpose and need identified for the project, the scope of the project is focused on decisions concerning vegetation management and related transportation system activities, creating new recreation sites, and gravel pit designation.

The Laurentian 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/she will then decide on the following:

- The amount and type of vegetation treatment 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.

1.7 PUBLIC INVOLVEMENT AND ISSUES WITH THE PROPOSED ACTION

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

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

The interdisciplinary team utilized several methods to inform the public about the scoping comment period for the project. In August 2015, a scoping package requesting comments was mailed to 1,974 individuals, groups, and agencies who either own land within the project area or who have expressed an interest in these types of projects. The scoping package was also available online at http://www.fs.usda.gov/project/?project=44466. The project was listed in the Superior Quarterly (a schedule of proposed actions for the Superior National Forest) starting in July 1, 2014.

The purpose of scoping is to identify significant environmental issues deserving of further study and to deemphasize the insignificant issues in the environmental effects analysis (40 CFR 1500.4g).

Fifty-six responses were received from individuals, groups, and agencies. All comments received on the project were reviewed by the interdisciplinary team and district ranger. The following explains how public comments were categorized and addressed. Categories of comments include:

1. **Issues analyzed in the environmental assessment (EA):** An issue is a point of debate with a proposed action based on some anticipated effect(s). Issues may drive alternatives based on extent of geographic distribution of effects, duration of effects, intensity of interest, or conflict generated.

2. **Alternatives, including mitigation measures:** Alternatives are other reasonable courses of action or mitigation measures not included in the proposed action (CEQ 1508.25 (b)). Alternatives may be based on key issues or may be suggested by the public during scoping. The

EA describes which alternative(s) will be analyzed in detail, analyzed briefly, or eliminated from further study.

3. **Non-issue comments and questions:** Nonissues are comments that do not debate possible effects of the proposed activities. They may be questions, asking for more clarification of the proposed action.

4. **Comments noted:** Some comments are statements of opinion or preference about the proposed actions. These are considered by the interdisciplinary team and provide information on individual and group values and preferences relating to this project. However, the scoping process is not a vote and comments are not used in that manner.

Appendix f-response to scoping comments lists all comments received and how they were categorized.

Through the analysis of public comments, the interdisciplinary team identified issues that need to be analyzed in the EA. Issues identified and analyzed in the EA include clearcutting, recreational opportunities, and impacts from temporary roads. Alternative 3 was developed in response to comments and concerns related to the proposed use of herbicide. To the extent possible, the interdisciplinary team resolved issues through modification of the proposed action. Alternatives are described and analyzed in chapter 2.

Administrative Objections

The project decision is subject to objections following Forest Service regulations at 36 CFR 218, subparts a and b because the project is an activity implementing a land management plan and is not authorized under the Healthy Forest Restoration Act. Only individuals or organizations who submit timely and specific written comments (as defined at 36 CFR 218.2) about this project during the scoping period or the comment period on the environmental assessment are eligible to file an objection to the project. The opportunity to object will be provided when a draft decision on the project is published, after public comment on this EA is considered.

CHAPTER 2: COMPARISON OF ALTERNATIVES

2.1 INTRODUCTION

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

2.2 HOW A RANGE OF ALTERNATIVES WAS DEVELOPED

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

The interdisciplinary team considered all scoping comments to determine if there were any unresolved issues about effects. Six alternatives were identified for this project: three alternatives were analyzed briefly and three alternatives were analyzed in detail. The amount of analysis of discloses the trade-offs between resources, effects of the alternatives, and how each meets the purpose and need. 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 modified proposed action will be analyzed in detail, as well as a second action alternative, no herbicide use, which was raised for the project from scoping.

2.3 ALTERNATIVES ANALYZED IN DETAIL

ALTERNATIVE 1 – NO ACTION

In this alternative, the proposed action would not take place. Existing management actions such as road maintenance would continue. Natural succession processes would take place; in the long term, early successional species such as aspen or birch would succeed to later successional species of spruce-fir (or brush where there is inadequate tree regeneration). Responding to wildfires and suppression actions would continue as this area has highly mixed ownership, residential and commercial developments, communities, and other infrastructure and natural resources. Selection of this alternative would not preclude future management actions in the project area.

ALTERNATIVE 2 – MODIFIED PROPOSED ACTION

The proposed action, included in the August 2015 scoping report, was developed by the interdisciplinary team to meet the purpose and need for the Mesabi Project. The team made minor modifications to the proposed action (sent to the public during scoping) based on additional field reviews, new information, and public comments. A summary of the modifications made to the proposed action is described in chapter 1, section 1.5.

Alternative 2-modified proposed action creates a young age class, an important component of the landscape ecosystems (LE) through harvesting. To the extent possible, the harvests would create large (more than 100 acres) young patches. Regeneration, through harvest, of some of these mature stands is needed to stimulate new growth of young trees and shrubs. Large young patches in the long term would become large mature patches. Existing mature patches would provide forest interior habitat and maintain forest connectivity and corridors for species like the Canada lynx.

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

Alternative 2 would reduce hazardous fuels; using hand, mechanical, and prescribed burning methods; through chipping and pile burning on site; underburning; removal of biomass; and through harvesting, site preparation, and thinning activities. Most fuel reduction activities would occur in the wildland urban interface areas of Britt, Cook, Hibbing, and the Flats.

Biomass removal could occur on harvest units with secondary treatments of slash disposal or site preparation and on nonharvest units with primary treatments of understory fuel reduction or site preparation. Biomass removal would not occur on units where soil mitigations call for retaining slash. Biomass removal would include tops and limbs (from harvest operations), brush, and nonmerchantable stems. It would not include stumps or existing coarse woody debris. Biomass removal would follow operational standards and guidelines (appendix c).

Summary of Actions

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

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

- Alternative 2 modified proposed action treatment map displays locations of the proposed treatments.
- Appendix a describes treatment types and mitigation measures.
- Appendix b lists specific treatments and mitigation measures for each unit.
- Appendix c lists 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 and a sample pit plan.
- Appendix h provides proposed herbicide application background, techniques and products, cost comparisons, mitigations, and project design criteria.

Table 2.1: Summary of Proposed Action by Primary Treatment Type and Alternative

Primary Treatment Description	Modified Proposed Action Alternative 2 Acres*	Alternative 3 Acres*
Create young forest with harvest	7,498	7,498
Clearcut with reserves	6,560	6,560
Shelterwood	938	938
Improve stand condition with harvest	4,846	4,846
Two age cut	247	247
Thinning	4,599	4,599
Restore stand condition without harvest	391	391
Nonharvest restoration underplant	306	306
Site preparation broadcast burn	85	85
Reduce/remove hazardous fuels	1,507	1,507
Fuels treatment	537	537
Underburn	970	970
Total for all Treatment Types	14,242	14,242

* All acreages are based on calculated GIS stand acreages.

Table 2.2: Summary of Proposed Secondary Treatments and Reforestation (following a primary treatment as described in Table 2-1)

Treatment Description	Modified Alternative 2 Acres*	Alternative 3 Acres*
Secondary Treatment	13,732	13,732
Diversity Planting	277	277
Pile Burn***	7,498	7,498
Site Preparation Broadcast Burn	2,486	2,486
Site Preparation Using Mechanical Equipment for Natural Regeneration	290	828**
Site Preparation Using Mechanical Equipment for Planting	170	170
Underburn	2,472	2,472

Table 2.2: Summary of Proposed Secondary Treatments and Reforestation (following a primary treatment as described in Table 2-1)				
Treatment Description	**Modified Alternative 2 Acres***		**Alternative 3 Acres***	
Site Preparation Herbicide	538		0	
Release (for sensitive species)	2		2	
Reforestation		3,113		3,113
Conversion	1,918		1,918	
Diversity Planting	288		288	
Seeding	907		907	
* All acreages are based on calculated GIS stand acreages. ** For Alt 3, the 538 acres of herbicide treatment for Alt 2 is combined with the 290 acres of SP using mechanical equipment for natural regeneration for a total of 828 acres. *** Pile burn as an optional secondary treatment is identified on units with clearcut with reserves or shelterwood as the primary treatment. .				

Summary of Actions: Non – Vegetation

Table 2.3: Summary of Non-Vegetation Proposed Actions.		
Proposed Action	**Modified Alternative 2**	**Alternative 3**
Add as system road (miles)	18.1	18.1
Add as a long-term special use (miles)	2.02	2.02
Add as temporary special use (miles)	0.3	0.3
Decommission (miles)	30.1	30.1
Existing temporary road corridors to be used (miles)	18.6	18.6
Construction of new temporary roads (miles)	3.1	3.1
Existing road miles to be converted to trail	5.2	5.2
Gravel pits with proposed changes to existing condition	37	37
Number of new backcountry campsites	2	2
New single-track mountain bike trail (miles)	7	7

There are several communication sites located within the project area servicing commercial, private, and emergency entities including the Forest Service and the communication needs of the area: Lookout Mountain Communication Site, Virginia Communication Site, Sand Lake Communication Site, and Laurentian Divide Communication Site. Each site has an approved site plan that dictates the use at each site, and the current and future use of these sites would continue. These sites are displayed on the Transportation Map.

ALTERNATIVE 3-NO HERBICIDE ALTERNATIVE

Alternative 3 (no herbicide alternative) was developed to compare the analysis in the proposed action to an action alternative that contained no herbicide use. This was done to independently evaluate benefits and concerns related to utilizing herbicide as a site preparation tool in the project area. Alternative 3 is similar to alternative 2 except that it excludes the use of herbicide,

relying on mechanical methods for site preparation. The treatment units, roads, and other activities would remain the same as noted in table 2-1 to 2-3.

2.4 ALTERNATIVES CONSIDERED AND NOT CARRIED FORWARD FOR DETAILED ANALYSIS

Some 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 alternatives. 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 considered alternatives a through c and eliminated them from detailed study for one or more of the following reasons:

- Did not meet the project's purpose and need
- Did not follow forest plan direction
- Beyond the scope of the Mesabi Project
- Issue driving the alternative would be resolved during project implementation
- Was a duplication within the existing alternatives

Alternative A – Proposed Action from Scoping Report

In August 2015, a scoping report was distributed to the public informing them of the project. The report included a "proposed action" which outlined management activities the interdisciplinary team had determined at the time would best accomplish the purpose and need for action as described in the report.

The August 2015 proposed action was not carried forward for detailed analysis primarily because the interdisciplinary team conducted further field reconnaissance and analysis and made modifications that would better meet project objectives (the purpose and need).

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

Alternative B-Less clearcutting

One concern was raised during scoping on the proposed clearcutting acres for the project. Along with clearcutting, other methods of even-aged harvest are proposed such as two-age cut and shelterwood treatments. However, this alternative was not considered in detail because reducing the acreage of clearcutting would not lead the project to meet the purpose and need for reducing aspen, creating young forest, increase diversity, and contributing to health and vitality of the project area. Clearcuts with reserves is proposed for 6,560 acres to create young forest with harvest. The team was guided by the forest plan guidelines G-TM-2 and G-TM-7, and standard S-TM-2 describing type of treatment for the various stand types and outcomes. In stands 20 acres or larger, five percent of the stand would remain as a legacy patch where no harvest occurs (FP G-TM-5).

The Mesabi EA explains and analyzes the need to create young forest and improve species diversity within the dominant landscape ecosystems. Efforts were made to reduce fragmentation by creating young stands adjacent to existing young stands on federal and other ownership. Section 3.3 in the Mesabi EA analyzes effects of clearcutting and all proposed vegetation activities. Interior species habitat, fragmentation, and large mature patches are discussed in section 3.6 – management indicator habitats.

Alternative C-No new roads

One commenter raised concerns about how roads affect overall forest health and contribute to the decline of certain species. This alternative was not considered in detail because the effects are already considered under the no-action alternative. Under this alternative, no management activities proposed would occur; thus, no roads would be decommissioned, constructed, or special use authorizations proposed would be granted. Further, it would not be possible to meet the purpose and need for vegetation management without road management to allow for access.

The EA includes analysis and information on road effects per agency and forest plan direction. For example, O-TS-3 provides an objective for the Forest that new roads built to access land for resource management will primarily be OML 1 or temporary and not intended for public motorized use, and will be decommissioned after their use is completed. Additional standards, guidelines, and objectives as described on p. 2-49 of the forest plan would be adhered to.

2.5 COMPARISON OF ALTERNATIVES CONSIDERED IN DETAIL

Comparison of Effects of Alternatives by Resource

This section summarizes and compares effects of the three alternatives analyzed in detail. The main points of each resource analyzed in chapter 3 or the appendices are summarized here. For the detailed analysis including analysis methods, data, cumulative effects, etc., see chapter 3 and relevant appendices. Alternative 1 (no action), alternative 2 (modified proposed action), and alternative 3 (no herbicide alternative) will be referred to as only alternative 1, 2, or 3 in these summaries. The following tables allow for a comparison of acres proposed for treatment in the three alternatives. Table 2.4 shows the acres of the proposed primary treatments, table 2.5 shows secondary treatments, and table 2.6 shows transportation management and recreation activities.

Table 2.4: Comparison of Vegetation Management by Primary Treatment (Acres)

Proposed Action Primary Treatment Category	Alternative 1	Alternative 2	Alternative 3
Creating young stands with harvests (Treatments such as clearcut with reserves and shelterwood harvests)	0	7,498	7,498
Improving stand conditions with harvests (Treatments such as two age cut and thinning)	0	4,846	4,846
Restoring stand conditions without harvests (Includes nonharvest restoration underplant and site preparation broadcast burn)	0	391	391
Reduce/remove hazardous fuels (Includes fuels treatments and underburning)	0	1,507	1,507
Total acres treated	**0**	**14,242**	**14,242**

Table 2.5: Summary of Proposed Action: Vegetation Management Secondary Treatments and Reforestation for all Alternatives			
Treatment Description	**Alternative 1**	**Alternative 2**	**Alternative 3**
Secondary Treatment	0	13,732	13,732
Diversity Planting	0	277	277
Site Preparation Broadcast Burn	0	2,486	2,486
Site Preparation Using Mechanical Equipment for Natural Regeneration	0	290	828
Site Preparation Using Mechanical Equipment for Planting	0	170	170
Underburn	0	2,472	2,472
Site Preparation Herbicide	0	538	0
Release (RFSS)	0	2	2
Reforestation	0	3,113	3,113
Conversion	0	1,918	1,918
Diversity Planting	0	288	288
Seeding	0	907	907

Table 2.6: Summary Of Proposed Action: Transportation System Management and Recreation Activities For Alternatives				
Proposed Action	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Map ID**
Existing road miles to be added to the system	0	18.1 miles	18.1 miles	A1 to A64; A70 to A74
Existing road miles to be decommissioned	0	30.1 miles	30.1 miles	D1 to D125; D130
Special use road authorization (permanent)	0	2.02 miles	2.02 miles	SUP1 to SUP11
Special use road authorizations (temporary)	0	0.3 miles	0.3 miles	SUP12
Existing road to be converted to trail	0	5.2 miles	5.2 miles	AT1 to AT3
Backcountry campsite	0	2	2	1 & 2
New single-track mountain bike trail	0	7 miles	7 miles	3

Vegetation

The purpose of the 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 vegetation in the project area from its existing condition toward the desired conditions described

in the forest plan. Proposed action alternatives follow management direction and strive to achieve goals for sustainable forest products in an environmentally acceptable manner and provide a sustainable level of commercially available timber (USDA Forest Service 2004a). Vegetation management, designed to meet the desired future condition, would be accomplished through timber harvest, planting, release activities, and prescribed fire in addition to natural succession.

Under alternative 1 there would be no new management of the vegetation. Natural succession would continue and would result in the forest not moving towards forest plan landscape ecosystem (LE) objectives for young forest or vegetation composition; except for objectives for spruce-fir. For age composition, no new young age class (0-9) would be created by management action; further reducing that age grouping to 80 percent less than existing conditions. In addition, natural disturbances such as wildfire, insect and disease outbreaks, and wind storms could occur changing species composition which may not be meeting desired ecosystem and vegetation goals.

Under alternatives 2 and 3, similar amounts of management activities would occur to move vegetation toward desired objectives for age class, composition, structure, and spatial patterns. Vegetation management activities include increasing the amount of acres of red pine and jack pine forest types while decreasing the amount of aspen forest type. In addition, alternatives 2 and 3 propose to maintain or increase the amount of acres in the white pine forest type across the upland LEs. For age class distribution, both action alternatives would increase the amount of young age class through timber harvest and forest management, especially treatments such as clearcuts and shelterwoods harvests. Finally, tree species diversity in the treated stands would generally increase under all action alternatives. A mix of silvicultural practices would be applied to improve species diversity in stands within the project. Planting would be done to diversify the species mix within a given stand. Herbicide use in alternative 2 would be used to prepare sites for planting and conversion, which would set back competing vegetation longer allowing the planted trees to become established more quickly and efficiently when compared to the same sites using mechanical site preparation in alternative 3. Eastern white pine, for instance, would be planted in conversion units following timber harvest, in nonharvest restoration units, and with diversity planting to enhance its presence on the forest. Within stands to be thinned, more area would be opened up to allow for better crop tree growth but also to allow for recruitment of young trees into the canopy.

Herbicide

The project area has opportunities to use herbicide as a cost effective tool to control competition in young stands of conifer and paper birch. Increasing or maintaining the amount of paper birch and long-lived conifer forest types within our landscape is an objective of the forest plan. Broadcast and focused applications of herbicide combined with some form of mechanical treatment (timber harvest, rock rake, disc trench, etc.) would increase the amount and survival of paper birch and conifer regeneration by giving seedlings a few years with reduced competition for water, light, and other resources. This allows for increased growth and a greater photosynthetic area for seedlings to survive competitor influence into the sapling stage.

Alternative 1 would not utilize herbicide as a tool for competition control to regenerate the desired species. This alternative also does not help move the project area from its current condition to desired conditions as described in the forest plan.

In alternative 2, herbicides would be used to target specific sources of competition (i.e., woody species, grasses, and broadleaf herbaceous plants) to allow desired species the ability to out compete non-desired species for resources such as light, water, and soil nutrients. An example would be using herbicide to slow the growth of grasses, aspen, and brush species for improved paper birch regeneration and recruitment of paper birch into the overstory. Using herbicides would allow a stand to reach the next successional stage in a much shorter timeframe given that only one follow up release would be needed to establish the desired regeneration. In turn this would save money and time to reach the desired condition. See appendix h for more information on the herbicide proposal.

Alternative 3 uses mechanical site preparation in lieu of herbicide treatments. This alternative would cost approximately $123,072 more than alternative 2 and potentially take longer to net similar results to establish desired tree species. It is anticipated that there would need to be at least two mechanical releases to establish the desired regeneration. Mechanical site preparation and an additional release results in the higher cost of alternative 3 compared to alternative 2. Site preparation using mechanical equipment would provide scarification for reforestation purposes and would crush or cut existing competition but not remove it from the site. This method would maintain species diversity similar to the levels that existed within the stand following timber harvest or in the case of nonharvest treatments similar to the existing conditions of the stand. Herbaceous competitors, brush species, and aspen would still be present on site with intact and healthy root systems and may even respond favorably to the mechanical treatment. This would prevent slower growing species, such as paper birch and white pine, from being established as a major component of the stand. However, alternative 3 would also require two or three additional release treatments that would not be needed in alternative 2, which is also reflected in the increase cost.

Wildlife

Threatened and Endangered Species

Alternative 1 would have no effect on Canada lynx and no effect to lynx critical habitat; while alternatives 2 and 3 are not likely to adversely affect Canada lynx and are not likely to adversely modify lynx critical habitat. This is because human disturbance factors are minimized, prey habitat is maintained and improved, and lynx habitat would be maintained or improved. Both action alternatives would also comply with all applicable forest plan management direction related to Canada lynx and its habitat.

Alternative 1 would have no effect on gray wolf and no effect to wolf critical habitat; while alternatives 2 and 3 are not likely to adversely affect gray wolf and are not likely to adversely modify wolf critical habitat. This is because human disturbance factors would be minimal, adequate habitat is maintained, and prey habitat improvements would take place. Alternatives 2 and 3 both also would comply with all applicable forest plan management direction related to gray wolf and its habitat.

Alternative 1 would have no effect on the northern long-eared bat (NLEB) while alternatives 2 and 3 may affect, and likely to adversely affect the NLEB. Individual northern long-eared bats may be killed or injured during tree removal activities during the summer active period. Alternatives 2 and 3 maintains suitable summer roosting habitat and protects known roost trees. The loss of suitable summer roost habitat alone is not likely to have significant population-level effects. There will be no impacts on hibernacula.

The U.S. Fish and Wildlife Service concurred with the findings above in a letter dated June 8, 2016.

Regional Forester's Sensitive Species

Terrestrial and Aquatic Wildlife

Alternative 1 (no action) would have no direct, indirect, or cumulative effects 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. Additionally it would have no impact on lake sturgeon, shortjaw cisco, Nipigon cisco, northern brook lamprey, creek heelsplitter, black sandshell, Quebec emerald dragon fly, headwaters chilostagman caddisfly, and ebony boghaunter.

For alternatives 2 and 3, proposed activities would have no impact on Freija's grizzled skipper and wood turtle. Proposed activities in alternatives 2 and 3 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.

Alternatives 2 - 3 would have no direct, indirect, or cumulative effects to shortjaw cisco, Nipigon cisco, Quebec emerald dragonfly, headwaters chilostagman caddisfly, and ebony boghaunter.

For alternatives 2 - 3, proposed activities may impact individuals of lake sturgeon, northern brook lamprey, creek heelsplitter, black sandshell, but are not likely to cause a trend to federal listing or loss of viability.

Vascular Plants and Lichens

Alternative 1 would have no direct, indirect, or cumulative effects 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, fairy slipper, ram's head lady's slipper, western Jacob's ladder, small shinleaf, cloudberry, caloplaca parvula, cetraria aurescens, frullania selwyniana, menegazzia terebrata, pseudocyphellaria crocata, ramalina thrausta, sticta fuliginosa, usnea longissima, goblin fern, New England sedge, Canada ricegrass, Canada yew, barren strawberry, or peltigera venosa.

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

Proposed activities in alternatives 2 and 3 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, fairy slipper, ram's head lady's slipper, western Jacob's ladder, small shinleaf, cloudberry, caloplaca parvula, cetraria aurescens, frullania selwyniana, menegazzia terebrata, pseudocyphellaria crocata, ramalina thrausta, sticta fuliginosa,

usnea longissima, goblin fern, New England sedge, Canada ricegrass, Canada yew, barren strawberry, or peltigera venosa, but are not likely to cause a trend to federal listing or loss of viability.

Management Indicator Species

Management indicator species (MIS) include the bald eagle, white pine, northern goshawk, and gray wolf. These species are discussed in chapter 3, section 3.5. The gray wolf, bald eagle, and northern goshawk are sensitive species as well as MIS and potential effects are considered under threatened and endangered species (3.3) and regional forester sensitive species (3.4). Effects to white pine are described below.

Alternative 1 would retain the current status of white pine. Decade two objectives in the forest plan calls for increasing the amount of white pine on the landscape by two percent. Alternatives 2-3 would be expected to increase white pine on the landscape by thinning some existing stands to maintain 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.

Management Indicator Habitat (MIH) and Spatial Patterns

Management indicators provide a landscape level means of monitoring and evaluating effects of 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 and alternatives 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 Forestwide objectives.

For alternative 1, forests in the project area would continue to mature and no new management-induced edge would be created but edge density would continue to be high due to the small size of the existing young patches. The amount of mature interior forest as well as the number and acres of mature, upland forest patches would increase (see tables 3.6-2 and 3.6-3), although the quality of some patches of mature forest would decrease as old birch and aspen decline. The effect of this change would be more habitat for wildlife species such as black-throated blue warbler, goshawk, boreal owl, three-toed woodpecker, and Connecticut Warbler.

However for alternative 1, in the absence of measurable natural disturbance, young forest patches on federal lands would become rare and patch sizes would remain small. This reduction in and poor distribution of young forest patches would have minor negative effects on species that use edge, including most game species. Also, without the creation of large, young forest patches high-quality mature interior forest would become less available in the project area in a few decades.

Both action alternatives would do a better job of decreasing upland edge density and interior mature forest in the present with alternative 1, but would provide more interior mature forest compared to existing stands due to maturing into the future (table 3.6-2). A reduction in edge density is not expected to have negative impacts on those species that use edge, including most game species, because all action alternatives would create considerable amounts of young forest and edge habitat. Alternatives 2 and 3 would result in the same or higher amounts of interior forest habitat compared to existing (table 3.6-2).

Non-Native Invasive Plants (NNIP)

Based on analysis of past, present, and reasonably foreseeable actions (appendix e), the cumulative effects of the project on NNIP would be negligible and would not differ much between alternatives 1, 2, and 3. Some effects would be negative and others would be beneficial.

For alternative 1, even though no management activities associated with the project would occur, direct effects on NNIP would still occur. Any NNIP in the analysis area would continue to exist and would probably spread along typical corridors. Overall, this alternative would have the least amount of weed spread. Under alternatives 2 and 3 management activities would occur including the building of 1.8 miles of new temporary upland road. NNIP would likely be spread along some of these roads. However, the ecological risk would be small as they typically stay along roadways and temporary roads would be decommissioned after use. Native forbs, shrubs, and trees would revegetate after decommissioning outcompeting invasives. Herbicides under the NNIP EA will continue to be used. Lastly, the risk of spread would be minimized by operational standards and guidelines.

Hazardous Fuel

Under alternative 1, vegetation management activities that reduce fuels would not occur. Therefore, the risk of high intensity wildland fires would not be reduced. Acres in the high, medium, and low categories would remain at their current levels. In addition, the potential for increased acres supporting higher intensity fire is expected as forests mature and natural disturbances occur overtime.

Alternative 1 would increase the potential to lose key components of certain ecosystems. The exclusion of timber harvesting and fuel reduction activities would allow balsam fir to invade and proliferate in the understory of most stands, making stands that are currently vulnerable to passive crown fires more likely to experience active crown fires in the future. Because alternative 1 does not treat any units, this alternative presents the greatest risk of crown fires from a wildland fire than all of the other alternatives.

For alternatives 2 and 3, effects are the same. They would both treat the same of amount of available acres in the high and medium risk categories, and would decrease available fuel to support wildland fires through timber harvesting, altering vegetation by mechanical or hand means, and prescribed burning. These treatments are effective at reducing wildfire severity, suppression costs, and increasing forest resiliency. Susceptibility to crown fire and threats to firefighters and public safety would be less than alternative 1. Hand crews would have a greater chance of suppressing wildland fires because the fire intensities and spread rates are reduced substantially in surface fires.

Transportation

Forest plan direction is to maintain the minimum National Forest Road System needed to provide adequate access to both National Forest System and non-National Forest System land (D-TS-1, FP p. 2-47). In addition, maintaining road and trail densities below two miles per square mile helps maintain the natural competitive advantage of lynx in deep snow (G-WL-8, FP, p. 2-30).

Alternative 1 would make no changes to the existing transportation system or gravel pits within the project area. There would be no difference in transportation system actions between alternatives 2 and 3. See table 1.6 for a description of transportation system actions.

Water Resources

Under alternative 1, there would be no additional young forest created by vegetation management. Water quality and watershed health is high under the existing condition. No new system or temporary roads would be constructed. As a result, there would be no increased potential for negative effects to water quality or watershed health, but there would also be no road decommissioning, resulting in no potential improvements potentially associated with a decrease in road density. Continued motorized use of these roads would result in no new disturbance, maintain current levels of erosion into streams, and maintain current level of watershed, riparian, stream, and wetland function.

Under alternatives 2 and 3, identical new temporary and permanent road miles are proposed. The potential for impact from these action alternatives to water quality from soil disturbance and erosion are higher than the impact with alternative 1; however, with implementation of MFRC guidelines and Forest OSGs, impacts to watershed, riparian, stream, and wetland functions are likely to be minimal.

Both action alternatives proposed to decommission identical amounts of existing roads. Decommissioning may improve existing water quality and watershed conditions within the analysis area, decrease potential surface erosion and run off, and decrease sediment input into local streams, lakes, and wetlands.

Road density analysis for these two action alternatives yielded identical results. Increases in road density as proposed have the potential to result in additional soil disturbance and erosion; however, with standard BMPs in place the potential for impact is greatly reduced.

Aquatic ecology is likely to be minimally impacted by the proposed action. Although 24 new road-stream crossings are proposed, the overall impact in concert with forest plan and 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.

Regarding herbicide effects to water resources under alternative 2, see the following soil productivity summary.

Recreation and Scenery

For the recreation resources, alternative 1 proposes no new management activities to enhance the recreational resource; therefore, no recreation sites would be affected by harvest activity. Hazardous fuels would continue to build up reducing growth of long-lived conifer species in the Lookout Mountain area. The proposed project of adding an additional seven miles of mountain bike trail would not occur, nor would designating a backcountry campsite at Moose Lake and Sandy Lake. Taking no action would not move the project area toward forest plan desired conditions for recreation.

For scenery, alternative 1 proposes no new management activities in the project area and therefore would not have any short-term management impacts on the existing condition of the scenery resource within high and moderate scenic integrity objectives (SIO) areas. Over the long term, visual effects of natural succession, especially dying balsam fir in the understory, would continue to increase; as would the potential for fire in large, continuous stands of dead understory.

Alternatives 2 and 3 propose similar forms of vegetation management that have occurred in this area in the past and are expected 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. Effects to recreation sites from sights and sounds of proposed harvest activities would be temporary and would have little effect on the recreation resources. The backcountry site on Sandy and Moose Lake and the seven miles of new single-track mountain bike trails would move forward as part of the proposed action and would help achieve forest plan objectives for recreation. Forest Road 278 would be opened to all off-highway vehicles (ATVs and UTVs) following the mitigations and recommendations of engineering for mixed motorized use.

For scenery alternatives 2 and 3 would have short-term effects of being able to see management activities in the spring for about one month until spring green-up, then blend in to the surrounding landscape. Temporary openings created by harvest and subsequent planting of pine would enhance high scenic integrity objectives over the long term by increasing long-lived conifer species. Forest openings created by harvest would also be similar in size, shape, and edge characteristics to natural openings in the landscape being viewed as identified in the operational standards and guidelines. Natural appearing forest openings often provide interest and a sense of perspective to motorists along scenic byways where wildlife and open vistas add variety to the scenic experience. All action alternative proposals would meet the forest plan's desired conditions and objectives for scenic resource management in high SIO areas.

Tribal Communities

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

The district ranger and the interdisciplinary team consulted with tribal representatives while developing the objectives (purpose and need) and proposed action for the project.

The following comments were received from 1854 Treaty Authority representatives during scoping:

- Access to Sandy and Little Sandy Lakes
- Access to wild rice lakes in the project area

Under alternatives 2 and 3, access to Sandy and Little Sandy Lakes would be improved if an easement or other access is obtained. Regarding access to wild rice lakes, the project would not change access to these lakes.

Heritage Resources

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

For alternatives 2 and 3, tree falling, prescribed burning, skidding, slash disposal, and the construction/rehabilitation/closure of temporary roads all present potential threats to heritage resources. Reforestation measures can also affect heritage resources through ground disturbing

activities associated with site preparation and planting. Indirect effects associated with all action alternatives may include increased access to, and visibility of, heritage resources due to the thinning of trees/shrubs near the site.

Under the action alternatives, impacts to all heritage resource sites would be avoided through standard measures of protection pursuant to the 2004 Superior National Forest Plan (2-39/S-HR-9). Recorded and newly discovered heritage resource sites would be avoided during implementation. Heritage resource sites would be excluded from the activity units, with the boundaries marked as appropriate in the field prior to project implementation. This would eliminate direct effects to the heritage resource. Post-treatment monitoring of mitigation measures (site buffers) and maintenance of confidentiality with respect to heritage resource locations would effectively eliminate post-treatment impacts; thus, heritage resources would experience no indirect effects under all alternatives.

Gravel Pits

Implementation of alternative 1 (no action) would result in no additional vegetation management activities and associated road building. Minerals materials (gravel) would still be in demand across the project area for maintenance of current transportation system and other Forest Service facilities. Maintenance and construction of roads for other government agencies may also use existing gravel sources. Gravel would also be needed for site development, maintenance, and construction of roads within private parcels of land. Under alternative 1, pit development disturbance size would not increase beyond that of previous analysis and therefore would not meet future anticipated needs for gravel. Site-specific analysis would be needed for additional development or expansion in the future. Additionally, those not designated as continuous use would not be available for commercial sale.

Implementation of alternatives 2 and 3 would result in vegetation management activities that would require use of gravel for the associated management of the transportation system. Thirty gravel pits included in this analysis would be available to meet the needs of the project and the need for gravel for other public and private developments. Six sources are proposed to be closed and reclaimed. One pit, the Jammer Lake Pit, is designated as a preference right pit to Seppi Brothers Concrete Products. Seppi Bros. has proposed to conduct mineral material exploration on approximately 360 acres of land around the current pit area. This would cause minimal disturbance excavating a shallow trench with a backhoe and then backfilling.

Soil Productivity

Alternative 1 would have no direct effects to soil productivity because no soil disturbing activities would take place as a result of this alternative. Land that would have been converted back to a productive status through road decommissioning would remain in an unproductive condition under this alternative. Additionally, the risk of a severe wildfire causing detrimental soil effects would increase.

Alternatives 2 and 3 would result in vegetation management activities. The difference between the action alternatives is that alternative 3 proposes to use mechanical site preparation rather than site preparation with herbicide. By following operational standards and guidelines described in appendix b and c, these treatments would result in minimal impacts to the soil from site preparation. Potential direct impacts to soil resources from site preparation within treatment units would be due to the effects of landings, skid trails, harvest and mechanical activities, and

fuels reduction activity. Impact to the soil from the equipment would be compaction, rutting, displacement, and erosion.

Alternative 2 uses herbicide to control the competing vegetation; there would be a low risk of herbicide leaching through the soil into groundwater or into a waterbody by runoff. However, when herbicides are applied in conjunction with herbicide label instructions, project mitigations, MFRC guidelines, and considering that the stands selected are away from water bodies and spraying would not be near wetlands, there would be a low risk of delivery into surface water and of herbicide leaching into the groundwater.

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).

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

In alternative 1, within-stand diversity would be created largely through succession of aspen and birch to spruce-fir, northern hardwoods, and brush. Alternative 1 would not create a disturbance to encourage young forest production within project area and it is uncertain that natural disturbances will occur over a large enough area in the project area in the next ten years to promote the creation of young forest that would accomplish the goals set out in the forest plan (FP). As the forest continues to age, succession would move some stands towards a spruce-fir forest. However, key species such as jack pine, white pine, and paper birch would continue to decline. In addition, forest types such as aspen and jack pine are succeeding to balsam fir and brush species in the absence of disturbance. Loss of these components in native vegetation communities might reduce the resiliency of the forest and further compound climate change effects.

Activities in alternative 2 and 3 would both meet the purpose and need by increasing or maintain key tree species of native vegetation communities including increasing jack pine, white pine, red pine, and paper birch. Actions with either of these alternatives would create 7,498 acres of young forest with harvest, which is in line with FP 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 restore stand conditions by underplanting 306 acres. Secondary and reforestation treatments would diversity plant 288 acres, seed 907 acres, and conversion plant and/or seed 1,918 acres.

Alternatives 2 and 3 would both used a combination of post-harvest treatments to ensure the desired regenerations objectives are met; however, alternative 2 would use herbicide on a subset of 538 acres with one timber stand release, while alternative 3 would use mechanical site preparation followed by two timber stand release activities. Both alternatives would allow for improved species and structural diversity over time, however the regeneration would be established more quickly in alternative 2 compared to alternative 3 on those 538 acres. While there could be an initial loss of species diversity after the initial herbicide application, there would be a long-term benefit of improving the site for jack pine and birch. Increasing diversity on 538 acres in alternative 3 would cost approximately $123,072 more than alternative 2.

Improve Habitat for Sensitive Plants

Alternative 1 would not remove encroaching shrubs and saplings from two sensitive plant locations, which prefer open, sunny conditions. These sensitive plants would be outcompeted to hazel, alder, and other shrubs. There is no difference between alternatives 2 and 3, which would cut back the encroaching vegetation on approximately two acres, providing open, sunny conditions the least moonwort, ternate grapefern, and barren strawberry to thrive.

Enhance wildlife habitat for threatened, endangered, and sensitive species

Forest conditions would continue to provide for lynx denning, foraging, and movement across the analysis area under all three alternatives. Alternative 1 would have no effect on Canada lynx and no effect to lynx critical habitat; while alternatives 2 and 3 are not likely to adversely affect Canada lynx and are not likely to adversely modify lynx critical habitat. This is because human disturbance factors are minimized, prey habitat is maintained and improved, and lynx habitat would be maintained or improved. Both action alternatives would also comply with all applicable FP management direction related to Canada lynx and its habitat.

Alternative 1 would have no effect on gray wolf and no effect to wolf critical habitat; while alternatives 2 and 3 are not likely to adversely affect gray wolf and are not likely to adversely modify wolf critical habitat. This is because human disturbance factors would be minimal, adequate habitat is maintained, and prey habitat improvements would take place. Alternatives 2 and 3 both also would comply with all applicable FP management direction related to gray wolf and its habitat.

Alternative 1 would have no effect on the northern long-eared bat; while alternative 2 and 3 may affect and likely to adversely affect the NLEB. Individual northern long-eared bats may be killed or injured during tree removal activities during the summer active period. Alternatives 2 and 3 maintain suitable summer roosting habitat and protects known roost trees. Loss of suitable summer roost habitat alone is not likely to have significant population-level effects. There would be no impacts on hibernacula.

Introduce Fire into Fire Dependent Ecosystems

Alternative 1 would not use any management ignited fire to reduce fuel hazard, improve wildlife habitat, improve stand conditions, or prepare stands for planting or natural regeneration. Succession would continue along its current path, where shade tolerant species such as balsam fir would continue to become established in the understory of pine stands, which would potentially increase the risk of a higher intensity wildfire.

There would be no difference in the amount, type, and effects of prescribed fire in alternatives 2 and 3. Both alternatives propose to use prescribed burning on approximately 2,470 acres to prepare the site for regeneration on recently harvested stands, of which 1,472 acres would be converted to jack pine, red pine, or a mixed pine. The remaining acres would be maintaining or improving black spruce, jack pine, and paper birch through seeding or natural regeneration. Prescribed underburning would occur on 2,472 acres as a secondary treatment following a thinning harvest. Underburning would be a low intensity burn used to maintain vitality of the stands as well as reduce the potential risk of high-intensity crown fire especially in older red and white pine stands. There would be no differences between alternative 2 and 3

Reduce Hazardous Fuels

The Forest Plan states: "Areas that are identified as Wildland Urban Interface (WUI) and have vegetation conditions that are in Condition Class 2 or 3 will be given highest priority for hazardous fuels treatment (p.2-19)." Under alternative 1 no management action is proposed; therefore, it would not reduce the existing fuel hazards in and around the WUI. Current fuel loadings would continue to increase throughout most of the forest land within the project area. This is due to dead, dying, and/or wind thrown trees as well as general successional trends. The increasing fuel loads would contribute to more intense wildfires which would have more severe effects. Values at risk, such as but not limited to private property, recreation resources, and natural resources, could be negatively impacted by a wildfire in the project area. Any changes in climate that would increase temperatures and/or decrease moisture may further compound the potential for large wildfires to produce severe effects.

Alternatives 2 and 3 would be the same in amount and types of fuel reduction treatments. Both alternatives would reduce hazardous fuels by harvesting, conducting prescribed burns, and other fuel reduction work to a level that would decrease the wildfire behavior potential. This type of work is most effective when conducted in and around WUI areas, by breaking up the continuity of vegetation thereby reducing the potential for extreme fire behavior. This enhances Firewise and other defensible space efforts on private property and extends defensible landscapes further away from developments. Ultimately, it is an area between a fire and the values at risk where firefighters are able to more safely conduct suppression actions. Also, removal of hazardous fuels near high travel corridors would improve the safety of Forest visitors and local residents exiting in the area during a wildfire.

Alternatives 2 and 3 propose to conduct understory fuel reduction work with prescribed fire and mechanical treatments on 1,507 acres. Creating young stands and thinning stands through harvest would remove crown fuel and crush ladder fuel on 12,344 acres in alternatives 2 and 3. Broadcast prescribed burning would be used to prepare sites for regeneration on 2,486 acres in both alternatives, which would reduce the surface and ladder fuels following harvest activities.

Mechanical site preparation would reduce surface and ladder fuels by crushing and displacing or piling to reduce competition. Alternative 2 proposes 460 acres of mechanical site preparation compared to Alternative 3 which proposes 998 acres. Alternative 2 proposed to use herbicide to prepare sites in lieu of mechanical site preparation. Herbicide use could temporarily increase fuel availability and loading in certain areas such as in a WUI. However, small isolated areas where herbicide would be utilized would not have an effect in regards to posing a fuel concern on the landscape level. Therefore, effects for alternatives 2 and 3 are the same.

Improve Riparian Function, Water, and Soil Resource Health

Alternative 1 would have no direct, indirect, or cumulative effects to water or soil quality because there would be no soil disturbing activities, increase in road miles, or increase in the percentage of watersheds in a young or open condition. However, there would also be no road decommissioning, resulting in no potential improvements associated with a decrease in road density and returning the road bed to a productive, vegetative condition. Nor would there be any actions taken to improve vegetative communities in riparian areas by maintaining or planting long-lived conifer species.

Under alternatives 2 and 3, identical new temporary and permanent road miles are proposed as well as decommissioned. The potential for impact from these action alternatives to water quality from soil disturbance and erosion are higher than the impact with alternative 1; however, with implementation of MFRC guidelines and Forest OSGs, impacts to soils, watershed, riparian, stream, and wetland functions are likely to be minimal.

Aquatic ecology is likely to be minimally impacted in alternatives 2 and 3. Although 24 new road-stream crossings are proposed, the overall impact in concert with FP, 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 FP and MFRC guidelines these impacts would be minimized. Crossings are unlikely to affect flood flow capacity or floodplain function.

Alternative 2 uses herbicide to control the competing vegetation. When herbicides are applied in conjunction following label instructions, project mitigations, MFRC guidelines, and considering that the stands selected are away from water bodies and spraying would not be near wetlands, there is low risk of delivery into surface water. Comparatively, alternative 3 would have 583 more acres of mechanical site preparation, resulting in slightly more soil disturbance than in alternative 2, especially when temporary roads are needed to be open longer and second entries are required to control competing vegetation.

Improve Recreation and Scenic Resources

For the recreation resources, alternative 1 proposes no new management activities to enhance the recreational or scenic resource; therefore, no recreation sites would be affected by harvest activity and there would be no short term impacts to scenery. Hazardous fuels would continue to build up reducing growth of long-lived conifer species in the Lookout Mountain area and over time, visual effects of natural succession, especially dying balsam fir in the understory, would continue to increase; as would the potential for fire in large, continuous stands of dead understory. The proposed project of adding an additional seven miles of mountain bike trail would not occur, nor would designating a backcountry campsite at Moose Lake and Sandy Lake.

Alternatives 2 and 3 propose similar forms of vegetation management that have occurred in this area in the past and are expected in the area by many recreational users. Alternative 2 would have slightly less mechanical equipment impacts to scenery and recreation as herbicide application would be used in lieu of mechanical site preparation with fewer follow up release treatments. All other actions between the action alternatives would be the same; thus, resulting in the same direct and indirect short-term effects. All action alternative proposals would meet the FPs desired conditions and objectives for scenic resource management in high SIO areas. Alternatives 2 and 3 would also increase recreation opportunities with the proposals to add two backcountry campsites on Moose and Sandy Lakes and seven miles of single-track mountain biking trails at Lookout Mountain.

Designate Gravel Pits

Implementation of alternative 1 (no action) would result in no additional vegetation management activities and associated road building. Minerals materials (gravel) would still be in demand across the project area for maintenance of current transportation system and other Forest Service facilities. Maintenance and construction of roads for other government agencies may also use existing gravel sources. Gravel would also be needed for site development, maintenance, and

construction of roads on private land. Under alternative 1, there would be no gravel pit reclamation on unneeded pits, nor would there be any pit designations, and there would be no exploration Jammer Lake Pit. All current uses and designation would remain the same.

Implementation of alternatives 2 and 3 would result in vegetation management activities that would require use of gravel for the associated management of the transportation system. Thirty gravel pits included in this analysis would be available to meet the needs of the project and needs for gravel for other public and private developments. Six sources are proposed to be closed and reclaimed. Additionally, the Jammer Lake Pit, a preference right pit to Seppi Brothers Concrete Products has proposed to conduct mineral material exploration on approximately 360 acres of land around the current pit area.

Provide Sustainable Forest Products

Alternative 1 would not provide forest products from this area at this time; therefore, this would not meet the purpose and need. This would not preclude providing timber products in the future. As no harvest activities would occur under this alternative, no temporary roads would be built to access stands for vegetation management.

Alternatives 2 and 3 would provide approximately 200,000 ccf (hundred cubic feet) over the next ten years. Harvesting the timber stands proposed in alternative 2 and 3 offers immediate economic returns to federal and local governments and to the timber industry. Harvesting in alternative's 2 and 3 would be a continuation of economic returns from harvests similar to the return in the past 10 years. 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

Under alternative 1 the successional path vegetation is currently on would continue in the absence of some type of management or natural disturbance. 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. No thinning, prescribed burning, or planting would occur in this alternative.

Alternatives 2 and 3 propose to thin 4,599 acres of primarily red pine plantations to enhance stand and tree health, productivity, and diversity. Thus, reducing stand density; thereby increasing growing space for the residual trees and maintaining a high level of vigor reducing susceptibility to insect and disease outbreaks.

Transportation: Unauthorized Roads, Motorized Roads and Trails, and Special Use Authorizations

All existing transportation routes would remain unchanged under alternative 1 and no new routes would be created. All current use patterns would likely continue.

Alternatives 2 and 3 address the current unauthorized roads within the project area. Both alternatives propose to add 18.1 miles of road to the system and 30.1 miles of road would be decommissioned. Both alternatives propose to reconstruct 0.2 mile of road, which would remain a system road. There would be approximately two miles of road needed to access other ownership. Additionally, there would be approximately 5.2 miles of existing road converted to a trail.

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 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 are 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 and is continually updated when treatments that change stand characteristics, such as harvest, occur. Data from FSVEG Spatial was extracted in 2015 and used for this analysis.

Forest vegetation is highly variable and constantly changing and not all stand data may be current. However, it is the best available forest information and is adequate for analysis and drawing conclusions.

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 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 project. Cover letters and preliminary proposed action maps were mailed to all three bands, along with scoping materials. The 1854 Treaty Authority submitted comments on maintaining access to wild rice lakes in the project area and improving the access and campsite to Sandy and Little Sandy Lakes. Response to these comments may be found in appendix f, comments MS-044-1 and MS-04402. Should alternative 2 or 3 be selected, additional heritage resource survey would be completed in the project area.

Alternative 1 (no action) would not be responsive to tribal interests related to maintaining or increasing Forest access and recreation improvements.

Alternatives 2 and 3, would attempt to obtain an easement to Sandy and Little Sandy Lakes to officially recognize, designate, and manage this site as water access. Improvements to this site could include converting an existing user developed ATV trail to an official designated trail. Additionally, the action alternatives would designate and manage access and the backcountry campsite on Moose Lake, a popular wild rice lake.

3.3 VEGETATION

3.3.1 Introduction

Forest Plan objectives seek conditions more representative of native vegetation communities than what currently exist. This vegetation section discusses effects that each alternative is expected to have on the vegetative structure and composition of the project area as it relates to

moving the forest towards FP desired conditions. Effects are displayed by landscape ecosystem (LE). The LEs were described and delineated as part of the FP revision. Each LE is characterized by its 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 (USDA Forest Service 2004a). Pages 2-55 to 2-78 of the FP present vegetation objectives for the different LEs on the Forest. See 1.3-forest plan direction for the project area for information on the LEs in the project area.

Forest plan vegetation objectives were developed considering past, current, and future expected vegetative conditions of all lands within the northern superior uplands (USDA Forest Service 2004a). They were also developed considering the conditions of the Boundary Waters Canoe Area Wilderness (BWCAW) and the conditions of other ownerships. These FP vegetation objectives apply to National Forest System (NFS) lands outside the BWCAW. Forest plan cumulative effects analysis took into account not only NFS land but non-NFS land as well.

The project was designed to move toward forest vegetation management objectives as described in the FP (USDA Forest Service 2004a). Action alternatives follow management direction and strive to achieve goals for sustainable forest products in an environmentally acceptable manner and provide a sustainable level of commercially available timber (USDA Forest Service 2004a). Vegetation management, designed to meet the desired future condition, would be accomplished through timber harvest, planting, release activities, and prescribed fire in addition to natural succession.

An interdisciplinary team developed proposed actions for the project by reviewing all stands within the project boundary and by comparing existing conditions with desired future conditions from the FP. Stands were identified for management activity based on their condition, and how management of the stands could contribute to meeting FP desired future conditions. Many vegetation treatments were focused on increasing the number of acres in mature patches and the continuity of the patches. Action alternatives would provide for larger upland young patch sizes. When these patches mature in 40-60 years, they would contribute to larger upland mature patches than what currently exists in the project area. Action was deferred in various stands based on wildlife, recreation, social, soil, riparian area, or economic constraints such as low volume stands or cost of road building to remote stands. After several reviews, meetings, and public input, the pool of stands was adjusted to the proposed stands considered under all alternatives.

Appendices a and b includes information on the types of vegetation management activities proposed, lists units proposed for treatment, and type of treatment under each alternative.

The project's effects analysis for the vegetation resource is tiered to the forest plan environmental impact statement (USDA Forest Service 2004b). The FP EIS considered the role of disturbance, the range of natural variability, ecological classifications, and landscape ecosystems. The EIS also disclosed effects of implementing the Forestwide objectives. The project effects analysis' discloses effects of the project on vegetation and how each alternative would contribute towards meeting plan objectives and desired future conditions. The Mesabi environmental assessment (EA) does not repeat the analysis documented in the FP EIS.

3.3.2 Analysis Methods

The FP provides four specific measurable objectives for each landscape ecosystem. Three of these objectives are addressed in this section and include species composition, age class distribution, and within-stand diversity for each LE. These objectives are measurable; so they provide a good way to disclose effects to vegetation and to compare how the project's alternatives would move each LE toward the desired future condition described in the Plan. The fourth objective is MIH which are addressed in the FP and in chapter 3.6 of this EA.

Indicator 1: Species composition

This indicator describes change in species composition or forest type as a result of each alternative in the project area. Some proposed management activities would change a stand's forest type. Natural succession and disturbance may also change a stand's forest type. This indicator highlights differences between alternatives because proposed management activities would produce varying amounts of different forest types over time. The amount and distribution of forest types may also have direct implications on biological diversity, old age classes, wildlife habitat, and forest products.

Indicator 2: Age class distribution

This indicator describes change in age class distribution as a result of 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 forests 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 change in within-stand diversity as a result of each alternative. This indicator highlights difference in alternatives because the 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 (Oliver and Larson 1996).

3.3.3 Analysis Area

The geographic boundary selected for analyzing the direct and indirect effects is NFS land within the project boundary. The analysis area includes only that portion of the LEs found in the project area, even though each LE extends well beyond the project boundary. This analysis area was chosen because it shows how the actions would help to meet the objectives of the FP for each particular LE and would disclose effects on vegetation within those LEs. While LEs span across the entire Superior National Forest, proposed actions for this project are limited to the project boundary; however, effects of those actions would be reflected for the entire LE.

The project boundary also serves as the boundary for the cumulative effects analysis. This area considers all known activities across all ownerships within the 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 five years into the future. Data used to establish the existing condition is from 2015, which would mean the analysis period would go to 2020. This timeline was chosen because five 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 five years as a timeline also allows for comparison to FP goals and objectives for LEs, as 2020 is just past the halfway point towards achieving decade 2 objectives outlined in the Plan.

Since the existing condition is a 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 2015 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.

3.3.4 Affected Environment

The forest that exists today evolved as a result of both natural and human processes. Pioneer logging during the late 19th and early 20th centuries, followed by widespread slash-fueled wildfires, altered the composition and structure of the original forests. The next era of logging started in the 1940s and has continued to the present. Recent timber management and fire suppression activities have contributed to current forest conditions. Past logging practices resulted in a fragmented landscape; the suppression of fire resulted in an artificial buildup of fuels within the forest. Natural disturbance and forest succession have also taken place to varying degrees on managed and unmanaged lands within the project area. The forest that exists today is different from the forest that would have evolved under purely natural processes (i.e., it has a different age class and different species composition).

Each of the LEs that exist in the project have objectives for species composition, age class distribution, and within-stand diversity. The FP EIS established these objectives by not only considering the historic composition and structure of the Forest, but by considering the desired future condition within a social, ecological, and economic context. Each affected LEs existing condition in regards to these objectives is discussed below.

Species 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, etc. Forested stands in the project area are a mix of species. The FP 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 red pine could also be called white pine stands and vice-versa. The Superior National Forest inventory system does not have a mixed red-white pine forest type option. Forest types are therefore established based on available data and the professional judgment of the foresters and silviculturists.

Tables 3.3-1 through 3.3-5 provide both Forestwide and project area species composition information. The first set of numbers shows the percent of each forest type Forestwide. Percentages are shown for the existing condition, the projected condition in 2020 (assumes implementation of the proposed actions), and FP objectives for decade 2. The second set of numbers is specific to the Mesabi Project Area. The numbers show the breakdown of forest type by acres, and include the existing condition, alternative 1(no action), alternative 2, and

alternative 3. The tables show this breakdown for each of the five landscape ecosystems that were analyzed for species composition. The lowland landscape ecosystem species composition objectives listed in the FP are directed at maintaining the current species composition. As such, species compositions for those LEs are not presented here as there would be no change from the existing condition.

Table 3.3-1 shows the existing condition for the Jack Pine-Black Spruce (JPB) LE. The aspen forest type currently dominates, making up 45 percent of the LE, followed by jack pine at 23 percent. Forest Plan objectives seek a decrease in aspen forest type and an increase in jack pine in the JPB LE. Forest Plan objectives also seek an increase in spruce-fir forest type greater than the existing condition in this LE. This table also shows that the projected condition in 2020 for aspen and jack pine forest types will not be at the desired objectives for decade 2 based on projects implemented through 2020. This shows there is a continued need to decrease aspen and increase jack pine on the JPB LE across the Forest. Spruce-fir forest types will be increasing due to silvicultural treatments as well as inactivity as older aspen stands transition to a spruce-fir forest type. Forest types such as red pine, white pine, and paper birch would all be at or near Forest Plan objectives for decade 2 by the projected condition in 2020. Aspen occupies the most acreage across all the upland LEs due to historical timber harvesting practices and allowing aspen to occupy them as the main source of regeneration, which consequently allowed this type to be much more dominant on the landscape than had naturally occurred in the past.

Table 3.3-1: Vegetation Composition in the Jack Pine-Black Spruce LE							
Upland Forest Type	**Forest wide[1] (Percentage)**			**Mesabi Project Area[3] (Acres)**			
	Existing Condition (2015)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2015)**	**Alt. 1**	**Alt. 2**	**Alt. 3**
Jack pine	23	22	32	2,244	2,244	2,373	2,373
Red pine	10	11	10	3,235	3,235	3,339	3,339
White pine	4	4	3	188	188	188	188
Spruce-fir	14	19	16	647	706	683	683
Oak	<1	<1	0	130	130	130	130
Northern Hardwoods	<1	<1	0	0	0	0	0
Aspen	45	40	35	3,839	3,791	3,582	3,582
Paper birch	4	4	4	392	380	380	380
Total[5]	100	100	100	10,674	10,674	10,674	10,674

[1] Percent of National Forest System land in the Jack Pine-Black Spruce LE. [2] Superior National Forest, Forest Plan, page 2-61, Table JPB-1. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers of acres may vary slightly due to rounding.

Table 3.3-2: Vegetation Composition in the Mesic Red and White Pine LE							
Upland Forest Type	**Forest wide[1] (Percentage)**			**Mesabi Project Area[3] (Acres)**			
	Existing Condition (2015)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2015)**	**Alt. 1**	**Alt. 2**	**Alt. 3**
Jack pine	5	5	6	1,293	1,293	1,507	1,507
Red pine	8	8	8	1,832	1,832	2,066	2,066
White pine	5	5	7	226	226	298	298
Spruce-fir	17	22	19	2,114	2,280	2,084	2,084
Oak	<1	<1	0	118	118	118	118
Northern Hardwoods	3	3	2	2,403	2,403	2,403	2,403
Aspen	48	44	43	12,570	12,452	12,141	12,141
Paper birch	13	12	15	1,604	1,557	1,542	1,542
Total[5]	100	100	100	22,160	22,160	22,160	22,160

[1] Percent of National Forest System land in the Mesic Red and White Pine LE. [2] Superior National Forest, Forest Plan, page 2-67, Table MRW-1. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Table 3.3-3: Vegetation Composition in the Mesic Birch/Aspen/Spruce-Fir LE

Upland Forest Type	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
Jack pine	3	3	4	611	611	880	880
Red pine	5	5	5	878	878	931	931
White pine	3	3	4	233	233	261	261
Spruce-fir	24	28	26	1,069	1,104	1,050	1,050
Oak	<1	<1	0	0	0	0	0
Northern Hardwoods	5	5	4	299	299	274	274
Aspen	45	42	42	7,481	7,447	7,174	7,174
Paper birch	14	13	14	286	286	286	286
Total[5]	100	100	100	10,857	10,857	10,857	10,857

[1] Percent of National Forest System land in the Mesic Birch/Aspen/Spruce-Fir LE. [2] Superior National Forest, Forest Plan, page 2-70, Table MBA-1. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

The aspen forest type in the Mesic Red and White Pine (MRW) LE (table 3.3-2) shows similar composition trends to that of the aspen forest type in the Jack Pine-Black Spruce LE. There is currently an over-abundance of aspen (48 percent) as compared to the desired objective for decade two (43 percent). The projected condition in 2020 also shows aspen at a slightly higher percentage than desired. Paper birch and spruce-fir forest types make up the next highest percentage of the landscape ecosystem, representing approximately 30 percent of the current acres within the LE combined. Projected 2020 acres show a significant increase in the spruce-fir forest types that corresponds with a large decrease in the aspen forest type. This is primarily due to older, untreated aspen stands transitioning to spruce-fir forest types.

Aspen also dominates the Mesic Birch/Aspen/Spruce-Fir (MBA) LE as well, although the spruce-fir forest type also makes up a significant portion of the LE (table 3.3-3). The three pine types represent anywhere from three to five percent of the area within this landscape ecosystem. Other than reducing aspen forest types, there are minimal changes needed in regards to species composition in this LE.

The Dry-Mesic Red and White Pine (DRW) LE (table 3.3-4) also represents a large component of the project. Again, aspen dominates the LE, making up 51 percent of the existing total acres. Objectives for decade 2 are for a forest wide percentage of 43 percent. The projected condition for 2020 indicates that Forestwide this LE is moving towards FP objectives.

Table 3.3-4: Vegetation Composition in the Dry-Mesic Red & White Pine LE							
Upland Forest Type	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
Jack pine	9	9	10	1,203	1,203	1,200	1,200
Red pine	14	14	13	3,036	3,036	3,472	3,472
White pine	10	10	12	195	195	195	195
Spruce-fir	8	12	13	1,331	1,653	1,409	1,409
Oak	<1	<1	0	12	12	12	12
Northern Hardwoods	1	1	1	331	331	331	331
Aspen	51	47	43	13,546	13,236	12,957	12,957
Paper birch	8	7	9	1,259	1,247	1,336	1,336
Total[5]	100	100	100	20,913	20,913	20,913	20,913

[1] Percent of National Forest System land in the Dry-Mesic Red and White Pine LE. [2] Superior National Forest, Forest Plan, page 2-64, Table DRW-1. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

The final upland landscape ecosystem represented in the project is the Sugar Maple (SMA) LE (table 3.3-5). This LE occupies the smallest percentage of area of the Forest compared with other upland landscape ecosystems. Northern hardwoods dominate this LE, making up 40 percent of the existing total acres. Within the Mesabi Project, there are only 279 acres in this LE and proposals in the project will not contribute to FP objectives as it relates to species composition via conversions; activities would meet FP objectives by maintaining current forest type composition. For the purpose of showing that the Sugar Maple LE is in the analysis area tables 3.3-5 and 3.3-10 are presented in this section. However, due to the lack of direct, indirect, or cumulative effects to this LE no further analysis is needed.

Table 3.3-5: Vegetation Composition in the Sugar Maple LE							
Upland Forest Type	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
Jack pine	<1	<1	0	0	0	0	0
Red pine	5	5	5	0	0	0	0
White pine	1	1	2	0	0	0	0
Spruce-fir	12	13	15	0	0	0	0
Oak	0	0	0	0	0	0	0

Table 3.3-5: Vegetation Composition in the Sugar Maple LE

Upland Forest Type	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
Northern Hardwoods	40	42	38	279	279	279	279
Aspen	27	27	24	0	0	0	0
Paper birch	15	13	16	0	0	0	0
Total[5]	100	100	100	279	279	279	279

[1] Percent of National Forest System land in the Mesic Birch/Aspen/Spruce-Fir LE. [2] Superior National Forest, Forest Plan, page 2-73, Table SMA-1. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Age Class Distribution

Each forest stand is also identified by an age class. Age class is broken down by decade, or as seen in tables 3.3-6 to 3.3-12 can be displayed in a range of decades or age class ranges. Age class distribution tables are displayed much in the same manner as vegetation composition tables. The first set of numbers shows Forestwide percentages in each age class, while the second set of numbers show acres in each age class and are specific to the acres in the Mesabi Project. Each landscape ecosystem has a different set of age class ranges based on the varying vegetative growth stages that are typical for each LE. Forested stands become two-aged when an understory becomes established prior to the death of the mature overstory. An example of this would be an 80-100 year old aspen stand breaking up due to old age and the gaps created then become occupied by balsam fir or white spruce saplings. 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.

The Jack Pine-Black Spruce LE is currently dominated by the 10-49, 50-79, and 80-109 age groupings (table 3.3-6). Acres in 0-9 age class are mostly a result of recent management activity within the project boundary. Although the age groupings are slightly different, the Mesic Red and White Pine LE shows a similar condition where most acres in the LE across the Superior National Forest are in the middle age (10-49) groupings (table 3.3-7). Eighty percent of all the acres across the Forest in this LE are in the 10-49, 50-79, and 80-99 age groupings. This percentage is slightly higher for the project area, where over 85 percent of the acres in this LE are in these age groupings.

Table 3.3-6: Age Class Composition in the Jack Pine-Black Spruce LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	7	10	14	505	23	701	701
10-49	37	39	44	4,955	4,686	4,642	4,642
50-79	22	22	18	1,905	1,599	1,359	1,359
80-109	24	23	17	3,129	4,143	3,749	3,749
110-179	10	7	7	180	223	223	223
180+	<1	<1	0	0	0	0	0
Total[5]	100	100	100	10,674	10,674	10,674	10,674

[1] Percent of National Forest System land in the Jack Pine-Black Spruce LE. [2] Superior National Forest, Forest Plan, page 2-61, Table JPB-2. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Table 3.3-7: Age Class Composition in the Mesic Red and White Pine LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	7	12	10	1,957	808	4,020	4,020
10-49	40	41	49	10,211	10,109	9,537	9,537
50-79	15	11	10	1,956	2,563	1,652	1,652
80-99	25	22	16	6,796	5,820	4,793	4,793
100-119	8	10	11	890	2,523	1,878	1,878
120+	4	3	3	350	338	280	280
Total[5]	100	100	100	22,160	22,160	22,160	22,160

[1] Percent of National Forest System land in the Mesic Red and White Pine LE. [2] Superior National Forest, Forest Plan, page 2-67, Table MRW-2. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Similar percentages and groupings are also found in the Mesic Birch/Aspen/Spruce-Fir and Dry-Mesic Red and White Pine LEs as well (tables 3.3-8 and 3.3-9). As with the other LEs, there are acres present in the 0-9 age class, which primarily come from more recent actions within the project area. Concentration of acres in the middle age groupings is primarily due to past logging and management objectives. Acres in the 10-49 age class are mostly a result of modern era

logging, while the acres in the 50-99 age classes are possibly a mix of logging and natural processes. Stands closer to 80 years old could be a result of regrowth after initial logging near the turn of the century, while stands 100 years or older have the possibility of being from natural origins as they may have been too young to harvest during the original logging boom of the late 19th and early 20th centuries.

Table 3.3-8: Age Class Composition in the Mesic Birch/Aspen/Spruce-Fir LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	6	7	11	1,536	327	1,826	1,826
10-49	38	41	48	5,670	6,155	6,002	6,002
50-79	16	12	10	1,857	2,220	1,305	1,305
80-99	26	25	17	1,430	1,514	1,334	1,334
100+	14	15	14	363	640	391	391
Total[5]	100	100	100	10,857	10,857	10,857	10,857

[1] Percent of National Forest System land in the Mesic Birch/Aspen/Spruce-Fir LE.[2] Superior National Forest, Forest Plan, page 2-70, Table MBA-2. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Table 3.3-9: Age Class Composition in the Dry-Mesic Red & White Pine LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	6	12	10	1,033	109	2,026	2,026
10-49	40	42	46	10,084	9,573	9,260	9,260
50-99	35	27	24	8,506	8,701	7,392	7,392
100-139	18	17	17	1,271	2,523	2,227	2,227
140+	1	>1	2	19	7	7	7
Total[5]	100	100	100	20,913	20,913	20,913	20,913

[1] Percent of National Forest System land in the Dry-Mesic Red and White Pine LE. [2] Superior National Forest, Forest Plan, page 2-64, Table DRW-2. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

The Sugar Maple LE is currently dominated by the 50-99 age class grouping (table 3.3-10). Acres in this age class in the Sugar Maple LE are likely a result of logging and past management. The 50-99 age class is the only representation of the Sugar Maple LE in the project area with 279 acres.

Table 3.3-10: Age Class Composition in the Sugar Maple LE

Age Class	Forest wide [1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	>1	7	4	0	0	0	0
10-49	28	27	33	0	0	0	0
50-99	40	31	27	279	204	204	204
100-149	28	33	33	0	75	75	75
150+	2	2	3	0	0	0	0
Total[5]	100	100	100	279	279	279	279

[1] Percent of National Forest System land in the Sugar Maple LE. [2] Superior National Forest, Forest Plan, and page 2-73, TABLE SMA-2. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5] Total numbers may vary slightly due to rounding.

Currently, the age class composition for the Lowland Conifer-A and Lowland Conifer-B LEs (tables 3.3-11 & 3.3-12) is heavily skewed towards the middle and older age classes. Most of the acres fall within the 80-159 age class, and are most likely of natural origin. There is a distinct lack of acres within the 0-9 age class. For a long time, lowland cover types were not actively managed on the Forest. Furthermore, many of the lowland forested stands on the Superior National Forest are not suitable for vegetation management, which has led to a lack of treatments in the past. However, the project area contains locations where lowland conifer timber harvest is feasible and could contribute to the young age class. Within the project, all proposed action alternatives within the Lowland LEs would move acres from the 80-159 and older age classes into the 0-9 age class through forest management.

Table 3.3-11: Age Class Composition in the Lowland Conifer-A LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	2	5	4	38	0	104	104
10-39	5	4	7	107	128	128	128
40-79	18	16	14	555	398	398	398
80-159	71	71	69	5,900	6,073	5,982	5,982
160+	3	4	7	151	151	138	138
Total[5]	100	100	100	6,751	6,751	6,751	6,751

[1] Percent of National Forest System land in the Lowland Conifer-A LE. [2] Superior National Forest, Forest Plan, page 2-76, Table LLC-2a. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5]Total numbers may vary slightly due to rounding.

Within-Stand Diversity

Table 3.3-12: Age Class Composition in the Lowland Conifer-B LE

Age Class	Forest wide[1] (Percentage)			Mesabi Project Area[3] (Acres)			
	Existing Condition (2015)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2015)	Alt. 1	Alt. 2	Alt. 3
0-9	<1	2	3	73	26	248	248
10-39	4	4	5	398	446	446	446
40-79	15	10	7	733	445	418	418
80-159	72	75	71	9,435	9,596	9,400	9,400
160+	8	9	14	601	728	728	728
Total[5]	100	100	100	11,240	11,240	11,240	11,240

[1] Percent of National Forest System land in the Lowland Conifer-B LE. [2] Superior National Forest, Forest Plan, page 2-76, Table LLC-2b. [3] Figures displayed for all alternatives reflect NFS land in year 2020. [4] Appendix E contains the list of Forest-wide projects included in 2020 projection (pg. E-4). [5]Total numbers may vary slightly due to rounding.

During the 2013 and 2014 field seasons, stand inventories were completed on many stands within the project area. In stands that were visited, structural and species diversity was found to be moderate in mature age classes. Many of these stands are short-lived species such as aspen, birch, and jack pine which are likely to have substantial amounts of dead, dying, and down wood available. Some stands have gaps in the canopy with shade tolerant species such as balsam fir or spruce in the understory. Decadent aspen and birch are being replaced by spruce and fir in the understory. Mature red and white pine stands have various levels of understory established within them, providing for vertical structure.

In the middle age classes (10-49, 50-79, and 50-99) of the five upland LEs, within-stand diversity varies. Many of these stands were created from past logging activities. Stands that were regenerated artificially such as red pine plantations tend to have less structural or species diversity than stands that undergo natural succession. Areas that were regenerated naturally or have undergone natural succession, often contain more species diversity, with the exception of some aspen stands which can regenerate into a thick monoculture. Diversity in younger age classes also varies but is lower than the older age classes. Many of these stands were likely created through clearcutting, which initially simplifies stand structure.

The FP does not have specific within-stand diversity objectives for the Lowland Conifer LEs. These stands within the project area typically occur as single species stands of black spruce or tamarack, or a mixture of both. Very few other tree species are found in any significant quantities within the Lowland Conifer LE.

3.3.5 Environmental Consequences

Alternative 1: no action

Direct and Indirect Effects

Indicator 1: Species Composition

Under alternative 1, the Jack Pine-Black Spruce LE would see little change in species composition as compared to the existing condition with the exception of the spruce-fir, aspen, and paper birch forest types (table 3.3-1). As aspen and paper birch forest type's age, they slowly transition over to a mixture of aspen-birch-spruce-fir and eventually to a stand that is dominated by spruce-fir. The loss of aspen and paper birch acres is attributed to this transition and increases in the amount spruce-fir.

In the Mesic and Dry Mesic Red and White Pine LEs, similar changes would result under alternative 1 (table 3.3-2 & 3.3-4). Acres of old aspen and paper birch would transition over to the spruce-fir forest type. This same successional process holds true for the Mesic Birch/Aspen/Spruce-Fir LE (table 3.3-3) where it is primarily acres of old aspen transitioning into the spruce-fir forest type. All other forest types within the aforementioned LEs would remain relatively unchanged as compared to the existing condition. No species compositional changes would occur in the Sugar Maple LE under alternative 1 (table 3.3-5).

In the Lowland Conifer LEs, alternative 1 would not have much effect on vegetation composition. Stands would get older and natural succession would occur. Single age class stands of black spruce and tamarack would begin to break apart and form two-aged stands.

In addition to natural succession, natural disturbances such as wildfire, insect and disease outbreaks, and wind storms could occur. These natural events have the ability to change species composition but are not quantified here due to the relative randomness of these events. Overall, alternative 1 does little to contribute to meeting FP goals for species composition. In the Jack Pine-Black Spruce LE (table 3.3-1) for example, FP objectives seek a nine percent increase in the jack pine forest type. Alternative 1 maintains jack pine acres in the project area while the Forest as a whole is projected to lose acres currently designated as the jack pine forest type. Alternative 1 does contribute to FP objectives as it relates to spruce-fir (as the FP seeks an increased percentage of spruce-fir forest type as compared to the existing condition in multiple LEs.)

Indicator 2: Age Class Distribution

Alternative 1, the no-action alternative, would not create any new acres in the young age class in the project area (tables 3.3-6 to 3.3-12). In all of the upland and lowland LEs, with the exception of the Sugar Maple LE, the existing condition shows varying amounts of acres in the 0-9 age class. These acres are almost all attributed to recent projects that had overlapping boundaries with the project. By the end of the projection period (2020), a substantial amount of acres in the 0-9 age class would move to the next age class across all LEs. Aging of individual stands results in certain age classes gaining acres, while some age classes lose acres as the vegetation ages from the existing condition (2015) to the end of the projection period in 2020.

Alternative 1 does not contribute toward FP objectives for the 0-9 age class across all LEs. Alternative 1 assists with some age classes meeting FP objectives in decade 2, while running counter to meeting the objectives for the 0-9 age class as well as objectives in the mid-range age

classes. Some of the largest disparities can be seen in the Mesic Birch/Aspen/Spruce-Fir LE (table 3.3-8). Alternative 1 reduces the 0-9 age class to 80 percent less than the existing conditions while increasing the 50-79 age class to 20 percent higher than existing conditions in 2015. As it stands, the projected condition for 2020 (midway through the second decade of the forest plan) would have the 0-9 age class at seven percent for the Forest, as opposed to the Plan goal of 11 percent. Likewise, the 50-79 age class is projected to be at 12 percent in 2020 while the decade 2 plan goal is 10 percent. Decreasing the amount of 0-9 age class while concurrently increasing the amount of the 50-79 age class within the Mesic Birch/Aspen/Spruce-Fir LE moves the Forest further from the age class composition objectives in the FP.

In both Lowland Conifer LEs (tables 3.3-11 and 3.3-12), alternative 1 does not create any new acres in the 0-9 age class. Both in the project area and across the Superior National Forest, acres in this young age class are clearly lacking in the Lowland Conifer LEs. Alternative 1 does allow for young forest stands to mature; thus, allowing for more acres to move into the 10-39 age class in both lowland LEs. This pattern is consistent with FP objectives for age class distribution.

Indicator 3: Within-Stand Diversity

As noted, there would not be any treatments under alternative 1, since it is the no-action alternative. As such, all of the acres within the project area would continue to age. In the short term there would be minimal effects to within-stand diversity.

In the long term, the amount of forest in the older age classes would gradually increase, which in turn would lead to greater stand complexity and diversity. Barring some landscape level disturbance (wind storm, fire, etc.), there would be a distinct lack of forest in the 0-9 age class. This assumes that no harvest would take place in the future, which is appropriate for this no action baseline alternative. Stands that are structurally simple and have relatively low amounts of diversity such as aspen stands, would transition to spruce-fir stands that contain more vertical structure and generally more species diversity. As the short-lived forest types reach old age, substantial amounts of dead, dying, and down wood would become available, creating more structural diversity. Stands with longer-lived species (such as red pine and white pine) would also have more structural diversity through canopy gaps and down wood being created, although this would happen at a slower rate.

Alternatives 2 and 3

Direct and Indirect Effects

Indicator 1: Species Composition

In chapter 1, the purpose and need for the project identified a need to alter the existing species composition to meet FP objectives for species composition across the varying upland LEs in the project area (1.3-forest plan direction for the Mesabi Project Area). These changes included a need to increase the amount of long-lived conifer and decrease aspen dominated stands within the project area. The species composition is predicted to be similar under both alternatives 2 and 3, but differ on implementation methods of site preparation. Alternative 2 would use herbicide as a tool for site preparation on 538 acres; while alternative 3 would use mechanical site preparation on 538 acres with an additional two or three releases. Changes in target tree species composition in alternative 3 (no herbicide use) could be limited, and therefore result in less of the target species composition, if follow- up treatments and follow-up maintenance treatments do not occur. Alternative 2 allows for managers to use herbicide as a silvicultural treatment on

specifically identified sites (away from waterways, lakes and wetlands) to ensure the success of establishing certain forest types across the project area while keeping costs at a nominal level and having effective results with fewer or no follow-up treatments necessary. Herbicide has only been proposed for use in the upland LEs. Alternative 2 is more likely to establish desired species composition than alternative 3, especially if follow up maintenance treatments cannot be done in alternative 3. Appendix h describes the operational standards and guidelines for herbicide usage proposed in alternative 2.

With the exception of the Sugar Maple LE, all of the upland LEs are well represented within the project area. Overall impacts to all upland LEs (not including the Sugar Maple LE, which would have no changes in species composition) by alternatives 2 and 3 include increasing the amount of acres of red pine and jack pine forest types while decreasing the amount of aspen acres. In addition, alternatives 2 and 3 look to either maintain or increase the amount of acres in the white pine forest type across the upland LEs.

In the project area, red pine forest types in the upland LEs are at or above the desired FP levels for decade 2 objectives; thus, lending this forest type to continued management opportunities to improve individual tree growth, enhance old growth characteristics, and improve the health and resiliency of those stands as identified by the project's purpose and need. In addition these forest types will allow for locations to maintain and promote mature patches on the landscape.

The aspen forest type is also overly abundant in most of the LEs in the project area while other forest types (jack pine, white pine, spruce-fir and paper birch) are not present at desirable levels for the FP objectives. As mentioned above, alternatives 2 and 3 look to increase or maintain the amount of acres of certain forest types while decreasing the amount of the aspen forest type. While there is a desire to reach FP objectives for the spruce-fir forest type within the project, alternatives 2 and 3 would prevent some older aspen and paper birch stands from transitioning into spruce-fir and would also remove some acres from the existing spruce-fir forest type to meet other objectives such as reducing hazardous fuels to prevent forest fires.

In the Dry-Mesic Red and White Pine LE, changes to species composition would be the most noticeable as this LE is largely represented in the project area at 20,913 acres (table 3.3-4). The existing condition of aspen within the project is at a much higher percentage than the Forestwide existing condition. The Forestwide existing condition of aspen forest types within this LE is at 51 percent while the project area includes approximately 64 percent of the aspen cover type in the Dry-Mesic Red and White Pine LE. With a decade 2 objective for 43 percent of the LE to be in the aspen forest type and the abundance of aspen in this project area there is ample opportunity towards achieving decade 2 objectives in the Dry-Mesic Red and White Pine LE. In the action alternatives for this LE, 589 acres of the aspen forest type would be regenerated to red pine, spruce-fir, and paper birch forest types helping to reach FP objectives to maintain red pine acres, while increasing acres in the spruce-fir and paper birch forest types.

The Mesic Red and White Pine LE, (another largely represented LE in the project area totaling 22,160 acres), would also have noticeable changes contributing towards FP objectives for vegetation composition. Decade 2 objectives for this LE include increasing the amount of jack pine and white pine forest types while maintaining red pine amounts and decreasing aspen acres. Alternatives 2 and 3 include decreasing the amount of aspen from 12,570 acres to 12,141 acres and converting those acres to jack pine, red pine, and white pine forest through artificial

regeneration. In addition, a small amount of area in the paper birch and spruce-fir forest types would also be converted to pine to meet project objectives.

Similar changes in composition would also be implemented in the Jack Pine-Black Spruce LE and the Mesic Birch/Aspen/Spruce-Fir LE with reductions in aspen acres and conversion towards pine forest types. However, in the Jack Pine-Black Spruce LE, acres of spruce-fir are anticipated to increase meeting the decade 2 objectives to increase the Forestwide percentage of spruce-fir. The Mesic Birch/Aspen/Spruce-Fir LE spruce-fir amounts would have little change; paper birch would be maintained at current levels.

Species composition would stay the same in all action alternatives for lowland conifer LEs. The two lowland conifer LEs within the project area would not have any management treatments in any alternative that would alter species composition. This is in line with FP direction, which seeks to have no changes in species composition for the lowland conifer LEs (USDA Forest Service 2004a).

Indicator 2: Age Class Distribution

The analysis considered natural succession and management actions such as timber harvest that affect age class by creating new young stands. Treatments such as clearcuts and shelterwoods would add acres to the 0-9 age class. Natural succession is accounted for in some shorter-lived forest types such as jack pine, aspen, and spruce-fir. Within these forest types, succession generally begins to take place when the stands reach 110-120 years old (USDA Forest Service 2004c). Within the Mesabi Project, natural succession of these forest types until the end of the projection period (2020) is relatively small.

The purpose and need of the project (chapter 1) identified a need to increase the amount of young forest, especially in the aspen and lowland black spruce/tamarack communities while decreasing the overall acres of aspen dominated stands. Both action alternatives would increase the number of acres in the 0-9 age class (tables 3.3-6 to 3.3-12).

In both action alternatives, an equal amount of acres would be moved into the young age class (0-9) through timber harvest and forest management. These acres would be removed from varying older age classes across the LEs to move age class composition towards FP decade 2 objectives (tables 3.3-6 through 3.3-12).

Across the Superior National Forest, there is a need to create more young forest in the Lowland Conifer LEs. Both action alternatives would create acres in the 0-9 age class (tables 3.3-11 and 3.3-12). All acres created in the 0-9 age class through timber harvest come from the 80-159 and 160+ age classes of the Lowland Conifer LEs. The action alternatives do not increase the acres in the 80-159 age class as much as alternative 1 because of the proposed harvest in the action alternatives. However, the acres of 80-159 age class would increase slightly in Lowland Conifer-A-LE while slightly decreasing in the Lowland Conifer-B-LE compared to existing conditions.

Indicator 3: Within-Stand Diversity

Tree species diversity objectives are located in the FP (USDA Forest Service 2004a), and differ from the forest type objectives in that they address the desired direction for total percentages of trees across the Forest, not total acres of forest type. Tree species diversity has declined in the Great Lakes region over the past 200 years due to land use (Schulte et al. 2007). Many stands

have become dominated by a single species and have lost the diverse mix of species that once made them resilient to disease and insects.

Tree species diversity in the treated stands would generally increase under all of the action alternatives as desired in the forest plan and as stated in the purpose and need of the project. A mix of silvicultural practices would be applied to improve species diversity in stands within the project. Planting would be done to diversify the species mix within a given stand. Eastern white pine, for instance, would be planted in conversion units following timber harvest, in nonharvest restoration units, and with diversity planting to enhance its presence on the Forest. Within stands to be thinned, more area would be opened up to allow for better crop tree growth but also to allow for recruitment of young trees into the canopy.

Using silvicultural techniques to design and implement timber harvesting projects would also improve species diversity. Species that may be currently under-represented within a stand can be managed in such a way that they have a chance to increase their numbers going forward into the future. An example of this would be reserving individual trees or clumps of trees within a harvest area that can serve as a way to retain the existing diversity within a stand. Furthermore, these reserve trees would serve as potential seed sources for natural regeneration. Timber harvest and mechanical site preparation, if timed correctly, can serve as a way to prepare an adequate seed bed for seeds to germinate naturally from the reserved trees. A species suited to this practice is eastern white pine. The tree is wind firm where it will not easily succumb to damage when left in the open when surrounding trees have been harvested. When timber harvest or mechanical site preparation occurs during the summer of a good seed year, chances of successfully regenerating white pine into the stand would be greatly increased.

Given the amount of even-aged treatments in the project area (chapter 1, table 1-5), structural diversity would be expected to decrease initially because treatments such as clearcut and shelterwood harvests tend to simplify stand structure in the short term. However, these effects would be mitigated by FP requirements of leaving 6-12 leave trees per acre on average and by retaining legacy patches in clearcuts of 20 acres or larger (USDA Forest Service 2004a).

Herbicide usage in alternative 2 may have an initial impact to within-stand diversity similar to other forest management treatments such as timber harvest, mechanical site preparation, and use of prescribed fire for site preparation. This is particularly valid for shrub species within the sprayed area (Sullivan et al. 1998). Usage of herbicide would be used to target specific sources of competition and to allow desired species the ability to survive competition from non-desired species for resources such as light, water, and soil nutrients. An example would be using herbicide to slow the growth of grasses, aspen, and brush species to allow for improved paper birch regeneration and recruitment of paper birch into the overstory. Using herbicide would allow for the movement of a stand into a later successional stage in a much shorter timeframe. This would allow for greater species and structural diversity over time.

Alternative 3 solely uses mechanical site preparation in lieu of proposed herbicide treatments. This treatment would provide scarification for reforestation purposes and would mechanically crush or cut existing competition, but not remove it from the site. This method would maintain species diversity similar to the levels that existed within the stand following timber harvest or in the case of nonharvest treatments similar to the existing conditions of the stand. Herbaceous competitors, brush species, and aspen would still be present on site with intact and healthy root systems and may even respond favorably to the mechanical treatment. Over the long term,

alternative 3, would have less desirable species diversity since slower growing species, such as paper birch and white pine would not become established as a major component of the stand because they are more likely to be out competed.

3.3.6. CUMULATIVE EFFECTS

Indicator 1: Species Composition

Vegetation composition data was not obtained from the State of Minnesota or the St. Louis County Land Department, only the acres and types (even age, selection, or thinnings) of proposed treatments.

Most acreage on State and county land within the project area to be treated will be utilizing even-aged treatments. Generally, this type of treatment is done to maintain a stand dominated by early successional tree species such as aspen, or to remove the current overstory and seed sources, allowing for conversions to other species. Due to the high costs and labor necessary to convert these stands, current economics are further restricting the amounts of conversions that government entities are able to maintain. The small percentage of funds available for conversions would be minimal to the amount of maintained forest types that will be harvested. Due to these even-aged treatments that will maintain the forest types, the project area will not see a large swing in forest type composition due to harvesting on State or county land.

Forest types are projected to stay similar to existing on State of Minnesota and St. Louis County lands, while forest types are projected to stay the same on non-industrial private land based on certain assumptions. Typically, private landowners do not list forest type conversion or forest management in general as a high priority (Baughman et.al 2001). These landowners list recreation, wildlife habitat, hunting, aesthetic enjoyment, and numerous other reasons for owning land rather than for the production of timber or timber income. Undoubtedly, some private landowners undertake projects that diversify or change forest types; however, this impact is believed to be minimal.

With the assumption that the State and county are not planning conversions on much of their forest types from one to another through forest management, it could be reasonably assumed that some mature and older aspen and jack pine stands would probably start succeeding to a spruce-fir forest type. The same succession scenario could also be applied to private land. Due to no projected change in species composition on State, county, and private ownership, potential cumulative effects for species composition would be the same as the direct and indirect effects.

There are no other federal vegetation management projects on-going or being proposed that overlap with the project boundary; therefore, the only cumulative effects in the project area (other than the alternative chosen) would be those of the State of Minnesota, St. Louis County, and private landowners.

Indicator 2: Age class distribution

Under alternative 1, a large reduction in acres in the young age class is forecast considering all ownership actions over the projection period. There would be no harvesting on federal land; while both the State and county have harvests planned that would create acres in the young age class, it would not be enough to off-set the acres that would be lost in the young age class under the existing condition. State and county proposed treatments are overwhelmingly even-aged management treatments, most likely aspen forest type clearcuts. These stand replacing treatments will reset the current age to the 0-9 age class.

Cumulative effects to the project area over the projection period (2020) would provide for an increase in the 0-9 age class in alternatives 2 and 3 as compared to the existing condition. Alternatives 2 and 3 assume that harvesting levels are the same on other ownerships, and the only change in those alternatives is through the different federal actions for each alternative. Currently five percent of the project area is in young forest on federal land. Under the alternatives, the amount of young forest in the project area would range from approximately one percent in alternative 1 to ten percent in alternative 3 on federal land. Including State and county proposed harvest, the alternatives to no action project approximately seven percent of the public land within the project area to be in the 0-9 age class.

Indicator 3: Within-Stand Diversity

Cumulative effects to within-stand diversity as it relates to species diversity would be similar to those that are mentioned under direct and indirect effects. For alternative 1, while there would be no harvest on federal land, harvests would still take place on State, county, and private lands. Species diversity would slowly increase on federal lands through succession. On sites where harvests took place on other ownerships, effects to species diversity would depend on the harvest type. Clearcuts would initially decrease species diversity, while thinnings could potentially increase diversity. Succession would of course also take place on other ownership lands that are not proposed for harvest, which would increase species diversity. Alternatives 2 and 3 would see the same results, only with federal actions added in.

Cumulative effects to stand structure would also be similar to that of direct and indirect effects. Thinnings and selection harvests have the potential to create more stand structure, and can actually accelerate the progression of a stand to have more mature forest characteristics. Clearcuts would initially simplify stand structure. This can be mitigated to a certain extent by the creation of reserve areas or legacy patches which would leave pockets of mature forest. Also, as mentioned earlier, non-industrial private harvest is expected to have little impact, judging by the small amount of harvest activity that has taken place in the recent past.

3.4 THREATENED AND ENDANGERED SPECIES

A biological assessment (BA) has been prepared and submitted to the U.S. Fish and Wildlife Service (USFWS) for their concurrence with the determination of effects. Consultation with the Fish and Wildlife Service specific to the Mesabi Project is documented in the project file. The biological assessment is available at http://www.fs.usda.gov/project/?project=44466.

The 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 project. The project BA tiers to the programmatic biological assessment for the revision of the FP (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 alternatives analyzed in detail are summarized in table 3.4-1. We received concurrence with our determination from the USFWS in a letter dated June 8, 2016.

Table 3.4-1: Determination of Effects

Species /Habitat	Alternative 1	Alternative 2	Alternative 3	Rationale for Determination
Canada lynx	NE	NLAA	NLAA	Human disturbance factors would be minimal; adequate habitat for cover, connectivity, and prey would be maintained.
Canada lynx critical habitat	NE	NLAA	NLAA	The proposed action would comply with all applicable forest plan management direction related to Canada lynx and its habitat.
Gray wolf	NE	NLAA	NLAA	Human disturbance factors would be minimal, adequate habitat would be maintained, and prey habitat improvements would take place.
Northern long-eared bat	NE	LAA, No Jeopardy	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

3.5 REGIONAL FORESTER SENSITIVE SPECIES

A biological evaluation (BE) evaluates effects of the Mesabi 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). Species evaluated in this report include all species on the revised R9 sensitive species list (December 14, 2011).

The BE is available at http://www.fs.usda.gov/project/?project=44466. 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 on 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 alternatives 2 and 3, proposed activities would have no impact on Freija's grizzled skipper and wood turtle. Proposed activities in alternative's 2 and 3 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 (no action) would have no direct, indirect, or cumulative effects to lake sturgeon, shortjaw cisco, Nipigon cisco, northern brook lamprey, creek heelsplitter, black sandshell, Quebec emerald dragon fly, headwaters chilostagman caddisfly, and ebony boghaunter.

Alternatives 2 - 3 would have no direct, indirect, or cumulative effects to shortjaw cisco, Nipigon cisco, Quebec emerald dragonfly, headwaters chilostagman caddisfly, and ebony boghaunter.

For alternatives 2 - 3, proposed activities may impact individuals of lake sturgeon, northern brook lamprey, creek heelsplitter, and black sandshell but are not likely to cause a trend to federal listing or loss of viability.

Vascular plants, lichens, and bryophytes

Alternative 1 would have no direct, indirect, or cumulative effects 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, fairy slipper, ram's head lady's slipper, western Jacob's ladder, small shinleaf, cloudberry, caloplaca parvula, cetraria aurescens, frullania selwyniana, menegazzia terebrata, pseudocyphellaria crocata, ramalina thrausta, sticta fuliginosa, usnea longissima, goblin fern, New England sedge, Canada ricegrass, Canada yew, barren strawberry, or peltigera venosa.

Proposed activities in alternatives 1 - 3 may impact individuals of triangle grapefern, common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort but are not likely to cause a trend to federal listing or loss of viability.

Proposed activities in alternatives 2 and 3 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, fairy slipper, ram's head lady's slipper, western Jacob's ladder, small shinleaf, cloudberry, caloplaca parvula, cetraria aurescens, frullania selwyniana, menegazzia terebrata, pseudocyphellaria crocata, ramalina thrausta, sticta fuliginosa, usnea longissima, goblin fern, New England sedge, Canada ricegrass, Canada yew, barren strawberry, or peltigera venosa but are not likely to cause a trend to 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 MIH 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. This project also complies with the Migratory Bird Treaty Act and the 2008 Memorandum of Understanding on migratory birds between the Forest Service and the U.S. Fish and Wildlife Service (extension signed 8/1/2016). The biological evaluation disclose effects to birds, focusing on species of management concern and on habitat used by birds.

3.6 MANAGEMENT INDICATOR SPECIES AND MANAGEMENT INDICATOR HABITATS

Management Indicator Species (MIS)

The forest plan designates four MIS: bald eagle, white pine, gray wolf, and northern goshawk (FP p. 2-34). Impacts to gray wolf are addressed in section 3.4 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 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. All alternatives maintain existing habitat and are in compliance with plan direction.

White Pine

Table NSU-2 on p. 2-59 of the Plan shows a decade two objective of increasing the amount of white pine by two percent. Alternatives 2 and 3 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 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. All alternatives are in compliance with the FP 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. Alternatives 2 and 3 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 alternatives 2 and 3 may impact individual wolves but is not likely to adversely affect the gray wolf.

Northern Goshawk

Effects of the project to northern goshawks are disclosed in the BE. There are three known active territories on federal lands in the project area. All three territories maintain adequate nesting, post-fledging, and foraging habitat (Mesabi BE). 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).

Proposed activities under alternatives 2 and 3 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.

MANAGEMENT INDICATOR HABITATS (MIH)

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 Forestwide objectives. Specifically, the project area is not currently contributing young age class forest types toward Forestwide objectives. The 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.

MIH 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 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. MIH 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 FP 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 FP 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 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 FP 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 FP predicted effects and movement toward objectives for the first decade of FP implementation. For spatial pattern MIH, the landscape-level analysis area is zone 1 as described by the forest plan (see FP p. 2-25 for map). This spatial zone of analysis is appropriate because the project's 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 FP implementation. The FP states that the MIH objectives are for National Forest System lands only, outside the Boundary Waters Canoe Area Wilderness. Objectives were developed considering the conditions of the wilderness and the conditions of other ownerships (Forest Plan p. 2-55 – see also FP 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. Seventeen 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 project rea.

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 48,000 acres of lowland habitat. Lowland mature patches vary in size and distribution.

Priority needs and opportunities were identified by the mid-level assessment to address FP desired conditions. These needs and opportunities were used in the development of the alternatives. One proposal was to create patches of young forest by harvesting smaller, adjacent stands regardless of ownership. 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 FP 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 FP 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 FP 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 Mesabi area would continue to mature and no new management-induced edge would be created but edge density would continue to be high due to the small size of the young patches. The amount of mature interior forest as well as the number and acres of mature, upland forest patches would increase (see tables 3.6-2 and 3.6-3), although the quality of some patches of mature forest would decrease as old birch and aspen decline. 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 decrease 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 alternatives 2 and 3, over 7,700 acres of young upland and lowland forest would be created, leading to an increase in edge habitat acres but a decrease in edge density due to the larger size of the young patches. It will also lead to a decrease in the amount of mature interior forest (table 3.6-2) but it will still have more interior forest compared to existing due to stands maturing. Over 7,000 acres of mature interior forest would remain in the project area under these alternatives, providing sufficient habitat for interior forest-associated species. In addition, these alternatives 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 FP guidance.

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

MIH #	Indicator	Existing Condition	Alternative 1 (No Action)	Alternative 2 and 3
11	Upland Edge Density (miles/square mile)	32.1	32.3	23.2
12	Upland Interior Forest Habitat (acres)	6,916	8,746	7,192

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 perimeter. 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 FP 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.

Table 3.6-3: Forest-wide (Spatial Zone 1) Number and Acres of Large, Mature Forest Patches on Uplands

	2015	2020			
	Existing condition	Alt 1 (no action)	Alt 2	Alt 3	Plan Direction
	Number and Acres of All-Upland Mature Patches				
Project area patches ≥ 300 acres	17 14,277 acres	21 17,206 acres	20 14,939 acres	20 14,939 acres	Strive to minimize the decrease in acres and number of mature patches ≥ 300 acres
Forest-wide patches ≥ 300 acres	84 51,971 acres	86 53,851 acres	85 51,584 acres	85 51,584 acres	In spatial zone 1 maintain a minimum 44,700 acres of mature and older upland forest in patches of ≥ 300 cares

Currently in the project area, upland patch sizes on nonfederal lands are generally small due to the intermixed ownership pattern. Young forest would be added to the landscape by regeneration harvesting of approximately 2,300 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 nonfederal 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 79 acres of tree clearing on federal lands for the expansion of 39 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.

Landscape Level: Direct, Indirect, and Cumulative Effects

Table 3.6-3 displays FP spatial pattern MIH objectives within zone 1 and how the 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.

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 FP objectives for Forest spatial patterns in this zone; the total number and acreage of large mature and older patches would increase from FP 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.

3.7 FIRE AND FUELS

3.7.1 Introduction

The project's purpose and need includes several concerns that the increasing fuel loading across the Forest would:

- lead to a higher occurrence of high-intensity crown fires within the wildland/urban interface areas;
- severely impact the forest's resiliency to the effects of wildland fires, drought, insects and disease; and
- may affect the maintenance and restoration of fire dependent ecosystems.

Proposed activities in the project area are intended to move vegetation from its existing condition toward the desired conditions as described in the FP by managing forest vegetation age, composition, structure, and spatial patterns. Several locations in the project area were noted as having hazardous fuels; thus, the proposed action includes treatments to reduce those fuels. Treatment of hazardous fuels on National Forest System (NFS) land adjacent to other ownerships was considered a high priority for treatment.

Fire risk is based on a variety of factors including ignition sources, weather patterns, and spatial distribution of vegetation in conjunction with the location of human developments. This section examines the current fuel conditions that indicate the relative risk of wildfire and the changes that would occur under each alternative.

3.7.2 Analysis Methods

Indicator 1: Fire Risk Index - Project Area. Acres treated in high, medium, and low risk index categories

The fire risk index provides a general characterization of fire risk over time and highlights the differences among alternatives by using a simple qualitative index. This indexing characterizes fire hazard based on species composition, age, and fuel characteristics. Stands were divided into three fire risk classes (high, medium, and low) based on species, age class, and treatment history. Low fire risk areas are lowland conifers and forest types more than forty years old that have had some type of vegetation management, such as thinning in the past. Medium fire risk areas consist of untreated grasslands, hardwoods, and mixed conifer/hardwood types that are more than forty years old. High fire risk areas consist of untreated upland conifer more than forty years old. The analysis compares the amount of acres treated under each alternative. See FP 2004, final environmental impact statement (Final EIS), p. 3.5-4 for more information.

3.7.3 Analysis Area

Indicator 1: Fire Risk Index - Project Area

The analysis area for considering direct, indirect, and cumulative effects includes all NFS land within the project area boundary. This area was selected because effects from treatments would have minor short-term effects only on areas within the project area boundary. The time period for the direct, indirect, and cumulative effects is based on a ten-year period, which is commensurate with the anticipated completion of NFS treatment activities, such as timber sales and subsequent reforestation.

3.7.4 Affected Environment

Fire Ecology

Fire is recognized as one of the major historical natural disturbance agents in the forests of northeastern Minnesota (Heinselman 1996; USDA Forest Service 2001). Along with wind, insects, and disease, fire helped to establish, maintain, and convert the vegetation of the area depending on the frequency, intensity, and patch size of the fire event. Different vegetation types adapted to fire through strategies that either allowed them to survive low-to-moderate intensity fires, or to rapidly and aggressively reseed or resprout themselves after high-intensity fires. Fire was such a frequent event in the forests of northeastern Minnesota, specifically the nearby Boundary Waters Canoe Area Wilderness (BWCAW), that Heinselman determined the "natural fire rotation" or the time that the equivalent acreage of the entire BWCAW burned-over was 75 to 100 years. Return intervals ranged from as little as five years between fires to over 200 years in some vegetation types.

Prior to organized fire suppression in northern Minnesota, red and white pine stands, in particular, were maintained by frequent lower-intensity fires that removed understory trees but did not generally kill adult pines (USDA Forest Service 2001). Red and white pine adaptations to frequent, low intensity fires include thick insulating bark and the self-pruning of lower limbs that eliminates the "fuel ladder" by which fire could climb into the crowns. These fires occurred every 5 to 50 years with average intervals of 20 to 40 years (Heinselman 1996). Typically, there were one or two dominant age classes of trees in the stand with a new age class entering the stand after a surface fire was severe enough to open up the stand, but which did not entirely kill the overstory pines. Occasionally, stands would be missed by fire long enough for shade-tolerant species like balsam fir to become established in the understory, and a subsequent fire moving through the stand, using the balsam fir as a ladder fuel, could become a stand replacement fire with conversion to birch or aspen-birch mix. Whether or not pine would eventually reestablish itself over time was dependent on the number of seed trees that survived to ensure that a seed source was available. The success of pine reestablishment also depended on whether fire occurred in a timely fashion to reduce competition from other species. Red and white pine stands could be maintained for centuries if low intensity surface fires occurred frequently enough. If fire missed the stand for several centuries, succession to black spruce, balsam fir, and white cedar would occur.

Since the early 1900s, fire suppression allowed shade tolerant species such as balsam fir to establish and proliferate in the understory of upland forest types. Decades of fire exclusion have resulted in a change in species composition, higher fuel loadings, an increase in ladder fuels, and a severe departure in the frequency and intensity of fires that would have occurred historically.

Currently, the project area has large amounts of live and dead balsam fir accumulating in the understory. Spruce budworm has been a constant pest in the area for the past several decades. This insect attacks and eventually kills balsam fir trees. The resultant mortality adds to the buildup of standing dead and down fuels. The combination of this volatile understory fuel and contiguous conifer overstory could allow a surface fire to get into the crown and become a high intensity crown fire. This type of wildfire is not only difficult to manage and potentially devastating to the stand, but it has the potential to threaten life and property.

Fuel and Fire Behavior Characteristics

Wildland fire behavior is highly influenced by forest fuel types, weather, and topography. Forest fuels consist of organic matter including both dead and living material. Dead fuels consist of grass, needles, leaves, twigs, branches and logs; primarily found on the forest floor. Live fuels consist of the foliage of the forbs, shrubs, brush, and trees. In Minnesota, conifer foliage is the primary live fuel of concern because it contains enough resin to sustain fire under normal burning conditions. Broadleaf foliage, including brush and shrubs, will typically support a fire when it has been thoroughly dried out by severe drought conditions.

When conifer foliage extends from the ground up into the overstory, the potential exists for fire to move from the forest floor up into the overstory and cause "torching" or "passive crown fire" to occur in the canopy. In passive crown fires, single trees or groups of trees may burn at once, but a solid, moving flame is not maintained in the canopy. If the crown foliage is not contiguous, due to gaps, interspersed non-coniferous trees, or too low of wind speed to maintain active flames in the canopy, crown fire would not be sustained. However, if the coniferous foliage is contiguous and the wind speed is sufficient, an "active" crown fire is likely. Active crown fires sustain active fire in the canopy and move rapidly through the canopy.

In relation to surface fires, crown fires present special problems to managers (Scott, Reinhardt 2001). They:

- Spread several times faster.
- Have frequent spotting which can occur over long distances and can ignite new fires ahead of the main fire.
- Have longer flame lengths and greater intensity which make suppression by ground forces impossible and require larger firefighter safety zones.
- Produce greater heat radiation which makes it more difficult to defend structures.
- Produce effects which are more severe and longer lasting including near total tree mortality, greater smoke production, and greater loss of foliar nutrients from the site.

Fire Occurrence

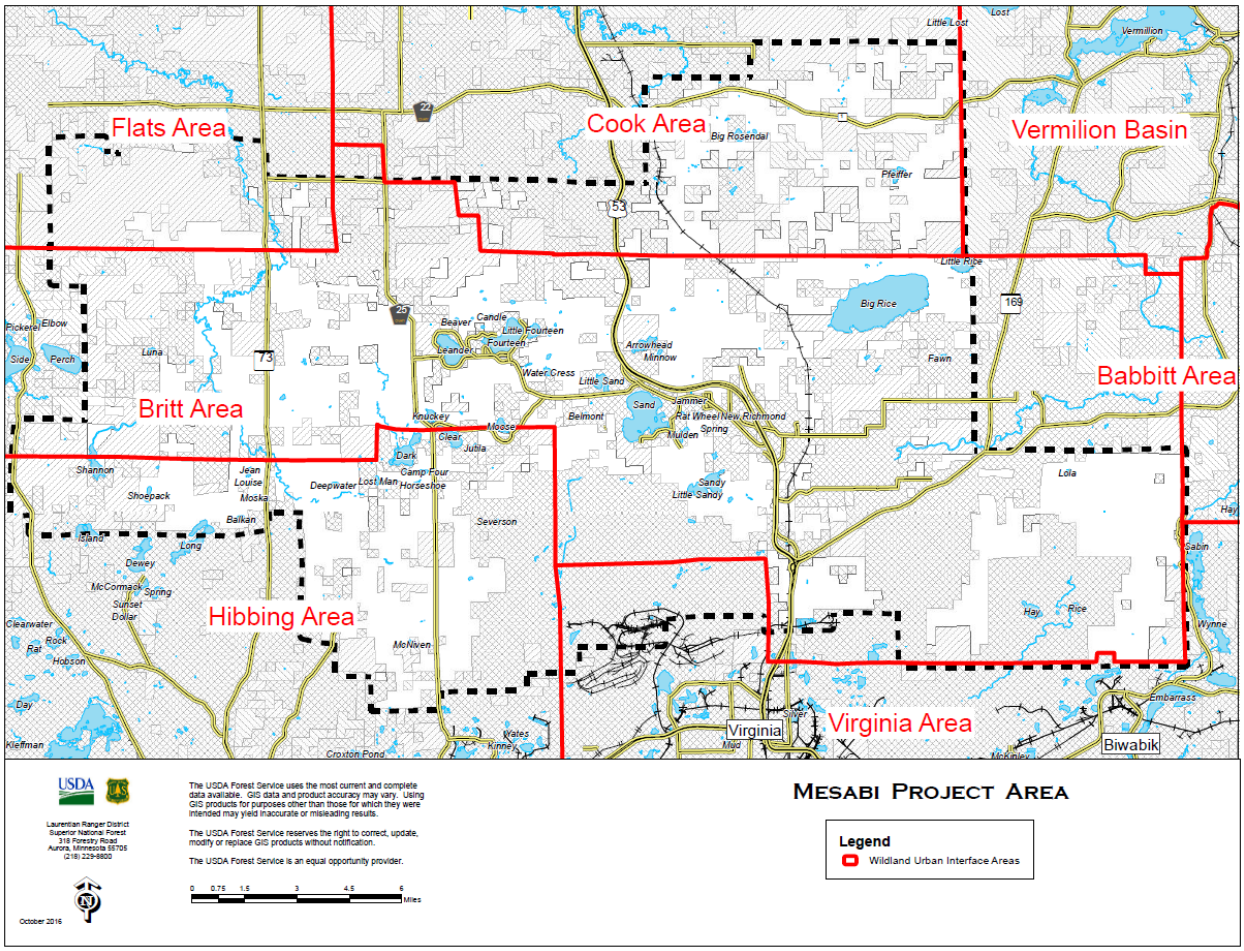
Historically, fires occurred regularly in the project area as evidenced by the native plant communities, fire scars on older trees, and char throughout the project area. From 1988 to 2015, there have been 214 fires, totaling 522 acres in the project area. These fires were suppressed quickly because of relatively good access. Ten fires were caused by lightning, which totaled 22 acres. The rest of the fires were human caused including ignitions from power lines. Burning debris caused the most fires (46); the largest being 28 acres. The last debris fire occurred in 2014. The largest fire in the project area burned 89 acres in 2015. In May 1992, the Vermilion Complex burned approximately 7,000 acres two miles east of the project area. The Vermilion Complex was two fires burning parallel to each other, one-quarter of a mile apart. Both fires were wind-driven, which destroyed several stands by high intensity crown fires.

Values at Risk

The project area contains one of the highest wildland/urban interface densities with the boundaries of the Superior National Forest. Private property with homes and seasonal cabins are scattered throughout the project area. High densities of residential homes occur in the Donnywood and Britt Developments, and around Sand Lake, Little Sand Lake, Clear Lake, Fourteen Lake, Dark Lake, and Lake Leander. In addition, the project area contains numerous recreational sites that receive use throughout the year including Lookout Mountain.

During development of the St. Louis County community wildfire protection plan (CWPP), wildland urban interface (WUI) areas were identified for the county. The project area falls within four of these areas: Britt, Cook, Hibbing, and Flats WUI areas (please see figure 3.7.1). These areas were then assigned values based on fire hazard risk, values, protection capabilities, and an overall rating. The Britt and Cook WUIs rated out with an overall rating of moderate, while Hibbing WUI rated out at high and Flats WUI rated out at low.

Figure 3.7-1 Wildland Urban Interface Areas



3.7.5 Environmental Consequences

Alternative 1: no action

Direct, Indirect, and Cumulative Effects

Indicator 1: Fire Risk Index

Under alternative 1, no timber harvesting, timber stand improvements, or fuel reduction activities would occur within the project area. Therefore, the risk of high intensity wildland fires would not be reduced. The acres in the high, medium, and low categories would remain at their current levels; however, acres susceptible to wildland fires would increase over time.

Acres in the high risk category would increase over time as young upland conifers grow over forty years old. Some medium risk acres would also move into the high risk category. Mature upland hardwood acres subject to severe wind events would naturally succeed to an upland conifer component. Typically, mature aspen and birch stands have sizable amounts of balsam fir and white spruce in their understories. Once the aspen or paper birch overstory is removed by windstorms or natural mortality, the suppressed balsam fir and white spruce is released and allowed to grow into the overstory.

Alternative 1 would increase the potential to lose key components of certain ecosystems. The exclusion of timber harvesting and fuel reduction activities would allow balsam fir to invade and proliferate in the understory of most stands. Balsam fir already present would continue to grow into the overstory, making stands more vulnerable to passive crown fires and more likely to experience active crown fires in the future. Additionally, surface fires initiating within these stands or spreading into these stands from adjacent stands would be more likely to transition into crown fires. This fire type would result in mortality to some trees in the stand. Firefighting forces would be at greater risk trying to suppress these fires due to the higher intensities and rapid spread rates of crown fires. In addition, greater proportions of the landscape would be susceptible to crown fire. The threat to surrounding residences and communities would be correspondingly greater as firefighting efforts would not be as effective against these fires. Accordingly, fuel hazards would steadily increase with time until a natural or human-caused disturbance changes the fuel type, fuel loading, fuel continuity, or fuel arrangement.

Thus, as alternative 1 does not treat any units, this alternative presents the greatest risk of crown fires from a wildland fire than the other two alternatives.

Alternatives 2 and 3

Both action alternatives would treat the same amount of acres, with the same prescription, except for 538 acres in alternative 3 that utilizes ground based herbicides for site preparation instead of mechanical. Both site preparation treatments would kill saplings, shrubs, and seedlings. The dead material would create a short-term increase in the fuel hazard and fire risk until the dead material rots into the ground a few years post treatment. Effects of herbicide application to fire risk are considered minor because herbicide areas are widely scattered and would not contribute to a long-term fuel hazard. Therefore, effects for alternatives 2 and 3 are the same.

Alternatives 2 and 3 would treat the same amount of available acres in the high risk and medium risk categories. Approximately 6,181 high risk acres and 2,171 medium risk acres would be treated through timber harvesting and fuel reduction treatments (table 3.7-1). Susceptibility to crown fire and threats to firefighters and public safety would be less than alternative 1. Hand

crews would have a greater chance of suppressing wildland fires because fire intensities and spread rates are reduced substantially in surface fires.

Treatment activities proposed in alternatives 2 and 3 would decrease the amount of fuel available to support wildland fires through timber harvesting, altering vegetation by mechanical or hand means, and prescribed burning (see appendix a). These treatments are effective at reducing wildfire severity, suppression costs and increasing forest resiliency (Ecological Restoration Institute 2013 and Waltz et al. 2014). The main focus of these treatments is to increase the amount of forest restored or maintained in a healthy condition to reduce risk of damage from fire, insects, and disease and for public safety. The timber harvesting proposed under each alternative would make most of the stands unavailable to support high intensity crown fires by changing the horizontal and vertical fuel structure in the stand. Although no treatment activity can prevent the occurrence of wildland fires entirely, timber harvesting and fuel reduction treatments can help reduce the potential for high-intensity wildland fires (USDA Forest Service, 2007 Superior National Forest Monitoring Report, Fire and Fuels, p. 30).

Stands may require one to three treatments to effectively change the fuel loading and forest conditions. These treatments may include timber harvesting, altering vegetation by mechanical or hand means, and prescribed fire as individual treatments, or a combination of these treatments. A post-treatment assessment would be completed after each treatment to determine if objectives were met or if additional treatments should be considered. Some units treated only with prescribed fire may need to be burned multiple times to change fuel loading, fire intensity, and fire behavior. Some prescribed burn units would have understory vegetation augmented to facilitate burning and achieve the desired fire effects. Augmentation treatments consisting of lopping and scattering understory material; hand cutting, piling and pile burning; and masticating or crushing by heavy equipment would be used. Prescribed burns would be controlled utilizing boundaries created with heavy equipment, by cutting a hand line, and through utilizing natural barriers such as rivers, lakes, and roads. Pumps and hose would be utilized when necessary to fire is kept within the designated area.

Thinning or final harvesting a treatment unit prior to prescribed burning would increase the effectiveness of the burn. Harvesting, timber stand improvement, and some fuel reduction activities would remove most ladder fuels from the treatment area and prevent crown fires from initiating. In addition, the removal of fuels below the canopy would lower the intensity of the fire and prevent heat from scorching the canopy. Harvesting can also remove tree species such as paper birch that are known to loft fire brands into the air when they burn. These fire brands can start spot fires across the fire control line. Harvesting would also extend the length of time (burn window) to burn an area. Timber slash would generate more available fuel for burning and help carry the fire. Fuels in a harvested area generally dries out quicker than fuels under an enclosed canopy due to exposure to the wind and sun.

Alternatives 2 and 3 would utilize even-age, intermediate, and nonharvest restoration techniques. Each method would affect fire behavior differently based upon the amount of available fuels (wood) extracted or if fuels become unavailable due to being crushed into the ground by heavy equipment. Mechanized treatments would also change the fuel continuity within a treatment area by removing vegetation and creating gaps in the canopy, therefore discouraging active crown fires. These gaps would be more evident in areas of final harvest compared to a thinning harvest simply due to the removal of more vegetation.

From a landscape context, harvested units provide a break in fuel type contiguity. Roads, landings, and the change in fuel arrangement (removing ladder fuels and decreasing the vertical contiguity between surface fuels and canopy fuels) in harvested units all serve as fuel breaks (Graham, et al 2004). Furthermore, harvesting equipment crushes slash, woody debris, and small diameter balsam fir ladder fuels to the ground during the harvesting process.

Some harvested units may need logging slash at landings piled and burned to reduce residual fuel accumulations. In areas where pile burning occurs, there may be some damage (short-term sterilization) to soils directly under the pile but the impact would be minimal when compared to the entire area being treated.

Smoke from prescribed burns and pile burning is generally a short-term impact on the area, and most impacts would occur on the day of the burn. Smoldering of larger material may smoke for a couple days after the burn. Material posing an escape threat would be extinguished on the day of the burn while material in the interior may be left to burn itself out. Smoke mitigation measures will be addressed in all burn plans based on the requirements in the Minnesota Smoke Management Plan. For more information on smoke and effects to air quality, see chapter 3.12.3

Table 3.7-1: Acres of High, Medium, and Low Risk Vegetation Treated by Alternatives in the Project Area

	Alt. 1	Alt. 2	Alt. 3
High Risk	0	6,181	6,181
Medium Risk	0	2,171	2,171
Low Risk	0	0	0

Cumulative Effects - Alternatives 1, 2, and 3

The number of acres treated by the State of Minnesota, St. Louis County, and private landowners would not change relative to the project alternatives. Effects of these treatments would be similar to those described for NFS land in the environmental consequences section, but on a different scale due to the additional number of acres being treated. Cumulatively, the more acres treated by the State of Minnesota, St. Louis County, and private landowners would enhance the fuels reduction across the National Forest System landscape. It is uncertain how much would be treated within the next ten years, but the Superior National Forest is actively engaging with the partners to achieve broader fuels reduction goals across the landscape.

Commercial timber harvesting has been and will be the primary mechanism to influence fire risk rankings on NFS, State, county, and private land in the past, present, and the foreseeable future. The State of Minnesota and St. Louis County plan to harvest 463 acres over the next five years. These acres are predominantly aspen forest type and would be moved from the medium risk category to the low risk category. A very small number of acres would succeed into the higher fire risk categories since current forest type, age, and condition would keep them in their current category for the next ten years.

Planned harvest on private land is unknown. Aspen is the primary forest type on private land. Any harvesting would move these acres from the medium risk category to the low risk category. Acres would not succeed to the higher fire risk categories because the current age and condition would not change in the next ten years. It is expected that some landowners would take some steps to reduce hazardous fuels on their land, such as removing balsam fir.

State, counties, and Forest Service agencies have planted conifer species (mainly red and white pine) in the past to increase this component on the land. It is expected that flammability of the forest fuels would temporarily increase in tandem with the increase in the total acreage of young-aged pine; however, flammability would decrease as the pine reaches maturity. In addition to the timber harvesting and fuel reduction treatments proposed, there are also a number of timber stand improvement projects using mechanical methods occurring on other ownerships. While some of these projects are primarily intended to release pine regeneration from competing vegetation such as balsam fir, this would have an added fuel management benefit in removing some of the conditions that lead to crown fire initiation.

Although prescribed burning and mechanical treatments would have the effect of reducing fuels in the project area, fire suppression on all ownerships is expected to continue. As a result, fuel buildup would continue to occur in untreated stands. Ownership is mixed throughout the project area, and this has caused the fire risk of stands to be altered throughout the entire project boundary. Activities that have occurred or are occurring on all ownership are returning the project area to a healthier condition. No activities are proposed in alternative 1 to reduce or maintain acres in a lower fire risk category. Alternative 1 would allow stands to move into higher fire risk categories over time and would increase the risk of losing key ecosystem components.

Tables 3.7-2, 3.7-3, and 3.7-4 display the acres in each fire risk category by ownership and alternative. The existing condition shows the total acres in each fire risk category in 2015. The alternative columns show the acres in each category, taking into account for planned treatments and succession. Alternative 1 shows more acres in the high and medium categories and fewer acres in the low category because succession would move them from the lower categories into the higher risk categories. Alternatives 2 and 3 shows less acres in the high and medium risk fire risk categories because more acres were treated than succession could move into the higher categories. Most acreage change would occur in the high risk category for both alternatives.

Table 3.7-2: High Fire Risk Acres after Treatment, Displayed by Ownership and Alternative

Land Manager	Existing Condition	Alt. 1 (2020)	Alt. 2 (2020)	Alt. 3 (2020)
National Forest System	12,490	13,149	6,968	6,968
State of Minnesota	988	988	988	988
St. Louis County	97	97	97	97
Private Landowners	300 (est.)	300	300	300
Total Acres	13,875	14,534	8,353	8,353

Table 3.7-3: Medium Fire Risk Acres after Treatment, Displayed by Ownership and Alternative

Land Manager	Existing Condition	Alt. 1 (2020)	Alt. 2 (2020)	Alt. 3 (2020)
National Forest System	52,988	54,642	52,471	52,471
State of Minnesota	18,091	17,828	17,828	17,828
St. Louis County	3,284	3,084	3,084	3,084
Private Landowners	600 (est.)	600	600	600
Total Acres	74,963	76,154	73,983	73,983

Table 3.7-4: Low Fire Risk Acres after Treatment, Displayed by Ownership and Alternative

Land Manager	Existing Condition	Alt. 1 (2020)	Alt. 2 (2020)	Alt. 3 (2020)
National Forest System	35,007	32,696	41,055	41,055
State of Minnesota	22,162	22,425	22,425	22,425
St. Louis County	3,127	3,327	3,327	3,327
Private Landowners	50,000 (est.)	50,000	50,000	50,000
Total Acres	110,296	108,448	116,807	116,807

3.8 SOILS

3.8.1 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 Forest's 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.

3.8.2 Analysis Methods

Indicator 1: Acres proposed for mechanical harvest and nonharvest treatment

This indicator includes 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 or for fuel reduction, biomass harvest, herbicide application, and prescribed fire. The difference between the action alternatives 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, miles of road being decommissioned and all-terrain vehicle (ATV) Use.

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.

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

3.8.4 Affected Environment

The classification system used for the 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 project area is in the North Superior Uplands Section (212L) and the corresponding Nashwauk Uplands Subsection (212Lc). In the northwest corner there is a small area of northern Minnesota and Ontario peatlands section (212M) and the corresponding Littlefork-Vermillion uplands subsection (212Ma) (USDA Forest Service 1998).

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

3.8.5 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 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. Normal road maintenance on existing system roads would continue.

If no prescribed burning occurs, the risk of a severe wildfire is increased. Severely burning the soil would cause detrimental impacts to the soil, and soil erosion could occur where the slopes are steep.

Alternative 2:

Direct and Indirect Effects

Indicator 1: Acres proposed for mechanical harvest and nonharvest treatment

Alternative 2 would result in future vegetation management activities. By following operational standards and guidelines described in 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, pg. 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 3.8-1 shows the acres of harvest, prescribed fire, fuel treatments, and mechanical site preparation that would occur on harvested sites.

Table 3.8-1: Acres of Treatment on Harvest Sites for the Mesabi Project

Treatment Type	Alternative 1 Acres	Alternative 2 Acres	Alternative 3 Acres
Harvest[1]	0	12,344	12,344
Prescribed Fire	0	3,442	3,442
Fuels Treatment	0	537	537
Site Preparation[2]	0	3031	3569
Herbicide Application	0	538	0

[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 site preparation could include mechanical treatments and/or prescribed fire treatments for the purpose of site preparation.

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 3.8-2.

Table 3.8-2: Mesabi Project Landings and Skid Trails by Alternative			
	Alternative 1	**Alternative 2**	**Alternative 3**
Landings	0	126.4 acres	126.4 acres
Skid Trails	0	379.3 acres	379.3 acres

[1]Landings calculation assumed 1% of harvested area would be utilized (See Forest Plan).

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

Management activities could also include biomass 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 project area.

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 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.

Regarding prescribed burning, nutrient loss could occur as a result by volatilization or a loss of organic matter on nutrient sensitive soils. This impact would be eliminated or minimized by following FP 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 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. There are 538 acres proposed to be treated (see table 3.8-1) under alternative 2. The amount and type of herbicide, the timing of application, the soil type, and the method of application would minimize the effect. A risk assessment for the Forest Service has been conducted for the proposed herbicides – glyphosate,

triclopyr and sulfometuron methyl (SERA 2003a, SERA 2003b, and SERA 2004 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. Sulfometuron methyl is potentially mobile in the soil, but in the presence of organic matter, soil microbes, and acidic soils, it will break down and be relatively immobile in the soil (Dept. of Pesticide Regulation 1999). For all 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 is 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 alternatives. Road decommissioning would allow for that land to be returned to a forested condition. Existing 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 3.8-3. Roads that are added as shown in table 3.8-3, are not newly created roads, but already are in existence.

Table 3.8-3: Transportation Activities by Alternative for the Mesabi Project[1]

	Alternative 1		Alternative 2		Alternative 3	
	Miles	Acres	Miles	Acres	Miles	Acres
Roads added to the system	0	0	19.8	48	19.8	48
Roads being decommissioned	0	0	28.4	68.8	28.4	68.8
New temporary roads	0	0	3.1	7.5	3.1	7.5

[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 FP standards and guidelines (S-TS-3, G-TS-13). Most of these impacts would be short term (less than fifteen years). Temporary roads totaling 3.1 miles need to be constructed to facilitate resource management. Of those temporary roads, 1.8 miles 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 (3.9) in the EA for additional information on sediment delivery from temporary roads.

See section 3.11.7-1: gravel, for a list of the gravel pits. Gravel pits that are to be reclaimed would be reshaped and the stockpiled topsoil would be spread back and then seeded and /or planted.

Alternative 3: no herbicide action alternative

Direct and Indirect Effects

Indicator 1: Acres proposed for mechanical harvest and nonharvest treatment

The difference between alternative 3 and alternative 2 is that alternative 3 proposes to use mechanical site preparation rather than site preparation with herbicide. By not treating with herbicide there would be an additional 538 acres of mechanical site preparation (see table 3.8-1). The area impacted by mechanical site preparation would be slightly higher in alternative 3. As long as FP and MFRC guidelines are followed, the risk to the soil from site preparation would be minimal. However, alternative 2 uses herbicide to control the competing vegetation, so there would be a low risk of herbicide leaching through the soil into groundwater or into a waterbody by runoff, as compared to alternative 3, which uses mechanical means to control competing vegetation. However, when the herbicides are applied in conjunction with herbicide label instructions, project mitigations, MFRC guidelines, and considering that the stands selected are away from water bodies and spraying would not be near wetlands, there would be a low risk of delivery into surface waters and of herbicide leaching into the groundwater.

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

In terms of roads there are no differences between alternatives 2 or 3 (see table 3.8-3).

Conclusion – Direct and Indirect Effects all Alternatives

Alternative 1 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.

Vegetation management and road management activities proposed in the action alternatives would result in minimal impacts to the soil resource. Effects to soil resources would be minimal since MFRC site-level and FP guidelines would be followed for prescribed fire treatments. If a wildfire did occur, alternatives 2 and 3 would reduce the impact to soil resources compared to alternative 1. Land affected by landings and skid trails (table 3.8-2) would be minimized by following MFRC site-level and FP guidelines. Gravel pit expansion would result in the soil of the proposed expansion area being non-productive until the area is reclaimed; productivity would be partially restored, and then gradually restored over the long term. The area affected would be small in comparison to the size of the project area. Actions taken to decommission existing roads in alternatives 2 and 3 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. 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; however, since the affected area is directly beneath each pile, the affected area is minimal. Gravel pit expansion will detrimentally affect the soil, but the affected area would be minimal and the area reclaimed once the gravel is removed. 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 four percent and one-half 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 five 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 FP 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 project area. Grigal (2004) reviewed the analysis for long-term site productivity completed as a portion of the generic environmental impact statement (GEIS) done for timber harvest in the state of Minnesota. In his review of the GEIS, he concluded that updated nutrient budgets and results of long-term studies indicate the nutrient capital is sufficient to tolerate numerous biomass removals and harvest rotations with minimal impacts to site productivity for most mineral soils in Minnesota. Known past and reasonably foreseeable future management actions that would occur on land impacted by proposed management activities would have minimal cumulative impacts to the soil resource.

3.9 WATER RESOURCES

3.9.1 Introduction

Background

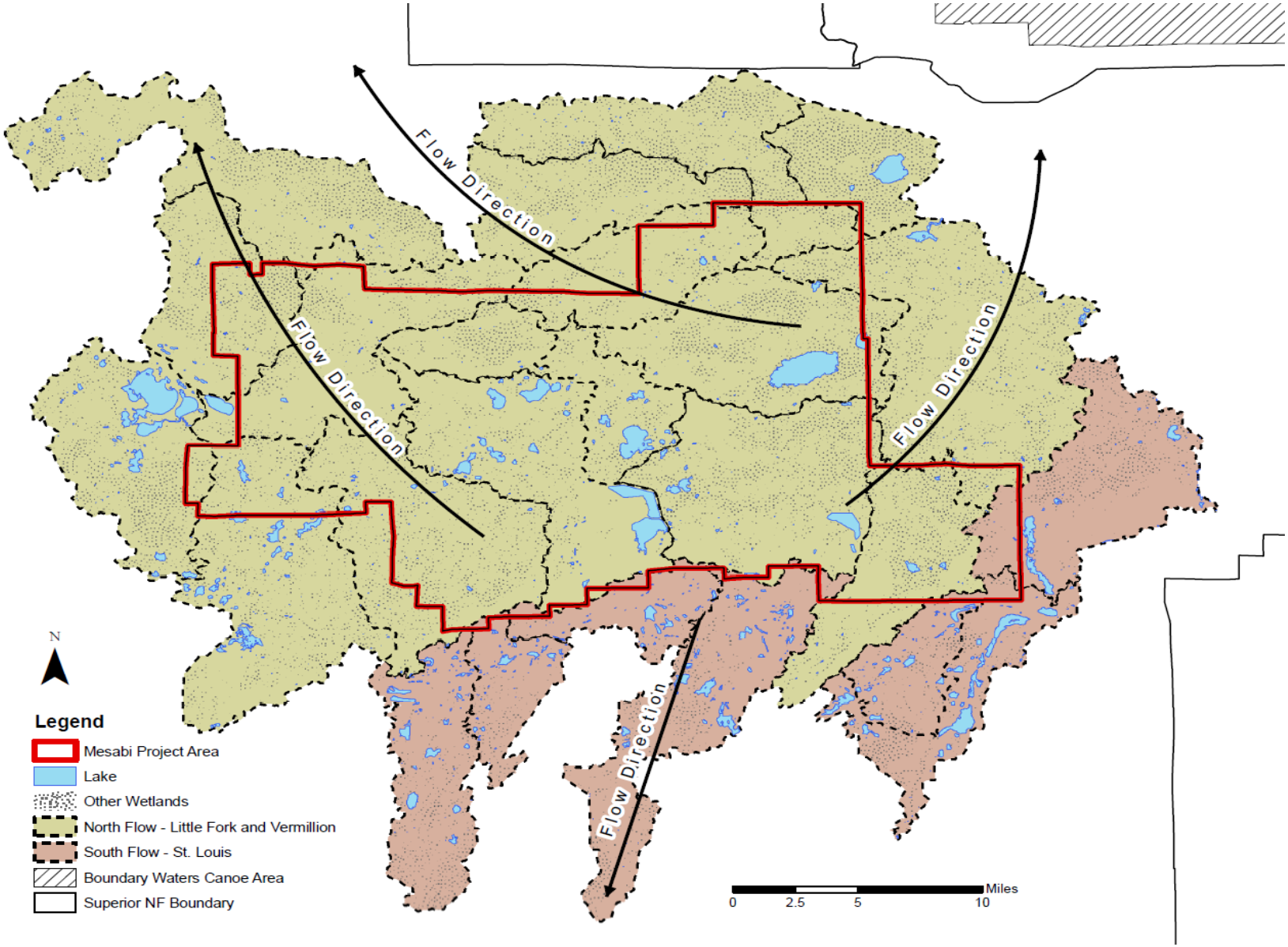
The Mesabi Project Area covers the non-contiguous area of the Superior National Forest south of Cook and north of Virginia. Reflecting its location close to some of the more populated areas in northeastern Minnesota and a major highway through the area (Highway 53), the area absorbs a substantial amount of recreational use, much of which occurs on water resources. None of the streams flowing through the 6th-order watersheds intersecting the project flow to the Boundary Waters Canoe Area Wilderness (BWCAW); instead the streams flow into Lake Vermilion just south of the Wilderness. Surface water within most of the project area flows north through the Vermilion River and Little Fork River Watersheds. Much of the southern border of the project area lies along the Laurentian Divide; water from the extreme southeastern corner of the project area flows south into the St. Louis River (figure 3.9-1). All or parts of 24 6th-order watersheds intersect the project area.

Past activities on both federal and nonfederal lands (to the extent known) include timber harvest, silvicultural release and planting, fuel reduction and prescribed burning, wildfires, recreation, long-term special use permits associated with private property access and utility lines, land exchanges, non-native invasive plant management, use of gravel pits, and road decommissioning (appendix E). These activities are expected to continue in the future.

Water resources within the project area have the following characteristics:

- Wetlands including lakes, rivers, and other types of wetlands, cover an average of 32 percent of watersheds intersecting the project area. Individual watershed wetland coverage ranged from six percent (Mountain Iron Mine) to 70 percent (Headwaters of Little Fork River).
- Lakes (e.g., Lake Leander, Lake Fourteen, Sand Lake) within the project area are included on the impaired waters list for the statewide mercury in fish tissue listing. A small section of the Rice River headwaters located within the project area is also identified as impaired for fish based on results from the State's index of biotic integrity.
- Trout lakes James, Camp A, and Deepwater are located within the project area. In addition, numerous trout streams are present including Sand Creek, the Dark River, Johnson Creek, and Angora Creek.
- 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 the northern brook lamprey, creek heelsplitter, and black Sandshell are present within the Sturgeon River, Dark River, and Upper Rice River watersheds within the project boundary. For additional information regarding impacts to biological life, refer to the project biological evaluation.

Figure 3.9-1: Mesabi Watersheds and Project Area



•Except for the extreme northwest corner, the project area lies within Minnesota groundwater province six, a region of limited general availability of groundwater. No vulnerable drinking water supply management areas are present within in the project area.

•According to Minnesota Department of Natural Resource geographic information systems (GIS) data, wild rice water bodies within the project area include Knuckey, Moose, Sandy, and Big and Little Rice Lakes, among others.

PROPOSED ACTIVITIES

Stand-level timber harvest treatments (e.g., clearcut and coppice cut), use of gravel pits, nonharvest treatments (e.g., new single track mountain bike trail), 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 Mesabi 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.

3.9.2 Analysis Methods

Three indicators related to water quality and watershed health were analyzed to evaluate effects associated with three project alternatives. These indicators help measure the potential direct, indirect, and cumulative effects to water quality and watershed health.

Indicator 1: Transportation System Information - 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. Miles of road construction and miles of road decommissioning proposed within the project area, and road density within watersheds intersecting the project were calculated for each alternative as indicators to assess impacts to water resources associated with the change in transportation system proposed as part of this project.

Road salt is not used on Superior National Forest System roads, so road effects to water resources are more likely related to 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. Effects of roads and trails are described in detail in section 3.6.1.b (pages 3.6-11 and 3.6-12) of the Superior National Forest Land and Resource Management Plan Final EIS.

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 additional construction of temporary road and 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 21.4 feet/acre had “moderately degraded water quality” and an increase in density of 15.3 feet/acre 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 alternatives (alternatives 2 and 3).

Along with a description of changes to the transportation system, the analysis will also quantify changes in 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 number of new stream crossings resulting from new permanent and temporary roads constructed within the project area were identified. 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 areas are 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.

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 – identified using GIS data; roads were buffered 16 feet on center and trails buffered 10 feet on center.

- "Change detection" – a State-generated GIS layer that uses digital 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 for the rate of young and open land created in the intervening years (2011-2016) were identified by either extrapolating the creation rate identified on a watershed basis into the future, or where estimates were unreasonable, the average 2001-2010 young and open upland creation rate was applied. These techniques were also used to estimate likely future conditions.
- Ecosystem land types (ELTs) mapped as nonforested upland – such as open fields and gravel pits.

Not applicable for the Mesabi 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 analysis assesses the proportion of young and open upland in the Forest by watershed at four snapshots in time: existing (2016), future (2031) under the no-action alternative, future (2031) under modified proposed action alternative 2 and future (2031) under the modified proposed action alternative 3. The listed layers were adjusted for each scenario based on expected changes, although future plans for road building, and harvest of State, county, or private lands 15 years into the future were sometimes unknown.

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 FP 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.

3.9.3 Analysis Area

Indicator 1: Transportation System Information - Miles of temporary road construction; miles of road decommissioning; road density

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 extends to the project boundary (figure 3.9-1) 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.

The analysis area for the road density component of indicator 1 includes the 6th-level watershed for each watershed that intersects the Mesabi Project. 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 Sturgeon River, Lower Rice River, Headwaters Little Fork River, Little Fork River (City of Cook), Sturgeon Lake, Pike River, Embarrass River, East Two River, Dempsey Creek, Kinney Lake, Wynne Lake (St. Louis River), Leaf Lake, and Mountain Iron Mine were not analyzed for road density.

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 selected 6th level watersheds (figure 3.9-2) as follows.

•Criterion #1: Watersheds containing more than 40 percent lowland/water/wetland were eliminated from analysis, reflecting the ability of water and lowland environment to buffer any changes in runoff. Since wetland is always considered "old", exceedance of the 60 percent young and open upland threshold for these watersheds is mathematically impossible.

•Criterion #2: a) Watersheds where less than three percent of the project was located within the watershed were tentatively eliminated from the analysis, reflecting the small effect of Mesabi Project activities on that watershed. Given the potential that the combination of a small watershed and a large project area could inappropriately eliminate watersheds under criterion #2a, those watersheds that were tentatively eliminated were also assessed for b) the amount of watershed in the project and the watershed's ownership. Under this additional criterion #2b, a watershed would remain excluded unless at least 10 percent of the watershed area was within the project and greater than 30 percent of the watershed included federally owned lands.

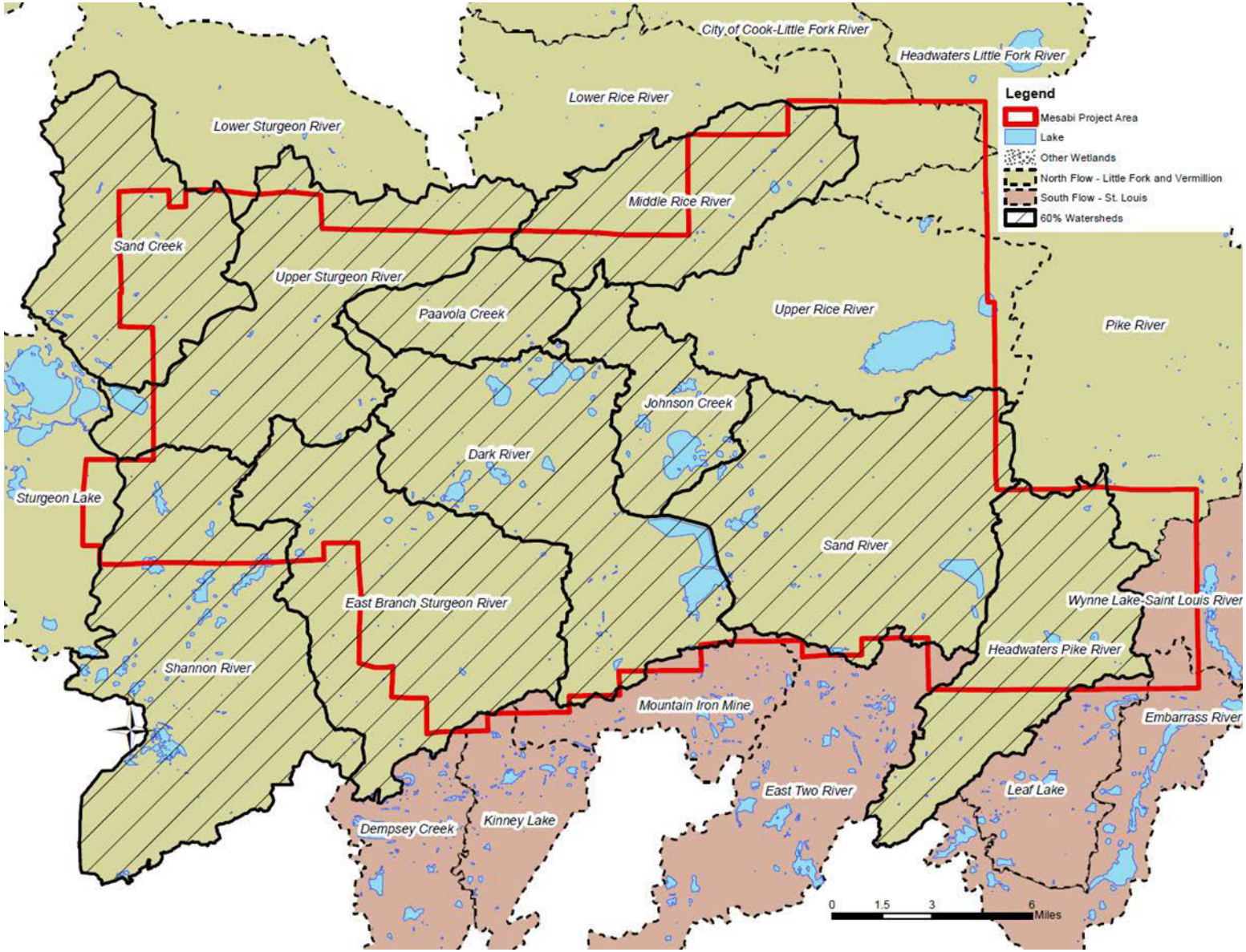
The **timescale** selected for the direct, indirect, and cumulative effects for indicator 3 is fifteen years. This length of time was selected to reflect the impact of on-going harvest on nonfederal lands. New open areas associated with the project are modeled as completed in 2017/year one.

3.9.4 Affected Environment

Indicator 1: Transportation System Changes - Miles of temporary road construction; miles of road decommissioning; road density

Approximately 508 miles of permanent system road are present within the 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 2004).

Figure 3.9-2: Mesabi 6th Order Watersheds Analyzed for Indicator 3 (hatched watersheds).



Indicator 2: Number of stream crossings

GIS data analysis indicates 254 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 all 254 crossings in the Mesabi Project Area between 2003 and 2013). 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 Forestwide basis, outside of the scope of the project, through the Forestwide 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.

In total, 94.3 percent of the project area was assessed under this indicator. Ten 6th-level watersheds occurring within or intersecting the project area comprise the analysis area for indicator 3 (table 3.9-1). These watersheds range in size from 10,156 to 43,020 acres.

Table 3.9-1: 60% Analysis Decision Matrix

6th-Level Watershed Name	% WS* in Project Area	% Project Area in WS	% Wetland in WS	% NFS Owned in WS	Criteria 1: Analysis decision based on wetland %	Criteria 2a: Analysis decision based on % project area in WS	Criteria 2b. Analysis decision based on % WS in project area & % NFS lands in WS
Upper Sturgeon R.	76	10	23	25.4	OK	OK	N/A
Shannon R.	21	4	26	5.6	OK	OK	N/A
Lower Sturgeon R.	1	0.1	38	0.2	OK	out	OK
Upper Rice R.	91	12	44	48.0	out	OK	N/A
East Branch Sturgeon R.	76	12	29	46.9	OK	OK	N/A
Paavola Cr.	100	4	36	28.2	OK	OK	N/A
Lower Rice R.	1	0	39	0.0	OK	out	OK
Headwaters Little Fork R.	2	0	70	1.2	out	out	OK
City of Cook-Little Fork R.	19	2	42	10.6	out	out	OK
Dark R.	99	14	19	35.0	OK	OK	N/A
Johnson Cr.	100	5	30	40.8	OK	OK	N/A
Sand Cr.	40	4	37	2.3	OK	OK	N/A
Middle Rice R.	65	5	23	27.6	OK	OK	N/A
Sturgeon Lk.	5	1	44	0.0	out	out	OK
Sand R.	97	15	34	25.0	OK	OK	N/A
Headwaters Pike R.	67	6	36	25.8	OK	OK	N/A
Pike R.	11	2.3	34	7.7	OK	out	OK
Embarrass R.	5	0.4	29	2.2	OK	out	OK
East Two R.	3	0.4	20	1.0	OK	out	OK
Dempsey Cr.	0	0.0	25	0.1	OK	out	OK
Kinney Lk.	2	0.1	17	0.4	OK	out	OK
Wynne Lake - St. Louis R.	13	1.6	27	10.5	OK	out	OK
Leaf Lk.	3	0.2	22	1.8	OK	out	OK
Mountain Iron Mine	11	0.5	6	0.0	OK	out	OK

*Watershed(WS) Shaded watersheds were analyzed; shaded data provide rationale for not analyzing

3.9.5 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: Transportation System Changes - Miles of temporary road construction; miles of road decommissioning and road density.

Alternative 1 would maintain the existing federal road transportation system on National Forest System (NFS) land within the project area (table 3.9-2). 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. There would also be no road decommissioning, resulting in no potential improvements potentially associated with a 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.

Developing a no-action alternative (alternative 1) estimate for road density is difficult as the rate of road construction on nonfederal lands is unknown. Table 3.9-3 provides the road density existing condition. Watersheds in the DeCatanzaro et al. (2009) study were found to exhibit "moderately degraded water quality" at 21.4 feet/acre. Existing road densities in the Mesabi Project Area range from 4.2 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. Road construction and decommissioning and associated change in road density on nonfederal 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 National Forest System land (table 3.9-4). 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 nonfederal lands is expected to continue at existing rate and degree of impact.

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

Alternative 1 analysis for young and open upland provides an estimate of how State, county, and private activities are likely to affect the watershed without the influence from federal activities. Figure 3.9-3 and table 3.9-5 indicate that with State, county, and private harvest activities, the amount of young and open upland will remain below the recommended threshold of 60 percent upland young and upland open.

ALTERNATIVES 2 AND 3: PROPOSED ACTION

DIRECT AND INDIRECT EFFECTS

Indicator 1: Transportation System Changes - Miles of temporary road construction; miles of road decommissioning and road density

Alternatives 2 and 3 proposes identical new temporary and permanent system road miles within the project area as shown in table 3.9-2. Under alternatives 2 and 3, newly-constructed temporary roads would be decommissioned after all use is completed (USDA Forest Service 2004 p. F-9). Approximately 32 percent of proposed temporary roads are restricted to winter use (1 of 3.1 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. The potential for impact with alternatives 2 or 3 is higher than the potential for impact with alternative 1; however, with implementation of MFRC guidelines and Forest OSGs, impacts to watershed, riparian, stream, and wetland functions are likely to be minimal.

Alternatives 2 and 3 also includes an identical amount of 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. 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, and decrease sediment input into local streams, lakes, and wetlands.

The road density analyses conducted for alternatives 2 and 3 yielded identical results. Under both alternatives 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 15.3 feet/acre was linked to a decline in water quality in the literature (DeCatanzaro et. al. 2009). Road density changes in the project area range from a decrease of 0.7 feet/acre (more decommissioning than new road added) to an increase of 2.8 feet/acre (table 3.9-3). Both situations are 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. Increases in road density as proposed in

alternatives 2 and 3 have the potential to result in additional soil disturbance and erosion; however, with standard BMPs in place the potential for impact is greatly reduced.

Table 3.9-2: Mesabi Transportation System Management

	Alt 1: No Action (Miles)	Alt 2: Proposed Action (Miles)	Alt 3: Proposed Action (Miles)
Length of new temporary road	0	3.1	3.1
Temporary special use road authorization	0	0.3	0.3
Total new temporary road construction	0	3.4	3.4
Existing road to be decommissioned	0	30.1	30.1
Total road decommissioning	0	30.1	30.1
Permanent special use road authorization	0	3.1	3.1
Total new permanent road	0	3.1	3.1

Table 3.9-3: Analysis Results-Road Density

6th Order Watershed Name	Existing Condition	Alt 2 – Proposed Action	Alt 3 – Proposed Action
	Road Density (feet/acre)**	Road Density Change (feet/acre)*	
Upper Sturgeon River	10.61	-0.09	-0.09
Shannon River	10.76	0.17	0.17
East Branch Sturgeon River	4.18	0.07	0.07
Paavola Creek	14.75	0.06	0.06
Dark River	12.47	-0.56	-0.56
Johnson Creek	9.34	-0.71	-0.71
Sand Creek	12.73	0.12	0.12
Middle Rice River	8.07	2.83	2.83
Sand River	6.71	-0.70	-0.70
Headwaters Pike River	8.93	0.16	0.16
Upper Rice River	10.61	-0.09	-0.09

* 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 (Alternatives 2 and 3 comparator)
NA = not analyzed

Indicator 2: Number of new stream crossings

Alternatives 2 and 3 result in an identical number of new crossings added: 13 new permanent and 11 new temporary stream crossings (table 3.9-4). The crossing structures added on 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 3.9-4: Mesabi Project Stream Crossings

	Alt 1: No Action	Alt 2: Proposed Action	Alt 3: Proposed Action
Number of new stream crossings to be added on permanent system roads	0	9 -Special Use, 2 – OML 1, 1 – OML 2 1 - ATV	9 -Special Use, 2 – OML 1, 1 – OML 2 1 - ATV
Number of new stream crossings to be added on temporary roads	0	11	11
Number of stream crossings to be removed from permanent system roads	0	0	0

Aquatic ecology is likely to be unimpacted by the proposed action. Although 24 new road-stream crossings are proposed, the overall impact in concert with FP, 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 FP 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 release/plant/seed; travel management projects; and special use authorizations.

Indicators 1 and 2: Miles of temporary road construction, miles of road decommissioning, road density; number of new stream crossings

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/forest management, 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 nonfederal landowners in the analysis area would continue to maintain their roads in their existing condition.

The Forestwide Travel Management Project (TMP) made decisions on the future uses of known unauthorized roads across the Forest. See appendix c for information on specific actions occurring in the project resulting from travel management. No new stream crossings on nonfederal lands were identified within the stream crossing analysis area. The 36.9 miles of road to be decommissioned (appendix e) within the project area would result in additional declines in road density.

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

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, currently there are no timber sales operating in the project area and none planned besides those analyzed in this environmental assessment.

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 alternatives 2 or 3 results in total young and open upland (federal and nonfederal ownerships) ranging from 7 percent to 32 percent in analyzed watersheds. Either of the action alternatives is not expected to produce substantial negative cumulative effects to water quality and watershed health as measured by indicator 3.

Figure 3.9-3: Percent Upland Watershed in Young and Open Condition in the Mesabi Project Area by 6th level watershed under existing conditions (2016), the No Action alternative (2031), and the Proposed Action (2031)

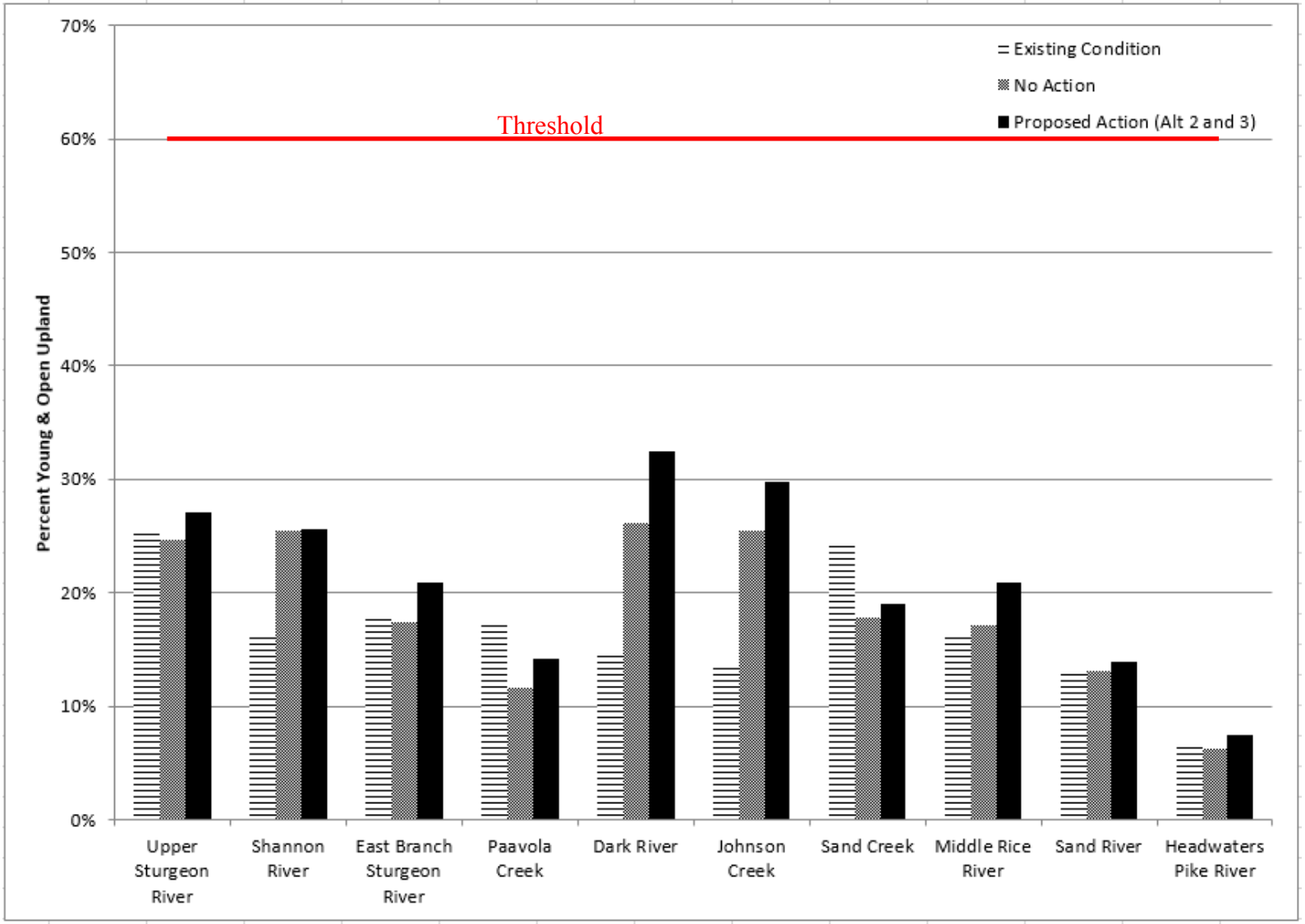


Table 3.9-5: Results of Indicator 3 Analysis for 6th Order Watersheds in the Mesabi Project						
6th Order Watershed Name	General Watershed Statistics		Indicator 3: Young and Open Upland			
	Area (acres)	Upland (acres)	Existing Condition: 2016 (%)	Alt 1 - No Action: 2031 (%)	Alt 2 - Proposed Action: 2031 (%)	Alt 3 - Proposed Action: 2031 (%)
Upper Sturgeon River	33,766	25,887	25.4	24.6	27.0	27.0
Shannon River	43,020	31,865	16.1	25.5	25.7	25.7
E. Br. Sturgeon River	39,535	28,181	17.7	17.4	20.9	20.9
Paavola Creek	10,156	6,459	17.5	11.6	14.1	14.1
Dark River	37,012	30,163	14.7	26.2	32.4	32.4
Johnson Creek	12,957	9,094	13.7	25.4	29.8	29.8
Sand Creek	24,772	15,702	24.6	17.8	19.1	19.1
Middle Rice River	21,854	16,722	16.4	17.2	21.0	21.0
Sand River	39,948	26,183	12.9	13.1	13.9	13.9
Headwaters Pike R.	24,764	15,791	6.8	6.2	7.4	7.4

3.9.6 Project-Specific Considerations: Herbicide

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. The herbicide proposal, (appendix h), outlines the restrictions and best management practices to be applied in use of herbicides. 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.
- **Sulfometuron Methyl** (2-[[[4-methoxy-6-methyl-1, 3, 5-triazin-2-yl) amino]-oxomethyl] sulfamoyl] benzoic acid methyl ester): a non-selective, sulfonyl urea herbicide used to control perennial and annual grasses as well as broadleaf plants.

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, non-ionic surfactants, such as Liberate™, Entrée™ or Activator90™, are proposed for use**.** To protect terrestrial adult frogs and toads; formulations of glyphosate which contain polyethoxylated tallow amine (POEA) surfactants would not be used.

3.9-6: Proposed Herbicides and Treatment Methods

Common Chemical Name	Example of Trade Names	Application	Surfactant
Glyphosate	Rodeo, Roundup, Accord	Boom Spray (Broadcast)	May be required
Triclopyr	Garlon 3A, Tahoe3A, Element 3A	Boom Spray (Broadcast)	Required
Sulfometuron Methyl	Oust, OustXP	Boom Spray (Broadcast)	None required

Herbicide (for example, triclopyr) has also been used to eliminate non-native invasive plant species Forestwide. Herbicide use has been approved in the Pelican, Pearl, Kabetogama, and Skibo EAs. Approximately 61 acres of herbicide treatments have been implemented in the Pelican area. To date, herbicide implementation has not occurred in the other areas. Past,

ongoing, and reasonably foreseeable future actions include the use of herbicide by MN DNR (62 acres over the past three years; none proposed for 2016).

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 a thorough review of the likely impacts that may be expected to aquatic resources.

Glyphosate:

Glyphosate is available in more than 50 formulations. Accord Glyphosate VMF, Accord Conc, Glypro AquaMaster, Rodeo, AquaNeat, Foresters and Glyfos Aquatic are among the less toxic formulations (SERA 2011a, table 5). Roundup is characterized in the report as having higher toxicity. A large and detailed body of literature is available on the effects of glyphosate and some glyphosate formulations to aquatic organisms. The toxicity of the original Roundup and similar formulations containing polyethoxylated tallow amine (POEA) surfactants is far greater than the toxicity of technical grade glyphosate, Rodeo, or other formulations that do not contain surfactants. Studies routinely find that aquatic organisms are not sensitive to glysophate; risks to amphibians and aquatic invertebrates appear to be insubstantial for the less toxic formulations.

Triclopyr/Garlon 3A:

Acid and salt formulation is slightly toxic to fish and aquatic invertebrates. Triclopyr acid has relatively low potential for bioconcentration. 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).

Sulfometuron Methyl:

Sulfometuron Methyl exhibits low bioaccumulation potential and generally low toxicity to fish and aquatic invertebrates. The SERA report on Sulfometuron Methyl states “if sulfometuron methyl is applied in areas where transport to water containing aquatic macrophytes is likely, it would be plausible that detectable but transient damage could be observed” (SERA, 2004). Indeed, aquatic plants appear to generally be more susceptible to this herbicide than aquatic animals. The offsite movement of sulfometuron methyl via runoff could be substantial under conditions that favor runoff, i.e., clay soils (SERA 2004).

3.10 NON-NATIVE INVASIVE PLANTS

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

3.10.2 Analysis Methods

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

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

This indicator is useful for distinguishing among alternatives because currently most 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.

3.10.3 Analysis Area

The area covered by the analysis of direct and indirect effects includes all lands administered by the Superior National Forest within the Mesabi 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 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 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.

3.10.4 Affected Environment

Table 3.10-1 displays the non-native invasive plants that are known to occur in the analysis area. This list was developed based on results from NNIP inventory data collected on the Superior

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

Mesic forested sites with shady understories on the Superior National Forest are fairly resistant to invasion by most NNIP. NNIP that disperse into such plant communities tend to get out-competed quickly by native shrubs, forbs, and trees. However, some NNIP are exceptions to this general observation. For example, common buckthorn and tatarian honeysuckle can thrive in the understory of mesic native plant communities. There is one known occurrence of common buckthorn in the project area, and three known occurrences of Tatarian honeysuckle in the 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 one percent of analysis area) mapped ELT 18 in the analysis area.

In general, the analysis area has a relatively high level of NNIP infestation (table 3.10-1). 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. Several high ecological risk species, spotted knapweed, Canada thistle, purple loosestrife, common buckthorn, and tatarian honeysuckle, are also present at different locations throughout the project area. Spotted knapweed and Canada thistle are found mostly along roadsides and in disturbed areas, and purple loosestrife, common buckthorn, and tatarian honeysuckle are found in riparian areas and lakeshores. The moderate ecological risk species, wild parsnip, common tansy and St. Johnswort, occupy primarily disturbed areas 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 3.10-1: Non-native Invasive Plants known in the Mesabi 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)	0.7	High
Canada thistle *Cirsium arvense*	P	Perennial, spread by seed and rhizome, occupies disturbed sites (Lym and Christianson 1996)	31.9	High
Bull thistle *Cirsium vulgare*	No status	Biennial, spread by seed, occupies disturbed sites (Lym and Christianson 1996)	2.0	Low
Orange hawkweed *Hieracium auranticum*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Callihan et al. 1982)	120***	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)	128***	Moderate
St. Johnswort *Hypericum perforatum*	No status	Herbaceous perennial; spread by seed and lateral roots, dry to mesic uplands (Krueger and Sheley 2002)	0.2	Moderate
Oxeye daisy *Leucanthemum vulgare*	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Krueger and Sheley 2002)	128***	Moderate
Tatarian honeysuckle *Lonicera tatarica*	No status	Perennial shrub spread primarily by bird dispersed berries, can colonize in forest areas (Czarapata 2005)	0.2	High
Purple loosestrife *Lythrum salicaria*	P	Aggressive herbaceous perennial; spread by seed and rhizome; wetlands and road ditches (MNDNR 2012)	15.5	High
Wild parsnip *Pastinaca sativa*	No status	Tap-rooted perennial, spread by seed; only flowers once; wide range of disturbed habitats (Czarapata 2005)	0.005	Moderate
Common buckthorn *Rhamnus cathartica*	R	Perennial, small tree, spread by bird-dispersed berries; can colonize in forest areas. (Czarapata 2005)	20.7	High
Common tansy *Tanacetum vulgare*	P	Herbaceous rhizomatous perennial, spread mostly by seed; disturbed uplands (LeCain and Sheley 2011)	46.6	Moderate

* P = Prohibited noxious weed (Minnesota Statutes 18.76 to 18.91) that must be controlled.
R = Restricted noxious weed (Minnesota Statutes 18.76 to 18.91) – importation, sale, transportation is illegal.
** 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.

3.10.5 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: modified proposed action

Direct, and Indirect Effects

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

Approximately 1.8 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, spotted knapweed, purple loosestrife, common buckthorn, and tatarian honeysuckle, are less common in the analysis area, but have a high ecological risk (table 3.10-1). These species can outcompete native vegetation and degrade wildlife habitat. Project activities would probably cause spotted knapweed and Canada thistle to spread, but most new infestations would be confined to disturbed areas. However, 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. For common buckthorn, purple loosestrife, and Tatarian honeysuckle, there are no proposed road actions near any of these infestations, so project activities are not likely to cause these species to spread.

Tansy, wild parsnip, and St. Johnswort have a moderate risk of ecological consequences. Project activities would probably cause new infestations of these species in disturbed areas such as along temporary roads. 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 all the new roads proposed in the 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 24.4 acres (135 sites) and 44.8 acres (373 sites) of weed treatments conducted in 2014 and 2015, respectively; similar acreage is expected to be treated in 2016. 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 3.10-2: Indicators for NNIP analysis

Indicator	Alt. 1	Alt. 2	Alt. 3
1. Miles of new upland road construction on NFS lands	0	1.8	1.8
2. Acres of treatment units within 50 feet of NNIP occurrence.	0	3,549	3,549

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

Approximately 3,549 acres of upland timber harvest 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 timber harvest. Spotted knapweed, tansy, and Canada thistle are all likely to spread as a result of treatment activities. For common buckthorn and Tatarian honeysuckle, project activities are not likely to cause these species to spread because there are no known infestations in treatment units or near enough to treatment units. For purple loosestrife, there is a small risk that project activities could spread purple loosestrife. Units 354 and 239 are each within several hundred feet of existing purple loosestrife infestations that could spread to the treatment units. These infestations would be treated before any proposed activities took place to reduce the risk of purple loosestrife spread. 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 2014 and 2015 to treat invasive plant infestations in the analysis area, which will help reduce the risk of future NNIP spread.

Herbicide use for site preparation and release proposed under alternative 2 has a risk of causing an increase of NNIP, particularly Canada thistle. This type of outcome has occurred occasionally on county and State reforestation projects. In 2012 monitoring of county reforestation efforts that used broadcast herbicide took place. Results of this monitoring (USDA Forest Service 2012) as well as conversations with county foresters suggest that use of Oust (Sulfometuron Methyl) for grass control can be associated with a big increase of Canada thistle at reforestation sites. To minimize this risk, NNIP that are near the 31 stands where this treatment is proposed will be treated in the future to reduce the amount of available NNIP seed sources. To the extent possible, Oust use would be minimized, and the effectiveness of broadcast herbicide use for reforestation would be monitored. These efforts should minimize the risk that there is a large increase in NNIP in these stands after broadcast herbicide treatments for reforestation.

Alternative 2 would have a greater risk of weed spread associated with vegetative treatments than alternative 1, but following operational standards and guidelines would minimize the risk of ecological consequences of NNIP spread due to management activities.

Alternative 3: no herbicide

Direct, and Indirect Effects

The only difference between alternative 3 and alternative 2 is that alternative 3 proposes to use mechanical site preparation rather than broadcast herbicide site preparation for 31 stands. Ground disturbance associated with mechanical site preparation can lead to NNIP spread, but generally the risk of a big increase of NNIP in one of these stands would be less for alternative 3 than alternative 2. Other than this minor difference, the indicators would be the same between alternatives 2 and 3, and effects of the two alternatives on NNIP would be very similar.

Cumulative Effects Common to All Alternatives

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

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

NNIP would continue to spread in the analysis area under all alternatives as a result of present and reasonably foreseeable actions on National Forest System land and lands under other ownership. Effects of NNIP would continue to be concentrated in developed areas (e.g. roadsides, gravel pits) and not undeveloped forestlands. Some road construction is likely on county or State lands in the analysis area. For example, some new roads could be built in connection with county or State timber harvest, and this could result in a small amount of NNIP spread. Other county road projects, like Folsom Road or McNiven Road, could result in a small amount of NNIP spread. Also, ongoing and future special use authorizations (appendix e) could also contribute to some small increases in NNIP along the special use roads. In contrast, the Superior National Forest Travel Management Project would result in fewer miles of road open to motorized recreation in the project area (appendix e), which would slightly reduce the risk of weed spread in the project area. Road decommissioning associated with the travel management rule (appendix e) would be beneficial and result in a small reduction in potential weed spread. Overall, road construction and use of existing roads could lead to small increases in NNIP infestation on both National Forest System land and lands under other ownership in the cumulative effects analysis area via spread along travel corridors for alternatives 1-3.

Timber harvest on non-federal ownership, such as future vegetation management on State lands (projected 555 acres of vegetation treatments) or St. Louis County lands (projected 1,178 acres of vegetation treatments – appendix e) or private timberlands would also make a small

contribution to the spread of NNIP. There are no ongoing federal timber sales within the analysis area. 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.

Minerals projects in the project area could also contribute to a small cumulative increase in NNIP. Ongoing and future iron ore mining at Minntac is described in appendix e. Disturbance associated with mine pit expansion could contribute to a small cumulative increase in NNIP.

In 2014, 24.4 acres of weed treatments occurred at 135 sites in the project area; in 2015, 44.8 acres of weed treatments occurred at 373 sites in the project area, and more would continue in the future. This is a beneficial effect with respect to NNIP spread. On April 27, 2006, Forest Supervisor Jim Sanders signed a decision to implement a Forest wide NNIP management EA, which would provide for treatments of NNIP in the project area (USDA Forest Service 2006) under all alternatives. Such treatments would minimize impacts from NNIP spread directly, indirectly, and cumulatively caused by project activities.

It is difficult to quantify a threshold for cumulative weed impacts. One way of approaching this question is to compare the abundance of NNIP on high risk sites in the project area to their abundance on high risk sites Forest wide. There are approximately 38.5 acres of NNIP infesting sites at increased risk of NNIP invasion (i.e. ELTs 7, 9, 11, 16, 17, and 18) in the analysis area. This represents approximately 22 percent of NNIP on high risk sites relative to the whole Superior National Forest. Unlike many projects on the Forest, the project has potential to be a major contributor to cumulative NNIP spread on the Forest. Operational standards and guidelines would minimize the risk of cumulative impacts of NNIP spread for the project.

Monitoring of a sample of Mesabi Project activities for NNIP spread (see appendix d) 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 Mesabi Project on NNIP would be negligible.

Projected climate change in the project area is also likely to contribute to cumulative effects (chapter 2). 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. The project area receives high recreational use and the cumulative effect of increased temperatures and trail use could potentially exacerbate NNIP populations in the area under future projected conditions.

3.11 RECREATION AND SCENERY

3.11.1 Introduction

The Mesabi Project Area offers a variety of both summer and winter recreational activities for Forest visitors. Recreation opportunities within the project area include numerous motorized and non-motorized trails, one developed campground, one primitive campground, one developed day use site and wayside, one developed day use site and beach, and approximately twelve small to moderate sized lakes used for fishing and boating.

This section outlines the recreation and scenery resources within the project area, and measures effects of proposed actions on recreation and scenic resources. Effects to recreation resources could be positive such as improved facilities including trails, campsites, and lake accesses. Conversely, the effects could be negative if these sites are not improved or protected from other proposed activities. Scenic resources throughout the project area can be enhanced by intentional vegetation management to convert areas to long-lived species such as pine, reducing brush for a better view of the forest beyond, or to create vistas that highlight natural openings such as lakes or long views to other attractive geographical features.

3.11.2. Analysis Methods

Indicator 1: Lineal feet of mechanical treatment adjacent to shorelines, trails, recreation sites, and roads with high scenic integrity objectives (SIO).

Lineal feet of mechanical treatment adjacent to trails, recreation sites, and roads will be used to compare effects to scenic resources among the alternatives because the quality of recreational experiences is often dependent upon the aesthetic character of the surrounding forest. A forest plan objective states that, "SIO boundaries lie at least ¼ mile from the actual location of travel ways, recreation sites and bodies of water with access" (FP p. 2-45, O-SC-1). Therefore, the SIO boundary considered in this analysis will include lineal feet adjacent to these sites. In addition, the quality of recreational experiences may be impacted by sights, sounds, temporary closures, and other intrusions which may occur during vegetation management activities. This indicator will help describe the different effects each alternative would have on scenery and the overall recreational experience adjacent to trails, campsites, and trails within the project area.

All project area recreation sites are listed in table 3.11-1, although only sites adjacent to harvest and prescribed burn units will be analyzed for direct and indirect effects. Furthermore, only treatments that change the character or appearance of a stand or require a temporary closure of a recreation site will be analyzed for effects to scenic resources and recreation sites. These include harvest prescriptions to create young forest such as clearcuts with reserves, coppice, and shelterwood cuts. This also includes treatments that maintain and enhance older forests such prescribed burning, thinning, and uneven age cuts. Effects from nonharvest treatments adjacent to recreation sites including fuel, release, and riparian treatments will not be analyzed in detail because they do not change the character of the existing forest to the extent that harvest activities would and have a short-term effect on the areas scenic resources.

In addition to measuring impacts from proposed vegetation management activities on existing scenic resources and recreation sites, three new recreation projects will be analyzed in the Mesabi EA as part of alternatives 2 and 3. These include the addition of campsites on both Moose and Sandy Lakes at popular user developed sites. There is also an opportunity to expand on new partnerships to plan and designate an additional seven miles of single-track mountain

bike trail in the Lookout Mountain Trail area. Improvements to this site would include trail corridor and tread construction and maintenance.

3.11.3. Analysis Area

The analysis area for direct and indirect effects covers recreation sites, trails, or roads within designated high SIO areas on National Forest System land that overlap mechanical treatment units. Only recreation sites with prescribed burning and mechanical treatment activity directly adjacent are considered because effects on recreation resources are expected to diminish rapidly beyond treatment boundaries. The analysis area for cumulative effects will include recreation sites, trails, or roads within high SIO areas on all ownerships in the project area. Recreation development on other ownerships within the project area is uncertain at this time.

The time period selected for analyzing the direct and indirect effects is over the reasonable and foreseeable future. This time frame is appropriate because effects of the project on recreation sites would occur predominantly while timber harvest or other project work is occurring. Effects from these activities would result from seeing and hearing mechanized activity, short-term closures due to proximity to prescribed burning, and smell of smoke. The greatest amount of noticeable change to scenery would occur directly after harvest from logging debris, site preparation activities, and changes in vegetation composition and structure. After several years harvested areas would revegetate and logging slash would have settled.

The time frame selected for analyzing the cumulative effects of the project is short term (one to ten years post-harvest) and long term (10 to 50 years post-harvest). Long-term effects would disclose changes in species composition and structure that relate to scenery, along with disclosing what would occur over time as a result of taking no management action compared to taking action.

3.11.4 Affected Environment

The Mesabi Project Area encompasses approximately 256,984 acres of land with mixed ownership; approximately 101,599 acres (40 percent) acres are National Forest System land. The project area has many residential and seasonal home and landowners.

The Forest Service uses management area direction as described in the 2004 Superior National Forest Land and Resource Management Plan (Forest Plan) to outline desired conditions, objectives, and standards and guidelines. Management areas (MAs) within the Mesabi Project Area include General Forest, General Forest-Longer Rotation, Recreation Use in a Scenic Landscape, and Candidate Natural Research Areas. Refer to chapter 1 for a map and brief description.

The project area does not include and is not adjacent to the Boundary Waters Canoe Area Wilderness (BWCAW); therefore, there would be no direct, indirect, or cumulative effects to the recreation resources of the BWCAW from this project.

The recreation resources that receive the most attention in the project area are trails for a wide range of uses including snowmobiling, ATV riding, hiking, biking, and skiing as well as a dozen well used dispersed campsites and boat accesses.

Table 3.11-1 lists all project area recreation sites and trails, their primary use, and the management area in which they are located. For more information on management areas refer to the FP, chapter 3.

Table 3.11-1: Project Area Recreation Sites		
Recreation Site	**Primary Use**	**Management Area**
Pfeiffer Lake Campground and Backcountry site	Campground, backcountry camping (hiking), picnic Area, boat ramp, and swimming beach	General Forest – Longer Rotation (LR)
Pfeiffer Lake Trail	Hiking	LR
Big Rice Lake	Primitive Campground, boat ramp	LR
Little Rice Lake	Carry in access	LR
Big Aspen Trail	Cross country skiing, hiking, ATV, mountain biking, equestrian	LR
Lake Leander Picnic Area	Picnic area and beach, carry in access	LR
Dark Lake Picnic Area	Picnic area and boat ramp	LR
Dark River Trail	Hiking and angler access	LR
Camp Four Lake	Backcountry camping (hiking access), carry in access	LR
Deepwater Lake Portage Trail	Hiking, ATV, backcountry camping	LR
Deepwater Lake	Carry in or ATV access	LR
Knuckey Lake	Boat ramp	LR
Clear Lake	Carry in access	LR
Shoepack Lake	Boat ramp	LR
Sturgeon River	Backcountry camping (hiking access)	LR
Sturgeon River Trail	Cross country skiing, hiking, backcountry	LR
Birch Knob Overlook	Overlook	LR
Taconite Snowmobile Trail	Snowmobiling	LR
Laurentian Snowmobile Trail	Snowmobiling	LR
Laurentian Snowmobile Trailhead	Snowmobiling	Recreation Use in a Scenic Landscape (RU)
Kinney Spur Snowmobile Trail	Snowmobiling	LR
Sand Lake Spur Snowmobile Trail	Snowmobiling	LR
Wolf Track Snowmobile Trail	Snowmobiling	LR
South Switch Snowmobile Trail	Snowmobiling	LR
Laurentian Divide Picnic Area	Picnic area	RU

Table 3.11-1: Project Area Recreation Sites		
Recreation Site	**Primary Use**	**Management Area**
Lookout Mountain Trail	Cross country skiing, hiking, mountain biking, single track mountain biking	RU
Giants Ridge Trail	Cross country skiing, hiking, mountain biking	RU
Wynne Lake Trail	Hunter/walking	RU

3.11.5 Environmental Consequences

Alternative 1: no action

Direct and Indirect Effects

For the recreation resources, alternative 1 proposes no new management activities to enhance the recreational resource; therefore, no recreation sites would be affected by harvest activity. Hazardous fuels would continue to build up reducing growth of long-lived conifer species in the Lookout Mountain area, the proposed project of adding an additional seven miles of mountain bike trail would not occur, nor would designating a backcountry campsite at Moose Lake and Sandy Lake. Taking no action would not move the project area toward forest plan desired conditions for recreation except for hazard tree removal being conducted for public safety within campgrounds, along trails, and near dispersed recreation sites.

For scenery, alternative 1 proposes no new management activities in the project area and therefore would not have any short-term management impacts on the existing condition of the scenery resource within high and moderate scenic integrity objectives (SIO) areas within the project area. Over the long term, visual effects of natural succession, especially dying balsam fir in the understory, would continue to increase; as would the potential for fire in large, continuous stands of dead understory.

Alternatives 2 and 3: modified proposed action and no herbicide alternative

Direct and Indirect Effects

Effects from vegetation management activities on the project area's scenic resources, particularly in areas with high scenic integrity objectives such as lakeshores, recreation sites, and trails are discussed in this section. The indicator "lineal feet of mechanical treatment adjacent to lakeshores, trails, recreation sites, and roads with high scenic integrity objectives" will be used to measure the potential impact of harvest activity on the area's scenic and recreation resources.

Alternatives 2 and 3 propose similar forms of vegetation management that have occurred in this area in the past and are expected in the area by many recreational users. Alternative 2 would have slightly less mechanical equipment impacts to scenery and recreation as herbicide application would be used in lieu of mechanical site preparation with fewer follow up release treatments. Areas in alternative 3 that would receive herbicide application would be signed to inform the public and may have a temporary impact while the vegetation has turned brown and dying prior to next season growth. All other actions between alternative 2 and 3 would be the same, thus resulting in the same direct and indirect effects.

The greatest amount of noticeable change to scenery would occur directly after harvest and prescribed burning from logging debris, evidence of fire on vegetation, site preparation activities, and changes in vegetation composition and structure. Over time, harvested areas would revegetated and logging slash would settle. Prescribed burn areas would likely green up within one growing season and be less noticeable after full green up and snow seasons. Vegetation management activities would help move scenic resources towards FP desired conditions by improving species diversity and transitioning areas of harvest towards a greater component of large, mature trees including long-lived conifers.

The greatest impact to recreation would likely be short term from prescribed burning activities where trails would need to be closed to provide for public safety during and immediately following prescribed burn, as well as a short-term impacts to recreationists from smoke.

Alternatives 2 and 3 would also increase recreation opportunities in the project area with proposals to add two backcountry campsites on Moose and Sandy Lakes adding seven miles of single-track mountain biking trails at Lookout Mountain, and allowing ATV and UTV use on FR 278.

Trails

Approximately 16 miles of trail within the high SIO areas would have noticeable visual impacts due to harvesting activities; of these approximately 12 miles could also have some type of secondary prescribed burn treatment. Table 3-11-2 displays the sections of trails within high SIO areas that could have direct effects to scenery and recreation from vegetation management. Hiking, biking, and walking trails could be closed for short durations during and immediately following prescribed burns. Site-specific treatments along the trails at Lookout Mountain may include cutting, piling, and burning of balsam fir and unit wide prescribed burning.

Table 3.11-2: Sections of Trails within High SIO Areas Adjacent to Treatments in Alternatives 2 and 3					
Trail Name	**Trail Type**	**Miles within Treatment area**	**Primary Use**	**ID**	**Treatment Type**
Big Aspen Spur C	Standard/ Terra Trail	0.5	Cross Country Ski	10262c	Harvest
Big Aspen Spur D	Standard/ Terra Trail	0.2	Cross Country Ski	10262d	Harvest
Birch Knob Spur	Snow Trail	0.05	Snowmobile	11258	Harvest
Little Sandy Lake Spur	Snow Trail	0.3	Snowmobile	10187b	Harvest
Taconite	Standard/ Terra Trail	0.4	Snowmobile	90189	Harvest
Taconite	Standard Terra Trail	0.1	Snowmobile	90189	Harvest
Taconite	Standard/ Terra Trail	0.1	Snowmobile	90189	Harvest
Taconite	Standard/ Terra Trail	0.1	Snowmobile	90189	Harvest
Taconite	Standard/ Terra Trail	0.1	Snowmobile	90189	Harvest
Taconite	Standard/ Terra Trail	0.3	Snowmobile	90189	Harvest
Virginia Spur	Snow Trail	0.2	Hiker/ Pedestrian	11245	Harvest
Wolf South Switch	Snow Trail	0.6	Snowmobile	11364	Harvest
Wolf Track	Snow Trail	1.0	Snowmobile	11002	Harvest
Total Miles Impacted by Harvest		3.95			
Big Aspen Spur A	Standard/ Terra Trail	1.6	Cross Country Ski	10262a	Harvest And Rx
Big Aspen Spur Aa	Standard/ Terra Trail	0.7	Cross Country Ski	10262aa	Harvest And Rx
Big Aspen Spur B	Standard/ Terra Trail	0.5	Cross Country Ski	10262b	Harvest And Rx
Big Aspen Spur F	Standard/ Terra Trail	0.1	Cross Country Ski	10262f	Harvest And Rx

Table 3.11-2: Sections of Trails within High SIO Areas Adjacent to Treatments in Alternatives 2 and 3					
Trail Name	**Trail Type**	**Miles within Treatment area**	**Primary Use**	**ID**	**Treatment Type**
Big Aspen Spur G	Standard/Terra Trail	0.1	Cross Country Ski	10262g	Harvest And Rx
Laurentian Snowmobile	Snow Trail	1.2	Snowmobile	10187	Harvest And Rx
Pfeiffer Lake	Standard/Terra Trail	1.3	Hiker/Pedestrian	10019	Harvest And Rx
Sand Lake Spur	Snow Trail	0.7	Snowmobile	10187a	Harvest And Rx
Sand Lake Spur Tac	Snow Trail	0.3	Snowmobile	90189a	Harvest And Rx
South Dark River	Standard/ Terra Trail	2.7	Hiker/Pedestrian	10180	Harvest And Rx
Taconite	Standard/ Terra Trail	1.0	Snowmobile	90189	Harvest And Rx
Taconite	Standard/ Terra Trail	0.1	Snowmobile	90189	Harvest And Rx
Taconite	Standard/ Terra Trail	0.3	Snowmobile	90189	Harvest And Rx
Taconite	Standard/ Terra Trail	1.4	Snowmobile	90189	Harvest And Rx
Total Miles Impacted by Harvest with Secondary Prescribed Burn		12.0			
Taconite	Standard/ Terra Trail	1.0	Snowmobile	90189	Prescribed Fire
Taconite	Standard/ Terra Trail	0.05	Snowmobile	90189	Prescribed Fire
Total Miles Impacted by Prescribed Burn		1.05			

To protect and enhance scenic values along the trail, all adjacent harvest units would follow FP guidelines including: Temporary openings will be similar in size, shape, and edge characteristics to natural openings in the landscape being viewed. Or, temporary openings will mimic a natural disturbance process typical for the area so that when ground cover has been established the opening appears to be a natural occurrence (FP p. 2-46, G-SC-1). Furthermore, evidence of temporary activities such as staking, paint, flagging, equipment maintenance, and staging areas should be minimized, removed, or cleaned up immediately following project completion (FP p. 2-47, G-SC-4) in high SIO areas adjacent to trails.

Where harvest occur along an active trail or trail system, mitigation measures in harvest specifications would include avoiding use of system trails for hauling/skidding logs, minimizing crossing skid trails over system trails, placing safety signing to warn recreationists of activities in the area, piling slash and other logging debris out of view of recreation sites and trails, and scheduling activities during low use periods (FP p. 2-41 G-REC-2).

Visitors would see a short-term change in the landscape to more open stands and burned ground and very short-term smoke. Prescribed burned areas would quickly recover with new vegetation growth. In addition, during the implementation of these treatments visitors should expect to see short-term impacts that may include temporary closures on the hiking, fitness, and mountain bike trails. These treatments are designed to remove the hazardous fuels of dead and dying balsam fir, slow the balsam seed source, encourage oak and other hardwoods, and move the site towards more longer-lived species including red and white pine.

Benefits to trail users post-harvest would include openings in the forest which helps break up the trail riding experience between densely wooded segments of trail to areas that provide vistas. Additionally, harvest including brushing along some portions of the trail for logging truck access keeps the route cleared to the width specified for safety and ease of passage and grooming, a task that is typically paid for and conducted by volunteers.

Project Area Recreation Proposals:

Sandy Lake/Little Sandy Lake

Current use has caused resource damage where the public accesses Sandy/Little Sandy Lakes, which is currently not a designated recreation site. To accommodate current use patterns and address resource damage, the project's proposed action is to officially recognize, designate, and manage this site as a backcountry campsite. This project analyzed creating an access route to the lake and designating a campsite near the lake access.

Discussions with affected landowners near Sandy Lake during this project determined that there is little interest in providing a permanent easement to cross private property on the route to the lake. Without a permanent easement it has been determined that further development of this public access and campsite cannot be implemented at this time. Designating and managing a public access to Sandy/Little Sandy Lakes and campsite near the lake will be a pending action based on whether or not access issues can be resolved or a different access route developed. We intend to repair the resource damage occurring on National Forest System lands along this route and monitor public use. We also intend to continue discussions with affected landowners and other partners about easements for the lake access route.

One public comment was received regarding the development of a new public water access on Rosendal Lake. It was considered but eliminated due to several factors including the small size of the lake, amount of work needed to pursue a private property easement, costs involved in developing a new road and water access, limited number of new public water accesses allowed per forest plan direction, and the overall cost-benefit ratio of developing a new access on a small lake.

Moose Lake Backcountry Site

Moose Lake is a wild rice and waterfowl hunting lake that receives a moderate level of use. This site is currently not a managed recreation sites; therefore, resource damage is occurring. To accommodate current use patterns and to address resource damage, alternatives 2 and 3 would

designate and manage this as a backcountry campsite. Changes needed to create the site include brush clearing, flattening and improving of tent pads, and installation of a fire ring and latrine.

Beneficial effects of this project would be managed instead of unmanaged use at this popular recreation site. Determining campsite boundaries and installing minimal facilities such as tent pads, a fire grate, and wilderness style latrine would concentrate visitor use on durable surfaces. Because of this design and management, under alternatives 2 and 3, recreation use would meet FP objective REC-1.

Lookout Mountain Single-Track Mountain Bike Trails

There is an opportunity to build upon and expand a new partnership and trail experience with single-track mountain bike trails at Lookout Mountain. In partnership with local volunteers seven miles of single-track mountain bike trail was constructed from 2014 to 2016. There is interest and an anticipated demand for additional single-track mileage. To accommodate increased use and enhance trail opportunities, the project's proposed action is to plan and designate an additional seven miles of single-track mountain bike trail in the Lookout Mountain Trail area. Improvements to this site would include constructing and maintaining a narrow trail corridor (4-6 foot wide) and a constructed trail tread (4 foot wide) by removing brush and small vegetation. No large trees will be removed as a part of this trail construction. Because of this design and management, under alternatives 2 and 3, recreation use would meet FP objective RTL-1.

Forest Road 278 Open to Mixed Motorized Use

Engineering has completed a mixed motorized use analysis for FR 278 to allow both highway licensed vehicles and ATV/UTVs on this road. This project includes the analysis and decision to allow ATVs and UTVs on FR 278 following the engineer's recommendations for safety mitigations. The Forest motor vehicle use map will be amended based on this decision to allow all motorized uses on FR 278.

3.11.6 Cumulative Effects of Alternatives 2 and 3

The cumulative effects analysis includes a discussion of past actions as well as reasonably foreseeable future actions inside and outside the project's high SIO areas. The discussion includes short-term (one-year) and long-term (ten plus years) effects. In the short term, some visitors traveling in the project area would observe an increase in temporary openings and a loss of mature vegetation as a result of harvest activities. Over the long term, visitors would see a greater amount of younger trees in the analysis area as the harvested stands begin to revegetate with these younger age classes found in larger patches of forest. In the first ten years post-treatment, openings in the forest created by management activity would be noticeable. Beyond ten years, these openings would revegetate through natural processes or by intentional planting. Management of these stands may continue within or beyond ten years to release the longer-lived species helping them become more established; these actions would have no impact on scenic character.

Minimal harvest is expected to occur on other ownership within the project area. The State of Minnesota has approximately 555 acres scheduled for harvest in units spread out across the project area. Approximately 14,494 acres of State land has been treated in the past 15 years, with nothing planned for 2016. Harvest activities on private land are generally small in scale and

are typically not noticeable. There are no other planned or approved SNF projects within the high SIO areas that would result in known future changes to the scenery.

The combined effects of fire suppression and forest succession have created stands with dense balsam fir and underbrush in some areas. Proposed activities in alternatives 2 and 3 would improve scenery (enhance big-tree character) and create openings through harvest or prescribed burning to mimic past disturbances and contribute to forest health and diversity. Alternative 1 would not include any activities to enhance big-tree character, reduce fuel loads, or manage for plant diversity.

There will likely be other State and county lands harvested within or adjacent to the project area that may result in short-term effects to the scenery resource. The combination of effects resulting from past, present, and future activities would impact the analysis area more than the effects resulting from each activity individually. However, cumulative effects of any past, currently proposed, and reasonably foreseeable future actions represent minimal change to the project areas high SIO resources.

3.12 OTHER DETERMINATIONS

3.12.1 Heritage Resources

3.12.1.1 Introduction

Historic properties are discrete locations on the landscape which display evidence of past human activities. Traditional cultural properties (TCPs) are districts, sites, buildings, structures, or objects that are valued by a living community for the role they play in sustaining the community's cultural integrity (King 2004:363). An example of a historic property would be an early 20th century logging camp and its associated artifacts and building remains. An example of a TCP would be a wild rice stand which has been annually harvested by a distinct, living community for the past 100 years. For the purposes of this analysis, the term heritage resources or heritage resource site will refer to both of these aforementioned property types.

This report evaluates the potential effects on heritage resources of the alternatives, including the no-action alternative (Alt. 1). The Regulatory Framework Section briefly describes the federal laws, guidelines, and procedures associated with management of heritage resource at a federal level. The Analysis Parameters section briefly describes the field methods, procedures, and the indicator used to measure the potential effects associated with proposed project. The Analysis Area section describes the geographic area and timeline considered during this analysis. Information presented in the Affected Environment section is the basis for the analysis of effects on heritage resources, presented in the Environmental Consequences section.

Over the last thirty-eight years, the Forest has conducted archaeological field surveys throughout the entire Mesabi Project Area. The Forest Service fully intends to avoid impacts to all heritage resources which are currently unevaluated, or eligible to the National Register of Historic Places. Mitigation measures include delineating heritage site boundaries within or adjacent to treatment units prior to ground disturbing activities and instructing field operation personnel to avoid delineated areas. Post-treatment monitoring would ensure compliance with, and effectiveness of, these mitigation measures.

3.12.1.2 Analysis Methods

One indicator was utilized in the effects analysis of heritage resources within the project area.

Indicator: Presence of recorded heritage resources in or adjacent to treatment units

This indicator does a good job of highlighting the difference between the alternatives because it compares the amount of potential disturbance to heritage resource sites that may occur as a result of proposed management activities.

3.12.1.3 Analysis Area

When a project is proposed on the Superior National Forest, heritage resource specialists assist in the analysis of potential project effects. Heritage analysis includes 1) review of historic documents, archival materials, historic aerial photographs, past heritage survey coverage, and overviews relevant to the project area; 2) analysis of the proposed project and its potential to adversely affect heritage resources; 3) review of public comments concerning the proposed project and its potential effect; and 4) consultation with interested parties including tribes, descendent communities, heritage advocacy groups, and the Minnesota State Historic Preservation Officer. Through this analysis, heritage resource specialists determine whether the project is an "undertaking" which has the potential to affect heritage resources within the project area.

A project is determined to affect a heritage resource site when activities alter, or have the potential to alter, the characteristics that qualify it for inclusion in the NRHP. These characteristics may include (but are not limited to) factors such as setting, location, design, materials, workmanship, feeling, and association. Destruction or alteration of all or part of an eligible or unevaluated historic property is considered to be an adverse effect which, in turn, requires mitigation and consultation in accordance with 36 CFR 800.5 of the NHPA. In addition to determining whether there are potential effects associated with a project, heritage resource specialists, in consultation with MN SHPO, also determine the project's area of potential effect (APE). The APE is the geographic area in which a project may alter or adversely affect heritage resources via the proposed undertaking.

After determining the project's APE and confirming that actions associated with the project have the potential to adversely affect heritage resources, heritage specialists determine if the existing data concerning cultural resources is sufficient for the proposed project. If the information is determined to be insufficient to address the potential impacts to heritage resources, then additional surveys and/or research is carried out. Heritage resource surveys and evaluations are carried out in accordance with current national guidance and professional standards as stated in the 2004 Superior National Forest Plan (2-39/S-HR-1 & 2).

Two types of survey methodology that are utilized by heritage resource professionals on the Superior National Forest include block and ground surveys. Block surveys utilize helicopter flyovers to identify clearings and/or building remains associated with historic homesteads, logging camps, and linear features such as railroad lines. Heritage resources identified during a block survey are subsequently ground verified and mapped. Block surveys have been conducted on approximately 94 percent of the NFS land within and surrounding the Mesabi Project Area.

Ground surveys are conducted in areas which exhibit high-medium probability for buried archaeological sites. Such areas include islands, lakeshores, river margins, glacial features such as beach benches, and historic trail corridors. Ground survey methods include surface walkover and sub-surface testing via shovel probes as allowed. Some level of ground surveys have been

completed on the major rivers, streams, lakes, and identified glacial features within the project area. A total of 7,229 acres have been intensively surveyed within the project area.

3.15.1.4 Affected Environment

Since 1978, 110 heritage resource surveys have been conducted within the project area. Performed in conjunction with earlier Forest Service management activities, these surveys were conducted by professional cultural resource specialists and complied with all applicable federal laws and standards. Included in this survey coverage are approximately 73 block surveys and 37 intensive surveys. Approximately 840 acres of land within the project area have been ground surveyed by intensive methods. As mentioned in the analysis methods section, ground surveys are completed on areas which exhibit medium-high potential for buried archaeological materials. Block surveys, conducted by helicopter flyovers, have been completed on 98 percent of the land surfaces within the project area.

Twenty-four heritage sites are located within or immediately adjacent (less than 20 meters) to the proposed projects' prescription units (table 3.12-1). The identified heritage sites in the project area are 19 historic types, with the remaining sites being subsurface pre-historic types. Multi-component heritage sites exhibit artifacts and/or features attributed to both historic and pre-historic occupational periods. There are two multi-component sites within the Mesabi Project Area.

Heritage resource sites in the project area consist of early-mid 20th century logging camps; homesteads; CCC/Depression features; Forest Service administration structures; and prehistoric Native American sites of unknown temporal affiliation.

Table 3.12-1: Number of Known Heritage Resources in/adjacent to Prescription Units[1]

Historic	Pre-historic	Multi-Component	Total
19	2	2	24

[1]Through May 2016

3.12.1.5 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 ground disturbing activities.

Alternatives 2 and 3: modified proposed action or no herbicide

Direct, and Indirect Effects

Activities associated with these alternatives present potential direct effects to heritage resources. Vegetation treatment activities such as tree falling, prescribed burning, skidding, slash disposal, and the construction/rehabilitation/closure of temporary roads all present potential threats to heritage resources. Reforestation measures can also affect heritage resources through ground disturbing activities associated with site preparation and planting. Indirect effects associated with all action alternatives may include increased access to, and visibility of, heritage resources due to the thinning of trees/shrubs near the site. Extensive literature search, consultation, and

thorough field surveys have revealed 24 heritage sites within or adjacent to the area of potential effect (APE) for this project's proposed prescription units.

Under the action alternatives, impacts to all heritage resource sites would be avoided through standard measures of protection pursuant to the 2004 Superior National Forest Plan (2-39/S-HR-9). Recorded and newly discovered heritage resource sites would be avoided during implementation. Heritage resource sites would be excluded from the activity units, with the boundaries marked as appropriate in the field prior to project implementation. This would eliminate direct effects to the heritage resource. Post-treatment monitoring of mitigation measures (site buffers) and maintenance of confidentiality with respect to heritage resource locations would effectively eliminate post-treatment impacts; thus, heritage resources would experience no indirect effects under all alternatives.

The Forest Service's direction to avoid all eligible and unevaluated heritage resources on NFS land inherently eliminates any direct effects to known heritage resources. Indirect effects are also avoided by consideration of potential physical consequences of management activities and by implantation of post-treatment monitoring to assure the effectiveness of the recommended mitigation. Should previously unknown heritage resources be identified during project implementation, those sites would be reported to the heritage program manager and appropriate measures would be taken to ensure their protection in consultation with the MN SHPO. Forest Service timber sale contracts contain enforceable measures for protecting any previously undiscovered heritage resource that might be encountered during treatment operations.

The Superior National Forest has a signed programmatic agreement (PA) with SHPO that directs the types of survey and consultation for heritage resources. The heritage review procedures have been reviewed by SHPO and are consistent with the provisions of the draft PA. The direct, indirect, and cumulative effects of the action alternatives on heritage resources have been evaluated following the provisions of the PA. Based on the completed surveys, including data review and analysis, the Superior National Forest Heritage Program concludes that, with implementation of the specified mitigation measures, there would be no effects to heritage resources under either action alternative.

Cumulative Effects of Alternatives 2 and 3

Implementation of mitigation measures (such as "flag and avoid"), post-treatment monitoring, and maintenance of confidentiality with respect to heritage resource locations would effectively eliminate direct and indirect effects as they relate to the action alternatives of the Mesabi Project. Thus, there would be no cumulative effects to heritage resources, as all potential direct and indirect effects would be mitigated.

3.12.2 Wilderness

The Forest Service has the responsibility to protect the wilderness character of the Boundary Waters Canoe Area Wilderness (BWCAW). The Mesabi Project is not adjacent to the BWCAW. At its closest point the BWCAW is approximately 10 miles from the Mesabi Project boundary (see location on project vicinity map, Figure 1.2).

Alternative 1 would have no impacts to the Boundary Waters Canoe Area Wilderness. Alternatives 2 and 3 would have no impacts to the BWCAW due to the distance between the project area and the BWCAW. The Mesabi Project boundary is approximately 8.0 miles from the BWCAW, at its closest point. 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.

3.12.3 AIR QUALITY

3.12.3.1 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. Humans have interrupted the historical frequent, low-intensity fire regimes through suppression on all land (including the Mesabi Project Area). This increased the amounts of fuel, both living and dead, that are available to burn should a wildfire occur.

3.12.3.2 Analysis Methods

A qualitative description of smoke effects generated during prescribed burning activities will be used to address effects to air quality.

3.12.3.3 Analysis Area

The analysis area used for this resource is the project area. This area was chosen because most proposed prescribed burns would be done on days when smoke would dissipate rapidly. Mesabi prescribed burns would be implemented during the next ten years, so any effects from burning would occur during that time period. Actual duration of effects from smoke would generally occur on the day when the burn was implemented and effects would be of short duration due to wind dispersing the smoke. Some minor smoldering may be evident several days after the burn. Moreover, smoke may or may not impact areas with human occupation depending on the direction of the wind. If necessary, a preferred wind vector can be identified in subsequent burn plans to reduce smoke impact on these areas.

3.12.3.4 Affected Environment

Existing Air Quality

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 24-hour 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).

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.

Wildfire is also a source of air emissions (smoke). Wildfires occur most often in the spring, when humidity is low and fuel is cured from dying off last fall. Wildfires are also likely to occur during the late-summer/early-fall during periods of drought; however, some wildfires also occur in the summer. In the spring, summer, and fall, another source of smoke emissions is from private and public landowners burning brush piles. In addition, the public can sometimes observe and smell smoke from intense wildfire activity in Canada.

Problems arise when smoke drifts into areas of concern, called "sensitive receptors." Sensitive receptors are locations where human population tends to concentrate and where smoke and air pollutants can adversely affect public health, safety, and/or welfare. Sensitive receptors may be a single residence, a group of residences, towns, and areas where people may tend to gather such as campgrounds and parks. Private property with homes and seasonal cabins are scattered throughout the project area. Higher densities of homes and cabins surround some lakes in the project area.

3.12.3.5 Environmental Consequences

Alternative 1: no action

Direct and Indirect Effects

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 combustion but often smolder after the main fire has passed, and have a higher potential to emit large amounts of residual smoke.

Alternatives 2 and 3: modified proposed action alternative and no herbicide

Alternatives 2 and 3 would utilize prescribed fire to reduce hazardous fuels, prepare sites for seed establishment, meet ecological objectives, and dispose logging slash. Both alternatives would burn the same units with the same prescriptions. Alternatives 2 and 3 would underburn 3,442 acres on 132 units; broadcast burn 2,571 acres on 107 units; pile burn approximately 1,500 timber harvest piles on portions of 7,498 acres in 258 units; and pile burn up to 27,000 fuel treatment piles on portion of 537 acres in 12 units. Timber harvest piles are piled with machinery where two piles are created for every 10 acres harvested. Machine piles are typically 20' by 20' and 15' in height. They consist of branches and unmerchantable pieces of wood. Fuels treatment piles are piled by hand where 50 piles are typically created for every acre treated in areas with a thick, dense component of balsam fir. The number of piles per acre is dependent on the amount of material being treated. Hand piles are typically 10' by 10' and 8' in height. These piles are primarily balsam fir trees of all diameters. The trees are limbed and the boles are cut into four foot lengths. Hand piling is typically used in areas adjacent to recreation areas and

dense populated areas where visual quality is of concern due to potential damage to residual trees from heavy equipment.

Proposed burning is expected to generate smoke emissions but these emissions would be mitigated by using guidance in the MN Smoke Management Plan (MN Smoke Mgmt. Plan 2016) and the Superior National Forest Air Quality Analysis for Burn Plan Preparation for prescribed burns. All prescribed burning would follow the Minnesota Smoke Management Plan that was developed to prevent adverse smoke impacts. Prescribed burns can utilize wind vectors that do not blow in the direction of sensitive receptors. Also, burning on days with a smoke dispersion index of "fair or better" and reducing acreage burned per day helps mitigate smoke effects and emissions to the sensitive receptors downwind. Larger burn units could be broken into several smaller units and burned over several days. Pile burning exhibits more complete combustion (hence producing fewer emissions) than underburning or broadcast burning since more of the burning happens in the flaming phase than the smoldering phase (NWCG 2001). Muliple piles can be burned at the same time without exceeding any health standards. In addition, prescribed burning would occur over a ten year period regardless of the alternative selected. Subsequently, fire emissions from the project would be released over a number of years versus a few days with a wildfire. Prescribed burning, either as a primary or secondary treatment, would also reduce the potential for crown fire in these stands; meaning any subsequent wildfire would likely only be a surface fire. Surface fires in general consume less fuel; therefore, emitting less particulate matter and other air pollutants.

Smoke effects 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.

Wildfires would still be possible; however, fire behavior would decrease on the sites treated.

Cumulative Effects

Prescribed burning activities in both alternatives 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. For best results, underburns are usually conducted in the spring before the ground vegetation fully leafs out. 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.

Prescribed burns would not impact the air quality or exceed any health standard in the BWCAW which is a Class I Airshed due to the burn distance to the BWCAW and the small burn size which would emit less particulates matter into the air. Most burn units are located more than nine miles away from the BWCAW; while the closest burn unit is located five miles from the BWCAW. Transport winds would dilute and disperse smoke emissions before it reaches the BWCAW. People in the BWCAW may smell smoke from the 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.

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 the Minnesota contributes about five one-hundredths percent of the degradation to visibility in the Class I Airshed in the BWCAW (Travel Management Project Supplemental EA, project file). Neither of the alternatives would contribute to degradation of visibility quality of wilderness character.

3.12.4 Gravel

3.12.4.1 Introduction

All saleable material from gravel pits are referred to collectively as mineral materials, encompassing 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, and site development for both public and private facilities. The Mesabi Project Area has a higher concentration of private land than other areas of the Forest. This diverse property ownership landscape creates a demand for aggregate within the project area. The project proposes to approve the extraction of gravel from thirty existing gravel pits and close and reclaim six pits. These gravel pits are in various locations within the project area. See the Transportation Map for locations.

3.12.4.2 Background

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

D-MN-1: 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). (SNF Forest Plan, pages 2-9)

D-MN-2: 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. (SNF Forest Plan, pages 2-9)

S-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.

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 3.12.4.1 and is based on past and anticipated needs. The thirty pits in the project area encompass approximately 33 acres. Implementation of an action alternative may increase that area by 332 acres for a total of 365 acres. This total acreage is based on potentially available material at each source if each source were excavated to depletion. The actual amount of material removed and resulting surface disturbance is highly variable year to year and dependent on many factors. For the purpose of this analysis, each pit authorized for use under an action alternative is assumed to expand by two acres over the next 10 years. The amount is reasonable given the highly variable nature of use and demand for material in the project are. If any project requires disturbance beyond this amount, additional analysis will be required. Using the assumed two acre expansion at each of the twenty six pits, a total new disturbance under an action alternative is sixty (60) acres.

Mineral material sources are found throughout the Mesabi Project area. Most glacial deposits in the project area are associated with the Rainy Lobe of the Laurentide Ice Sheet that advanced over the area during the early to middle Wisconsin Age (approximately 75,000 years ago to 10,000 years ago). The gravel pits are located within various types of glacial deposits; mainly ground and end moraines that formed during this time frame. These types of glacial deposits, along with eskers and outwash fans, are typical locations 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 for gravel from the project area is for relatively small volumes of material for construction, reconstruction, and maintenance of roads and trails. There is also some demand for small construction projects such as parking areas and boat ramps and for the development of private land: septic systems and driveways. The demand for gravel for projects on private land will more than likely stay the same. The historic use of the pits in the project area has averaged approximately 1,100 cubic yards per year. The demand for gravel will increase in the next several years as the need to resurface existing National Forest System roads is addressed. The projected increase in the project area is 10,000 to 15,000 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 (see appendix d for an example).

The Forest Service collects a minimum fee of $0.95/cubic yard for crushable material from the pits within the project area; however, some material can cost more if the material is of high quality. Purchasers are given the option of contributing $0.15/cubic yard to a resource recovery/reclamation (RRR) fund in lieu of completing resource recovery and reclamation after material extraction. The RRR fund 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 action alternatives, the thirty gravel pits would be approved for extraction of mineral material. Pit management plans would be developed per Forest Service manual guidance to provide direction for pit development, expansion, and rehabilitation. Specific mitigations would be included in the pit development plan and implemented at each pit based on relevant NEPA 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 needed for several years and may not be developed at this time depending on future needs of material and location of other pits in the area. See table 3.11.5-1 for information on the potential estimated size for expansion and material available for each pit.

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

Because gravel use is an on-going activity in the 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 thirty pits have been in operation for at least 10

years. Besides the anticipated need for gravel for administrative use (resurfacing Forest roads) 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 and appropriate NEPA analysis would be completed prior to use.

Table 3.12.4-1: Proposed Action: Mineral Materials

Pit Name	Approximate Disturbance (acres)	Potential For Expansion (acres)	Pit Type	10yr Use* (cubic yards)
Buhl	4	12	Continuous Use	7,571
Hwy 25	0.8	3.6	Administrative	0
McNiven	0.25	1.5	Continuous Use	0
Severson Lake	Limited	3	Continuous Use	0
469 Pit	0.71	5	Continuous Use	505
Chalet	<0.70	0	Continuous Use	0
Balkan	0.9	6.5	Continuous Use	0
Lostman	0.7	15.6	Continuous Use	0
Giants Ridge	0.82	0	Continuous Use	5
Zimmerman	0	1	Administrative	0
Horseshoe	1.9	0	Continuous Use	5
Shoepack	1.9	6	Continuous Use	117
Laurentian Trail	0.3	14	Administrative	0
Hwy 53	0	10	Undeveloped - Close	0
Jean Lake	0.3	9	Continuous Use	10
306	0	13	Undeveloped - Close	0
Sugar Sand	0.1	3.4	Continuous Use	0
Dark River	0.4	2.5	Continuous Use	0
Jammer Lake		60+	Preference Right	0
Luna Lake	0.3	0	Reclaim	0
High Line	1.5	13.3	Continuous Use	5
Gate Lake	0.4	16.4	Continuous Use	0
Ski Trail	0.36	18.6	Administrative	0
Candle Lake	0.75	39.8	Continuous Use	0
Rice River	3.2	24.6	Continuous Use	480

Table 3.12.4-1: Proposed Action: Mineral Materials				
Pit Name	**Approximate Disturbance (acres)**	**Potential For Expansion (acres)**	**Pit Type**	**10yr Use* (cubic yards)**
Raspberry	0.5	0	Continuous Use	25
Flowers	0	34	Continuous Use	0
Hernesmaa	0.3	0	Reclaim	0
Chocking Fox	<0.1	0	Reclaim	0
Maki Creek	0.3	5.7	Continuous Use	0
Pfeiffer Lake	1.8	12.8	Continuous Use	2,350
Taconite Trail	0.2	0	Continuous Use	0
Lehtinen Creek	0.3	0	Reclaim	0
Wolf Track	0.3	25	Continuous Use	0
259F	0.41	12.6	Continuous Use	120
County 420	8.25	29.7	Continuous Use	0
Little Lost Lake	0.42	16.8	Administrative	0
* Use or material extracted over last ten years from the pit as recorded through NRM mineral material permitting system.				

3.12.5 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. 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 Mesabi Project: This is a list of the core interdisciplinary team (IDT).

Terri Thomas, Project Co-Team Leader
Linda Merriman, WZ NEPA Planner and Co-Team Leader
Dan Ryan, Wildlife Biologist and Co-Team Leader
Ryan Siebold, Silviculturist
John Galazen, Forester (West Zone Fuels Planner)
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This is a list of the extended IDT. Some assisted with only a portion of the Mesabi Project and others served in a review or ad hoc role.

Marty Rye, Forest Hydrologist
Jason Butcher, Forest Fisheries Biologist/Aquatics Ecologist-Mid level
Peter Taylor, Environmental Coordinator
Jon Van Alstine, Geologist
Timo Rova, WZ Fire Management Officer

4.2 DISTRIBUTION LISTS

Scoping Package

In August 2015, a scoping letter requesting comments was mailed to nearly 2,000 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=44466 . The mailing lists contain the names for the Mesabi scoping letter is in the Mesabi project record.

Environmental Assessment

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

John Anderson	Dick Artley	Mark Belpedio
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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: http://www.fs.usda.gov/main/superior/landmanagement/planning

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