United States
Department of
Agriculture

Forest Service

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REVISED ENVIRONMENTAL ASSESSMENT

Pearl Project

Kawishiwi Ranger District, Superior National Forest
Lake and St. Louis Counties, Minnesota
Townships 59-61 North, Ranges 9-12 West

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CHAPTER 1: PURPOSE AND NEED

1.1 INTRODUCTION

This environmental assessment was prepared to provide the Kawishiwi District Ranger and the public with information about the potential effects of proposed vegetation management activities and connected road actions in the Pearl Project. This environmental assessment was prepared by an interdisciplinary team of resource specialists.

SUMMARY OF PROJECT

Who: The Kawishiwi Ranger District of the Superior National Forest is proposing the Pearl Project.

Why: The purpose of the Pearl Project is to promote healthy vegetation communities that are consistent with the desired condition outlined in the Forest Plan[1] and consider potential effects of climate change. Our monitoring and midlevel analysis[2] has shown that there is a gap between the existing condition in the Pearl area and the desired condition outlined in the Forest Plan for some resources. In general there is a need to promote diverse, productive, and healthy native forest communities; provide sustainable forest products; reintroduce fire into fire dependent ecosystems; reduce hazardous fuels; improve riparian function, wildlife habitat, habitat for sensitive plants, and recreational opportunities; and finally provide an adequate road system.

What: Proposed activities include a full suite of harvesting (such as thinning, clearcut with reserves, or selection harvest), reforestation activities (such as site preparation, planting, diversity planting, or release), and temporary road construction for access to management units. Other non-harvest treatments include management ignited fire, fuel reduction, riparian area improvements, and clearing brush along trails and campsites.

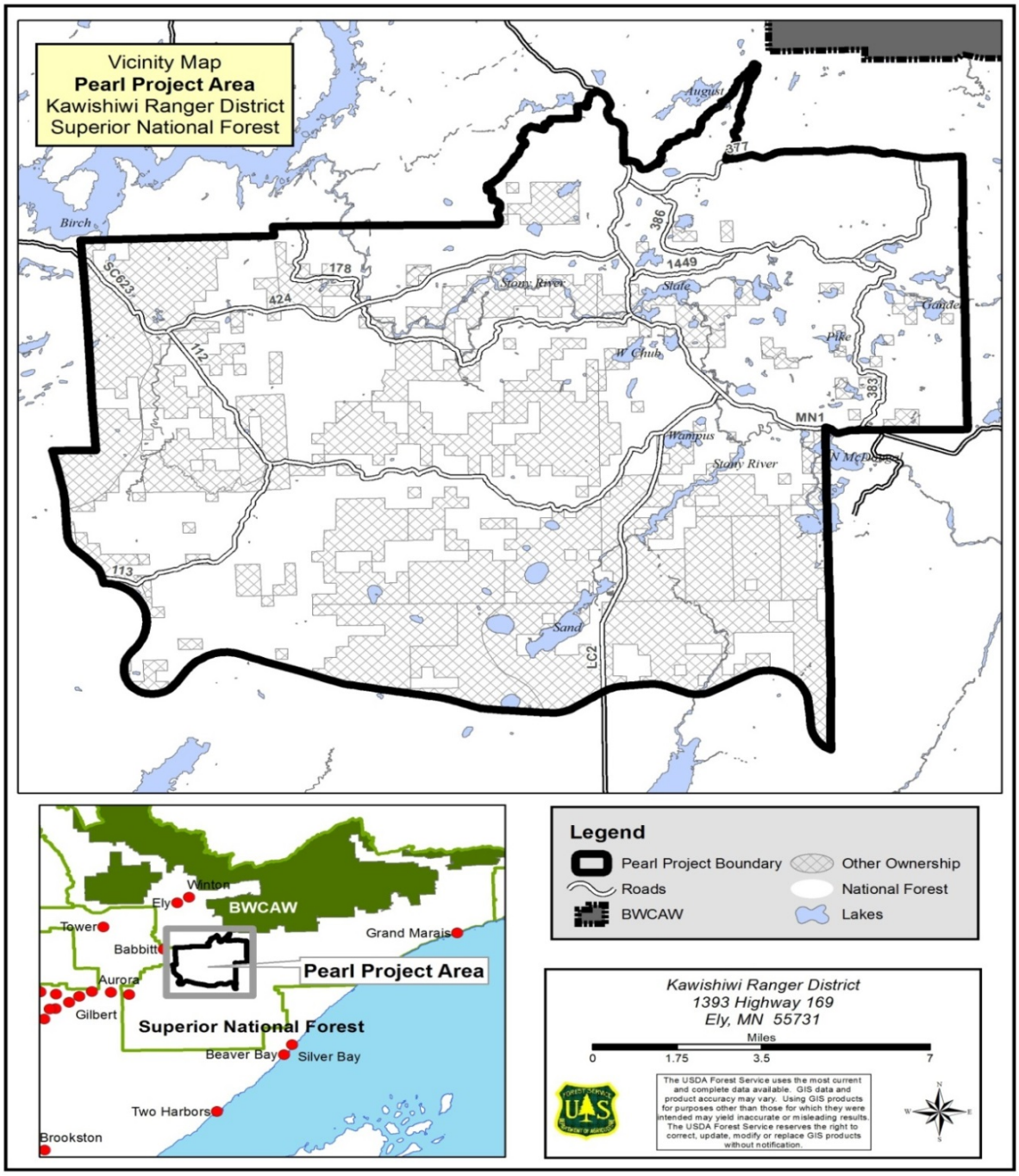
Where: The Pearl Project Area overlaps both Lake and St. Louis Counties, Minnesota. The vicinity map (Figure 1-1) shows the general location of the Pearl Project Area. The project lies approximately five miles east of Babbitt, Minnesota and two miles south of Birch Lake. Its eastern edge is in the vicinity of Dragon and Gander Lakes. The southern extent is near Sand Lake along Hwy 2. The project area falls within Townships 59, 60 and 61 North and Ranges 9, 10, 11 and 12 West. It encompasses approximately 127,000 acres, of which around 75,000 acres (57 percent) are National Forest System lands. Proposed activities would occur only on National Forest System lands.

When: If a decision is made to implement these activities, they would begin in 2015. Given the large scale of the proposal and cost of restoration activities, implementation would be limited by available funding and resources in any given year. Implementation of the primary treatments would be expected to occur over ten years.

[1] The Forest Plan may be accessed at SNF-Planning Page

[2] The mid-level assessment is an intermediate analysis between forest land management planning and project planning. The process provides the team with a systematic way to compare desired conditions and objectives from the Forest Plan, to the existing conditions of the midlevel assessment area, and to develop management recommendations that are based on specific ecosystem and resource needs of the midlevel area. It is an opportunity to assess all or a broad range of resources to gain an overall look at an ecosystem. The mid-level assessment process facilitates better project-level decision making by: considering all resources needs upfront; developing the basis for the Purpose and Need of subsequent NEPA projects; and compiling resource data that can be used for effects analysis.

Figure 1-1: Vicinity Map



1.2 ORGANIZATION OF THE ENVIRONMENTAL ASSESSMENT

This Revised Environmental Assessment (EA) is organized into four chapters with appendices. The major sections of the Revised EA are as follows:

- **Chapter 1: Purpose and Need.** This section provides introductory material that explains the purpose and need for the proposed action, provides background information about the project area, presents direction from the Forest Plan, and describes the issues to be addressed.
- **Chapter 2: Alternatives.** This section describes alternatives analyzed in detail in Chapter 3 and alternatives analyzed briefly. Chapter 2 also includes mitigation measures and monitoring procedures that would be used in implementing the action alternative. A summary comparison of the environmental effects for each alternative is provided.
- **Chapter 3: Affected Environment and Environmental Effects.** This section describes the affected environment and the direct, indirect, and cumulative effects likely to occur with the implementation of each alternative.
- **Chapter 4: References.** This chapter provides names of the preparers and contributors to this environmental assessment, a distribution list, and literature cited.
- **Appendices.** Appendices include more detailed information on the proposed action and alternatives, as well as supporting information for the analysis.

  Appendix A: Description of Treatment Types
  Appendix B: Proposed Treatments by Stand Unit for Alternative 2
  Appendix C: Past, Present, and Reasonably Foreseeable Future Actions
  Appendix D: Scoping Comment Disposition
  Appendix E: Economics

- **Changes in the Revised Environmental Assessment**

In response to public comment on the EA, several changes were made and are included in this Revised EA. The primary changes are to Section 2.4 Alternatives Considered and Not Carried Forward for Detailed Analysis. Other changes include additional information in Section 3.3 Boundary Waters Canoe Area Wilderness, the inclusion of a map displaying proposed temporary road locations and minor formatting and grammatical changes.

An important consideration in the preparation of this EA was the reduction of paperwork. 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 Pearl Project Record and is available at the Kawishiwi Ranger District Office in Ely, Minnesota, or upon request.

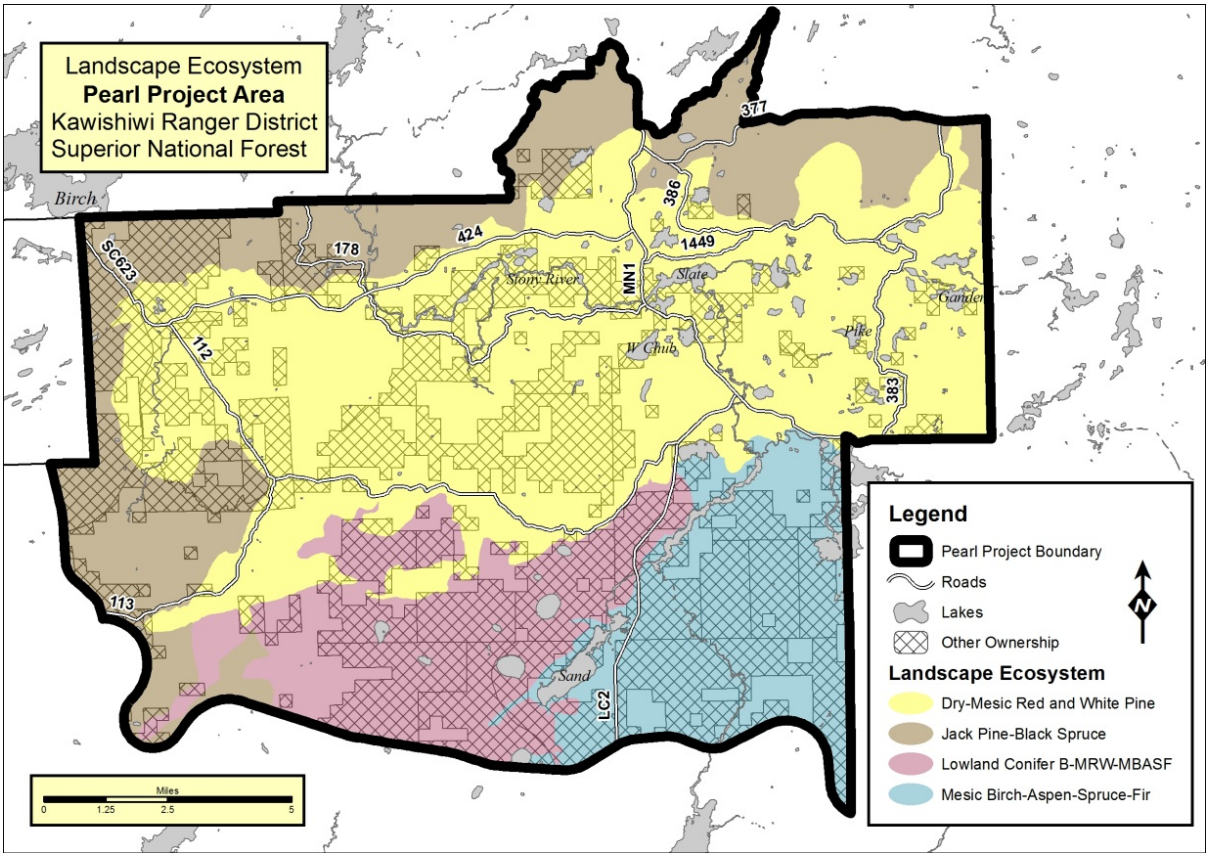
This environmental assessment is tiered to the Forest Plan Revision Final Environmental Impact Statement (FEIS). Relevant analysis from the Forest Plan Revision FEIS was incorporated by reference rather than repeating the information.

1.3 FOREST PLAN DIRECTION FOR PEARL PROJECT AREA

LANDSCAPE ECOSYSTEMS

The Forest Plan contains objectives for management of landscape ecosystems[3]. The Forest Plan considers the dominant features and capabilities of each landscape ecosystem and outlines different management objectives for forest vegetation composition, age class, tree species diversity, and management indicator habitats[4]. Forest Plan objectives for each landscape ecosystem are designed to maintain or restore the forest to conditions more representative of native plant communities. The dominant landscape ecosystems in the Pearl Project Area are the Dry Mesic Red and White Pine, Jack Pine-Black Spruce, and the Lowland Conifer-B (Figure 1-2 and Table 1-1).

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



[3] Landscape ecosystems 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).

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

Table 1.1 shows the acreages and percent of the project area by landscape ecosystems. This table also shows the percent of Forest-wide LE included in the Pearl Project, with the exception of Cedar, Lowland Non Forest, Upland Non Forest, and Lowland Hardwood (included in the project area percent listed in "other LE"). Section 3.3 contains more information on landscape ecosystems including age class and composition tables.

Table 1-1: Pearl Project Area Summarized by Landscape Ecosystem

Landscape Ecosystem	Acres[1]	% of Project Area	% of Forest wide LE
Dry Mesic Red and White Pine (DRW)	27,968	37	15
Jack Pine-Black Spruce (JPB)	20,555	27	7
Lowland Conifer A (LLC-A)	12,923	17	13
Lowland Conifer B (LLC-B)	4,025	5	4
Mesic Birch-Aspen-Spruce-Fir (MBA)	3,644	5	1
Other LE	6,207	8	NA
TOTAL:	75,322	100*	NA

- Total number of acres may vary slightly due to rounding. 1. Acres include only National Forest System land.

MANAGEMENT AREAS

The Forest Plan divides the Superior National Forest outside the Boundary Waters Canoe Area Wilderness (BWCAW) into ten management areas. The interdisciplinary team used management area direction to guide development of the purpose and need and the proposed action. Chapter 3 of the Forest Plan (FP) includes the desired conditions, objectives, standards, and guidelines for each management area. The Pearl Project Area primarily overlaps four Forest Plan management areas. The following is a brief summary of the four primary management areas that overlap the project area:

- General Forest (FP, pp. 3-5 to 3-8): Forests in the General Forest MA are largely a mosaic of tree groupings of different ages and heights. Areas disturbed through management activities are generally quickly revegetated. A variety of stand sizes, shapes, crown closures, age structures, and interspersions occur. Large patch sizes are emphasized, especially those patches associated with young, even-aged vegetation conditions.

- General Forest – Longer Rotation (FP, pp. 3-9 to 3-12): The desired condition is similar to that of the General Forest MA except that forest vegetation communities are generally managed with practice that mimic less severe stand maintenance disturbance, along with some management practices that mimic stand replacement disturbance.

- In both General Forest and General Forest – Longer Rotation Management Areas, forest health is maintained and management investments are protected to sustain the productivity of the area. To maintain or restore vegetation communities, natural disturbances to the landscape are mimicked through the use of management activities such as timber harvest and management-ignited fires. Prescribed fire is also used as a tool to prepare sites for regeneration of new forests and to reduce woody fuel that could cause

wildfires.

- Semi-primitive Motorized Recreation (FP, pp. 3-24 to 3-26): The desired condition for vegetation management includes management activities such as timber harvest and management – ignited fire to achieve landscape ecosystem objectives. These activities are designed to maintain the natural appearance of the landscape. Scenic integrity and recreation objectives guide the design and implementation of these activities.
- Potential/Candidate Research Natural Areas (FP, pp. 3-33 to 37): "Areas within National Forests that the Forest Service has designated to be permanently protected and maintained in a natural condition." (FP, p.Glossary-21). These areas are to be managed in the same manner as Research Natural Areas and are not suitable for timber. Natural forces and site conditions are the primary factors that determine size and composition of forest stands, with limited deliberate manipulation such as prescribed fire (D-RNA-2).

1.4 PURPOSE AND NEED AND PROPOSED ACTION

The Pearl Project is proposing to address needs related to restoration of native vegetation communities as well as to improve wildlife habitat and watershed health, provide sustainable timber products, and reduce hazardous fuels. During the "mid-level" phase of the project, analysis and assessments needs were identified by comparing the existing vegetation condition with desired conditions described in the Forest Plan. Prior to this analysis, field data was collected to obtain a more accurate picture of the existing condition by a team of interdisciplinary resource specialists. Listed below in italic are the Desired Conditions from the Forest Plan relevant to the Pearl Project. The desired conditions are followed by a description of the existing condition and needs for action.

Restore Native Vegetation Communities

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

D-VG-6 Vegetation conditions that have been degraded or greatly diminished in quality or extent on the landscape by past land use are restored to conditions more representative of native vegetation communities.

Forest Plan desired condition for vegetation across the forest is for native vegetation communities that are diverse, productive, healthy and resilient (D-VG-1). The means by which to achieve this desired condition is to move vegetation conditions from the year 2003 conditions [base year of the Forest Plan] towards the long-term desired composition, structure, age, spatial patterns, and within-stand diversity (O-VG-1).

The Forest Plan contains objectives for management of landscape ecosystems (LE). The Forest Plan considers the dominant features and capabilities of each LE and outlines different management objectives for forest vegetation composition, age class, tree species diversity, and management indicator habitats. Forest Plan objectives for each LE are designed to maintain or restore the forest to conditions more representative of native plant communities. The dominant LEs in the Pearl Project Area are the Dry Mesic Red and White Pine, Jack Pine-Black Spruce, and the Lowland Conifer-B (Figure 1-2 and Table 1-1).

Disturbance is a natural and vital part of landscape ecosystems. Historically all three dominant LEs in the Pearl project were heavily influenced by fire. In the Dry-Mesic Red White Pine LE stand replacement fires occurred every 150-300 years. These fires were the primary method of

regenerating the forest and influenced composition of trees species. Red and white pine trees survived most fires. Only the more severe crown fires likely killed all red pine and white pine in an area. Surface fires were more common which typically occurred around 40 year intervals. In this system surface fires acted to reduce ladder fuels and accumulations of fuel that would lead to more severe crown fires.

In the Jack Pine-Black Spruce LE stand replacement fires were common; occurring every 50-100 years in general. Stand replacement fires tended to be large and resulted in more early successional species. Jack pine and black spruce require heat from fire or exposure to sunlight after disturbance to open their serotinous or semi-serotinous cones and disperse seeds. Birch and aspen also regenerate vigorously after fire/disturbance, taking advantage of the increased sunlight.

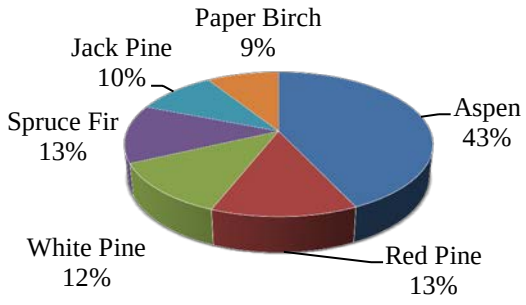
In the Lowland Conifer LE fire occurred on average every 150-300 years. The semi-closed cones of black spruce provided abundant seed after a stand replacement fire.

After European settlement, timber harvest replaced fire as the major disturbance agent that created young forest in northern Minnesota. Young forest or young age class provide habitat needs for wildlife species including moose and deer (young aspen/birch) and snowshoe hare (young conifer). Young age class created through disturbance contributed to a healthy, diverse forest. Continuing to provide a component of young age class is a desired condition and one of the Forest Plan objectives. The young age class (0-9 years) objective is ten percent for the DRW LE, fourteen percent for the JPB LE, and four percent for the LLC LE.

Figures 1-3 and 1-4 display desired vegetation composition objectives for Decade 2 within the dominant landscape ecosystems within the Pearl Project Area.

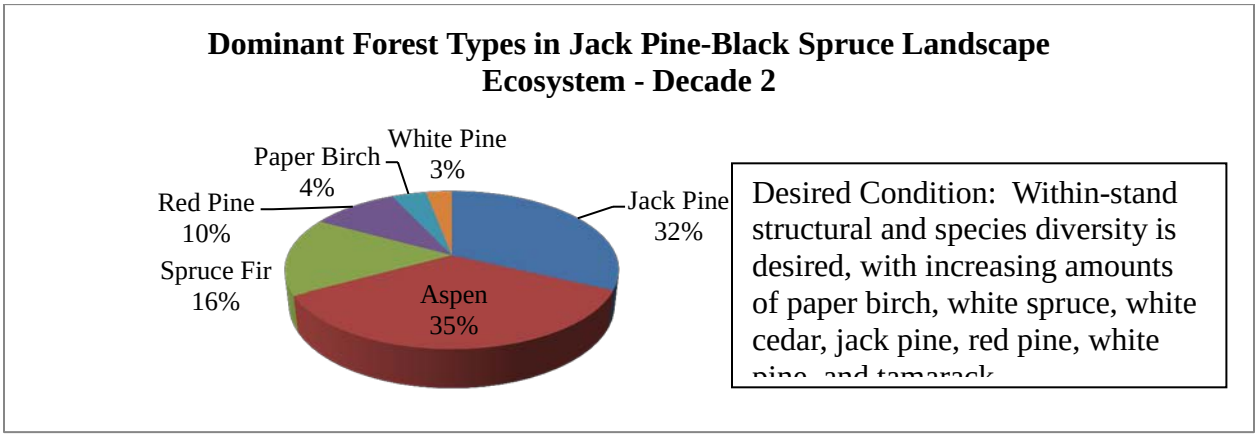
Figure 1-3: Dry-Mesic, Red and White Pine Landscape Ecosystem

Dominant Forest Types in Dry-Mesic, Red and White Pine Landscape Ecosystem - Decade 2



Desired Condition: Within-stand structural and species diversity is desired, with increasing amounts of white spruce, white cedar, jack pine, red pine, white pine, and tamarack.

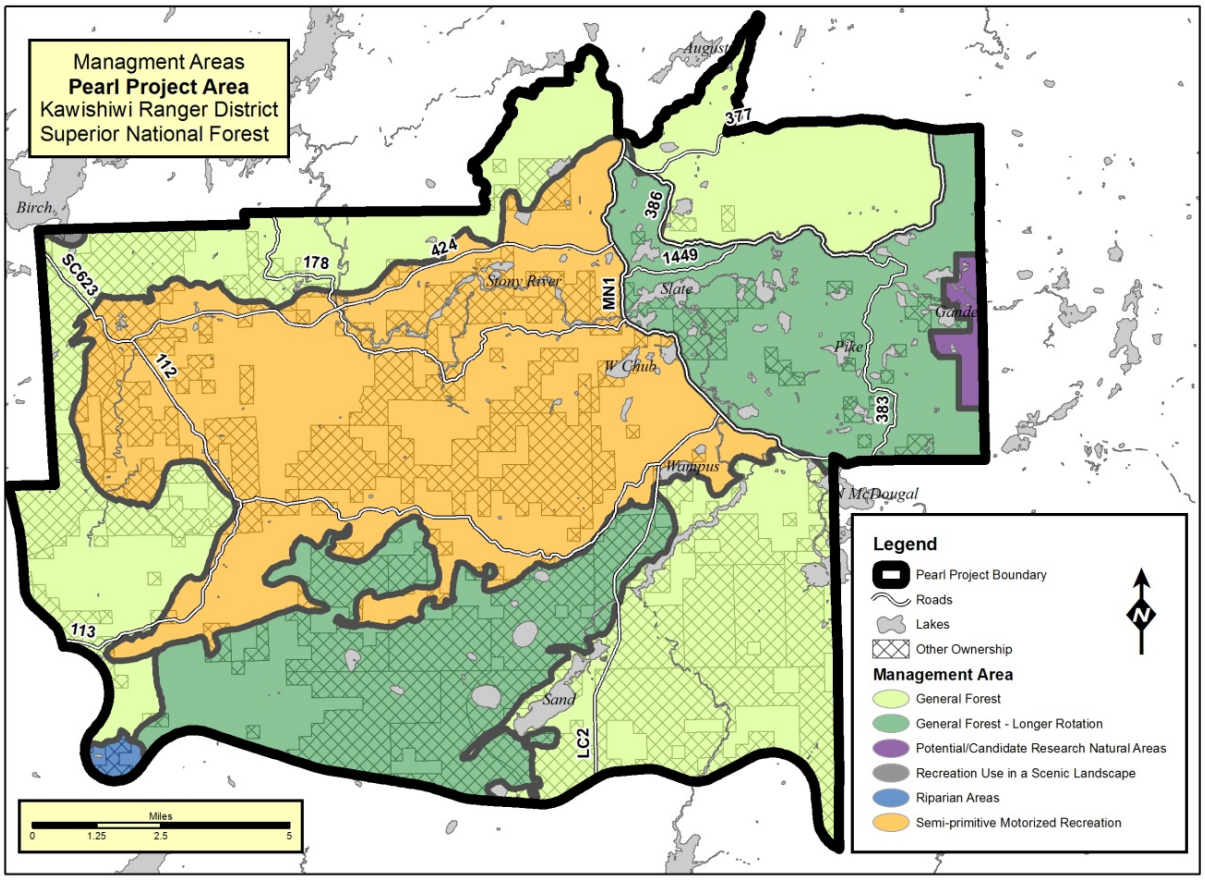
Figure 1-4: Jack Pine-Black Spruce Landscape Ecosystem



Along with LEs, Management Indicator Habitat (MIH) objectives are also explained in the Forest Plan (FP, Ch.2). These represent habitats used by a wide variety of native plants and animals, including sensitive and management indicator species (see Ch. 3.3). Additionally these habitats provide a means of monitoring and evaluating effects of actions on biotic resources. Their management is a key component for the full diversity of desired wildlife habitats. Management indicator habitat objectives in both the Dry-Mesic Red and White Pine LE and the Jack Pine Black Spruce LE are to increase the amount of young aspen-birch and jack pine forest.

Finally, the Forest Plan contains desired conditions for management areas (MA) (Figure 1-5). Each management area has a unique theme that differs from that of neighboring management areas. Where landscape ecosystem direction provides vegetation objectives for forest, type, forest age, and trees species diversity, the desired conditions for MAs describe what is desired socially and economically within a specific MA. Projects must reflect a blend of both MA and LE direction.

Figure 1-5: Management Areas in the Pearl Project Area



In the General Forest MA, forests are largely a mosaic of tree groupings of different ages and heights. Areas disturbed through management activities are generally quickly revegetated. Some recently harvested areas still have a partial canopy of older trees. The boundaries of these cut areas appear to follow natural landscape patterns. (D-GF-1, p.3-6)

Forest vegetation communities are managed with practice that mimic ecosystem processes, mainly stand replacement disturbance. A variety of stand sizes, shapes, crown closures, age structures, and interspersions occur. Large patch sizes are emphasized, especially those patches associated with young, even-aged vegetation conditions. Aspen, red pine, spruce /fir, white pine, jack pine, lowland conifer, and a number of hardwood species occur in large amounts, depending upon the landscape ecosystem. (D-GF-2, p.3-6)

The desired condition for forest vegetation in the General Forest – Longer Rotation MA is similar to that of the General Forest MA except that forest vegetation communities are generally managed with practice that mimic less severe stand maintenance disturbance, along with some management practices that mimic stand replacement disturbance. (D-LR-2, p.3-10)

In both the General Forest and General Forest – Longer Rotation MAs, forest health is maintained and management investments are protected to sustain the productivity of the area. To maintain or restore vegetation communities, natural disturbances are mimicked through the use of management activities such as timber harvest and management-ignited fires. These

disturbances are also used as a tool to prepare sites for regenerating new forests and to reduce woody fuel that could cause wildfires. (D-GF-5 and D-LR-5, p.3-6 and 3-10)

In the Semi-primitive Motorized Recreation MA, the desired condition for vegetation management are activities such as timber harvest and management –ignited fire that may be used to achieve LE objectives. These activities are designed to maintain the natural appearance of the landscape. Scenic integrity and recreation objectives guide the design and implementation of these activities. (D-SPM-2, p.3-25)

Potential/Candidate Research Natural Areas (FP, pp. 3-36 to 37) are to be managed in the same manner as Research Natural Areas. Pearl primary treatments within the CRNA include limited fuel reduction and prescribed burning as described under desired condition, D-RNA-2, p. 3-34, "Natural forces and site conditions are the primary factors that determine the size, shape, and composition of forest stands. In limited situations, deliberate manipulation (e.g. prescribed fire) may be used to maintain the ecosystem or unique features for which the RNA was established or to reestablish natural ecological processes. Non-native invasive species are controlled."

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

Current condition of vegetation and need for change

Forested stands in the Pearl Project Area are a mix of aspen, red pine, jack pine, paper birch, balsam fir, spruce, and white pine. Stands vary in age from young (less than 10 years old) to old growth (up to 179 years old). Some stands are healthy and vigorous while others show declining health. Stands tend to begin declining for the following reasons:

- Insect and disease
- Old age for the species (aspen and paper birch are short-lived species which begin to decline around 70 years)
- Spacing - trees growing close together compete with each other for water and light (such as red pine)
- Soils on certain sites are better suited to growing different tree species.

While declining trees do provide benefits and are an important part of the ecosystem, there is a need to improve the conditions of these forest communities to maintain the overall health and resiliency of the project area and to maintain a mixture of forest types (composition) and ages.

Currently there is less young age class in the Pearl Project Area than necessary to meet Forest Plan LE objectives. In addition, all of the current acres of young age class will grow out of the

young age class within ten years. Outside of the wilderness, fire is not allowed to burn uncontrolled as it did historically and therefore fire is limited as a stand renewing disturbance agent. Actions are needed to create young age class that would provide wildlife habitat and a diverse functioning ecosystem. Management actions are also needed to maintain the desired composition of early successional species of jack pine, aspen, and birch which are all under-represented in the Dry-Mesic Red and White Pine and the Jack Pine-Black Spruce LEs.

Some stands in the project area contain only a single tree species or have understories that are dominated by balsam fir or brush. There is a need in these stands to improve the structural and species diversity. By increasing diversity, stands generally become more resilient and wildlife habitat quality is generally improved. In addition, maintaining healthy and resilient forests is important in light of future climate change predictions for northeast Minnesota. Proposed activities would maintain a mix of forest types and ages to provide for wildlife habitats in the project area.

To move vegetation towards desired conditions, a number of management activities are proposed. Up to 12,230 acres of young forest would be created through even-aged timber harvest. These are primarily stands of older aspen, paper birch, jack pine, or black spruce. Most of these stands would regenerate naturally and become young stands of their original forest type. About 5,300 acres of newly created young forest would receive some type of secondary treatments of either site prep (mechanical, prescribed fire, or herbicide) or timber stand improvement (TSI) by hand (spot-foliar, basal bark, or hack and squirt) application of herbicide. Approximately 990 acres of herbicide application (hand and broadcast) would occur on young stands. These secondary treatments are designed to favor conifer trees and reduce competition of competing hardwood or brush. Follow-up diversity planting of white pine, red pine, and white spruce would occur on 3,080 acres. Conversion planting or seeding to primarily jack pine would occur on 1,180 acres. The remainder of young forest would regenerate naturally.

Our proposal also includes the maintenance and enhancement of older forest conditions. Up to 6,820 acres of timber harvest such as thinning and un-even aged harvest would occur in primarily red and white pine stands. The goal is to create gaps in the forest canopy to allow for the development of structural diversity. A second goal of these treatments is to reduce the density of stands leading to increased vigor of the remaining trees. Of the harvested stands, a follow-up broadcast application (from rubber-tired skidder tractor) of TSI herbicide would occur on 190 acres. Herbicides would be used in pine stands that have a particularly dense layer of hazel brush in the understory which is inhibiting the growth of other vegetation.

In addition to using timber harvest as a tool to promote older forest conditions, a variety of non-harvest activities are also included. The goal of these treatments is to favor advanced regeneration of long-lived conifer by reducing hardwood and brush competition. Activities include 620 acres of riparian improvement, 280 acres of release, 40 acres of broadcast herbicide application (from rubber-tired skidder tractor), 150 acres of hand (spot-foliar, basal bark, or hack and squirt) herbicide application, and 70 acres of mechanical crushing.

There is a need to construct approximately 50 miles of temporary roads to access and accomplish many of the desired conditions and objectives. These temporary roads are minimally constructed and would be closed between uses and decommissioned upon completion of all secondary and reforestation treatments (FP, p. 2-49).

Provide Sustainable Timber 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.

Vegetation management has the potential to provide wood products for business and mills in northern Minnesota as directed by the Forest Plan. Treatments designed to meet other project objectives could be accomplished through the sale of marketable wood products, including tops of trees for biomass. Over 23,000 acres of forest within the Pearl Project Area have been identified as needing some type of treatment to create young forest and improve stand condition. Approximately 93 percent of these acres are suitable (correct age, basal area, etc.) for commercial timber harvest. Timber harvest on the suitable forestlands within the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

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 build-up 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 approximately 7,150 acres in older red and white pine forest to reduce the potential risk of high-intensity crown fires and allow for an increase in structural and species diversity in these stands. Some of the under burning would occur as a secondary treatment after the stands are thinned.

Introducing fire into brush and grass systems rejuvenates growth of both vegetative types resulting in improved wildlife habitat. This project proposal contains 50 acres of broadcast burning in brush and grass habitat along a tributary of the Dunka River.

Finally, approximately 300 acres of broadcast burn and 180 acres of secondary site prep burn are proposed 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.

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 Pearl Project Area there are four primary WUI areas: the Matilla Rd/Dunka Bay of Birch Lake Area, the Stony River/Wander Rd/Slate Lake/Chub Lake Area, the Camp Buckskin/McDougal Lake area, and

the Sand Lake Area. 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. Our proposal is to treat fuels on approximately 2,010 acres in WUI areas. 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.

Figure 1-6: Example of heavy fuels near a cabin in WUI and what it looks like after the fuels are treated. In this example the balsam fir was hand cut and chipped on site.

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 along the Stony River, Little Isabella River, Baird Lake, Shamrock Lake, Dunnigan Lake, Bear Skin Lake, Gander Lake, Alsike Lake, a tributary to Birch Lake, and a few small connector wetlands in the Pearl 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. The Pearl project proposal includes up to 720 acres of riparian treatments. Activities would include hand release of advanced 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.

Figure 1-7: Example of hand treatment of balsam fir and shrubs in riparian area to encourage long-lived conifer species.

Improve Wildlife Habitat

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

The wildlife mid-level analyses identified vegetation management needs to address differences between the existing project area condition and Forest Plan direction. The interdisciplinary team of resource specialists addressed the following opportunities while developing the proposed action.

- Within the context of MIH objectives, create young forest for moose and deer browse and the variety of other wildlife species that use young forest.
- Increase the conifer component of stands through diversity planting for increased stand complexity and thermal cover.
- Shear in non-forested stands to stimulate new growth.
- Manage riparian areas for long-lived conifer and mature tree species to provide future bald eagle nest sites and maintain water quality for aquatic species.

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 a high number of known locations of sensitive plants in the Pearl Project Area compared to other parts of the Superior National Forest. The reason for this is there are many lowland forested peatland and poor fen habitats which are important habitat areas for many sensitive plants and because simply more people have looked for them here.

Despite the high number of known sensitive plant locations in the Pearl area, there are not many opportunities to improve sensitive plant habitat. For most sensitive plants in the project area, the desired condition for their habitats is currently present. However two sensitive plants, least moonwort (*Botrychium simplex*) and ternate grapefern (*Botrychium rugulosum*), are both found hin an old wildlife opening that is being encroached upon by small trees and shrubs. There is a need to improve habitat condition for these species that prefer more open habitat. The proposed activity is to remove encroaching vegetation using hand tools and brush saws on approximately one acre.

Improve Recreational Opportunities

D-REC-13. The Forest provides dispersed recreation facilities such as campsites and picnic sites for small groups. Dispersed recreation opportunities emphasize a remote recreation experience, have few or no facilities, and are often near bodies of water or along roads and trails where public use is low.

Within the project area there is a need in two locations to improve dispersed recreation opportunities at both Beetle and Dunnigan Lakes. At these areas, Forest users have created campsites. Both lakes receive a moderate level of use and are highly desirable fishing lakes. Both sites are also used each spring by the Finland Fisheries DNR for fish stocking. These sites are currently not managed recreation sites therefore resource damage is occurring. At Beetle Lake the slope to the water's edge is prone to erosion. At Dunnigan Lake the access road and unimproved lake access is small, brushed in, and inadequate to accommodate recreation uses other than launching a boat. To accommodate current use patterns, address resource damage, and assist DNR fish stocking efforts, the Pearl Project proposed action is to officially recognize, designate, and manage both of these sites as dispersed recreation campsites. Improvements would include brush clearing and the installation of fire grates and latrines.

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 Pearl Project Area includes most of the 26 mile long Stony Spur ATV/Snowmobile Trail and numerous low level gravel roads where recreational ATV riding is allowed. The Stony Spur Trail begins in the City of Babbitt and ends within the project area on Forest Road (FR) 377E at an ATV/snowmobile trail shelter named the Matilla Shelter. The segment of the Stony Spur Trail from Babbitt to FR 388 is open to both Class I ATVs (50" or less in width) and Class II ATVs (65" or less in width) which includes what are also referred to as side-by-side ATVs. There is a short (0.6 mile) segment (51085B) of the Stony Spur Trail between FR 388 and FR 377E that is currently only open to Class I ATVs. Because the Stony Spur Trail is open to Class II ATVs as are many of the low level gravel roads to the east of this trail segment, there is a need to open

this segment of trail to Class II ATVs to provide more opportunities for people operating the side- by-side or Class II ATVs. The only modification needed to open segment 51085B to Class II ATVs would be wider brushing specifications from the existing 8 to 10 foot corridor to a wider 12 to 14 foot corridor.

Provide an Adequate Road System

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

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

D-TS-5 and O-SU-2. Private and non-NFS landowners have reasonable access to their land when consistent with Forest Plan direction and when the proposed use cannot be accommodated on non-NFS lands.

There is a need to provide reasonable access across National Forest System land to non-NFS landowners in two locations. Both the DNR and St. Louis County have expressed the desire to access some of their lands that are currently land locked by federal land. Our proposal is to allow a 0.3 mile, long-term special use road to be built to access DNR lands. We also propose to allow the county to construct a 0.5 mile road to their parcel which we would manage as a closed National Forest System road (OML 1) when not in use.

Finally, there is one other location where management of the road system is needed. Beetle Lake is a 27 acre lake with public access along the Forest Road 383J. It is a desirable fishing lake and is stocked by the DNR. The public access is located on a portion of the lake that in low water can be difficult to launch a boat and not suitable for stocking fish. There is a gated special use road (SU5383H02) located on the north side of the lake with a user developed trail and campsite off of it. The DNR uses this location to stock fish, and for many years ATV riders have driven around the gate to access the lake from the campsite. Our project proposal would address the need to improve vehicle access to Beetle Lake for camping and fish stocking. Specifically, we propose to change the designation of approximately 0.4 miles of existing road from “special use” (which is currently gated and closed to motorized used by the public) to “OML 2” (which would be open and drivable to the public). Additionally, the road would be widened slightly near the access trail to the campsite to allow for parking, and the gate would be moved to just past the parking area for the campsite.

PROPOSED ACTION

Proposed actions are those actions the interdisciplinary team felt would best accomplish the purpose and need. When developing the proposed action, the interdisciplinary team worked with tribal personnel, State and county personnel, and Sand Lake/Seven Beavers Collaborative members. The purpose of these discussions was to share expertise and gather the latest research, information, and ideas on how to effectively reach the objectives listed above. The interdisciplinary team also took into consideration the potential effects climate change could have on existing and future conditions.

A scoping report that described the Proposed Action was distributed to the public in November 2013, and the public was invited to submit comments. As explained during scoping, the interdisciplinary team continued to refine the proposal in collaboration with interested parties

during the development of issues and alternatives. The interdisciplinary team modified the Proposed Action based on a review of comments received and further evaluation of the existing condition. The primary modifications are:

1. Three units totaling 90 acres of clearcut and coppice harvest were deleted from the Proposed Action because they were identified to be goshawk fledging areas.
2. Three units totaling 97 acres of clearcut and coppice harvest were added to the Proposed Action to eliminate the need for long term OML1 road construction. Once these units are harvested the temporary access will be decommissioned.
3. An existing unclassified road that is not part of a previous decision will be decommissioned (0.8 miles).
4. There are 749 acres of regeneration harvests (coppice, clearcut, shelterwood) that were dropped because they exceeded Forest Plan standards and guidelines within Lynx Analysis Unit 11 (LAU 11). While analyzing and summarizing data for the Biological Assessment (BA), it was determined that, within LAU 11, unsuitable habitat would exceed the 15 percent threshold over a ten year time period (Forest Plan, S-WL-1). An additional 42 acres (Units 744 and 746) were changed from coppice cut to riparian treatments, to reduce the amount of unsuitable lynx habitat but still improve the stand conditions for riparian purposes.
5. An additional 314 acres of regeneration harvests (coppice, clearcut, shelterwood) were dropped from the biological assessment analysis because they did not meet the minimum allowable age for even age regeneration harvests (S-TM-5).

The 1,105 acres discussed in numbers 4 and 5 above were dropped from analyses in the BA, however they were included in all other resource analyses and discussions in Chapter 3. These units are denoted with an asterisk in Appendix B and are displayed on the Alternative 2 map. There are approximately 2.5 miles of new temporary roads that may not be needed in association with the dropped units.

See Section 2.3 for a detailed description of the modified proposed action (Alternative 2).

CLIMATE CHANGE

This section summarizes the current state of knowledge regarding climate change impacts in the region, on the Superior National Forest, and on specific vegetation types within the Pearl Project Area. Much of the information comes from a draft Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (S. Handler, et al, 2013) and *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Swanston and Janowiak 2012, URL: Forest adaptation resources: Climate change tools and approaches for land managers).

No single project can develop a perfect plan to mitigate all the risks and uncertainty posed by climate change. However, there are incremental adjustments that can be made within an individual project or across an entire landscape to put the forest in a better position to adapt or tolerate continued climate change. The Pearl Project incorporated some adaptation actions

(Forest Adaptation[5]) into the Action Alternative. The latter 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. The team used this document to understand the major stressors and threats to forest ecosystems based on the following climate scenarios. The potential changing conditions for the forests of northern Minnesota include:

- Warmer temperatures, including 4 to 12 degrees F warmer during winter months
- Changing precipitation patterns with a net change toward drier conditions during the growing season
- More frequent intense rainfall and changes in spring snowmelt
- Future conditions may increase the risks from wildfire, invasive species, and forest pests

Then the team considered site-specific conditions for the Pearl Project Area that could modify the general climate change projections such as soils, management history, and topography. For more information please refer to the Pearl Scoping Report: Pearl Project Scoping Report) and the Climate Change Response Framework (Climate Change-SNF-Pearl Project).

The Pearl team developed a proposed action that included climate change adaptation strategies and approaches. Table 1-2 is the summary of our synthesis and strategies for selected forest types in the Pearl Project Area. 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. Generally, in most climate change projections:

- Species such as quaking aspen, paper birch, black spruce, balsam fir, and white spruce are likely to experience reduced suitable habitat and biomass across the assessment area.
- Species with ranges that extend to the south such as jack pine, red pine, 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 hotter, drier future climate scenarios.

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

Table 1-2. Regional projections, local considerations, and adaptation actions applied to proposed action for selected forest types in the Pearl Project Area		
Forest Type	**Regional projections and Pearl Project Considerations**	**Adaptation action applied to the proposed action**
Jack Pine	Much of the jack pine in the project area is very old, with balsam fir, black spruce, and brush common in the understories. With a chance for more large fires in the future, stands in this condition are not well suited to thrive because older jack pine are not the highest quality seed source. Jack pine is well suited to drier sites and conditions and might do well under future climate projections.	In jack pine stands: • Plant pockets of northern red oak and northern pin oak on dry sites. • Plant pockets of white and red pine and a lessor amount of white spruce. • Try seed sources of planted stock from further south or west in MN. • Manage for jack pine across a range of wet and dry sites.
Aspen	Aspen is generally susceptible to drought stress. Big tooth aspen is more common on drier sites, so this species may benefit from slightly drier conditions. Pure aspen stands are potentially more vulnerable to stress (hydraulic failure, pests, etc.). Mixed stands in the project area tend to have spruce-fir understories; with old aspen stands succeeding to red maple, balsam fir, and brush. Some aspen stands have an understory of white pine which may be more tolerant of climate change. Middle aged class is limited in the project area.	In aspen stands: • Focus on off-site aspen for conversion to other forest types. • Plant white spruce within aspen stands to retain aspen/spruce forest type for wildlife habitat. • Leave scattered clumps of aspen for reserve islands within stands. • Control competing vegetation in stands converted to spruce-fir.
White Pine	White pine plantations in the area are generally in poor condition. There are scattered white pines throughout the project area that provide good seed sources. There is not much blister rust in the project area. White pines grow well on a variety of soil types but will not recruit into the canopy without the development of canopy gaps. White pine could be favored by reduced competition if other boreal conifers decline. White pine is more drought-tolerant than other conifers and tolerates a wider range of soil types.	In white pine stands: • Apply prescribed fire in addition to thinning. • Use bud caps to prevent deer herbivory. • Emphasize planting in known areas of lower deer populations (interior forest, etc.). • Try seed sources or planting stock from further south or west in MN.

1.5 DECISION TO BE MADE

Based on the purpose of and need for action for the Pearl Project, the scope of the project includes decisions concerning activities such as vegetation management and related transportation system activities, management and maintenance of two user sites as campsites, and opening up a segment of trail to Class II ATVs, etc.

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

- The amount and type of vegetation treatment activities, including reforestation.

- The amount and type of related transportation system activities.
- Whether or not to authorize other proposed actions including managing and maintaining two user sites as campsites, opening up a segment of the Stony Spur ATV/snowmobile trail to Class II ATVs, hazardous fuels reduction, etc.
- Relevant mitigation measures and monitoring actions.

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

1.6 PUBLIC INVOLVEMENT AND ISSUES WITH THE PROPOSED ACTION

Public, community, and agency involvement has been an integral component of the Pearl Project and has occurred throughout the development of the purpose and need, proposed action, issues, and alternatives.

SCOPING

The interdisciplinary team utilized several methods to inform the public about the scoping comment period for the Pearl Project. In November 2013, a scoping package requesting comments was mailed to over 410 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 SNF NEPA Projects Page. In addition, the Pearl Project was listed in the Superior Quarterly (a Schedule of Proposed Actions for the Superior National Forest) starting in January 1, 2013. To date, over 20 written and verbal responses were received from individuals, groups, and agencies. Responses ranged from simply wishing to remain on the project mailing list to detailed pages of comments about different aspects of the project.

Additionally, the project Proposed Action was mentioned at a Sand Lake Seven Beavers Collaborative meeting. A follow-up meeting between Pearl Project IDT members and a representative from MN DNR was held in February 2014 to discuss their current and future management plans within the project area and specific comments and concerns. The Pearl ID Team considered site specific mitigations in high interest or areas of concern.

ANALYSIS OF COMMENTS

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

All comments received were considered by the interdisciplinary team and District Ranger. The interdisciplinary team placed the comments into one of four categories and determined the best way to address the comment in the environmental analysis. Categories of comments include: 1) Issue Analyzed in the Environmental Assessment, 2) Alternative, Mitigation Measures, Changes to the Proposed Action, 3) Non-issue Comment or Question, or 4) General Comment. All comments received during scoping can be found in Appendix D, Pearl Comment Disposition.

Through the analysis of public comments, the interdisciplinary team identified issues that need to be analyzed in the Environmental Assessment. Issues identified include the use and effects of

herbicides, the construction of new temporary roads for the purpose of vegetation management actions, and effects of non-native invasive species. The interdisciplinary team did not identify any issues where the extent of geographic distribution of effects, duration of effects or intensity of interest warranted development of another alternative considered in detail. To the extent possible, the interdisciplinary team resolved issues through modification of the proposed action and site-specific mitigations.

Review of comments on the EA led to the production of this Revised EA. The primary changes in the Revised EA to Section 2.4 Alternatives Considered and Not Carried Forward for Detailed Analysis. Other changes include additional information in Section 3.3 Boundary Waters Canoe Area Wilderness, the inclusion of a map displaying proposed temporary road locations and minor formatting and grammatical changes. Response to comments on the EA is found at Appendix D to the Draft Decision Notice.

ADMINISTRATIVE OBJECTIONS

See the Draft Decision Notice accompanying this Revised EA for information on opportunity to submit an administrative objection pursuant to 36 CFR 218.

CHAPTER 2: COMPARISON OF ALTERNATIVES

2.1 INTRODUCTION

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

2.2 HOW A RANGE OF ALTERNATIVES WAS DEVELOPED

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

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

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

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

2.3 ALTERNATIVES ANALYZED IN DETAIL

ALTERNATIVE 1 - NO ACTION

In this alternative, the proposed action would not take place, resulting in no new vegetation management actions in the project area. There would be no harvesting, fuel reduction, site preparation, or reforestation activities. Additionally, there would be no new temporary roads constructed to access these areas, nor would the special use authorizations to access nonfederal ownership occur under this EA. All vegetation management currently happening would continue

as would road maintenance. Natural succession processes would take place; in the long term, pioneer species such as aspen or birch would succeed to later successional species of spruce-fir (or brush where there is inadequate tree regeneration). Selection of this alternative would not preclude future management actions in the project area.

ALTERNATIVE 2 – MODIFIED PROPOSED ACTION

A summary of the modifications made to the proposed action is described in Chapter 1-Proposed Action. As described in the November 2013 Scoping Report, the proposed action was developed by the interdisciplinary team to meet the purpose and need for the Pearl Project. The team made minor modifications to the proposed action based on additional field reviews, new information, and public involvement.

Alternative 2-Modified Proposed Action emphasizes use of management activities to restore native vegetation communities, manage and enhance recreation opportunities, and provide an adequate road system for Forest use and needs. Activities such as timber harvesting, timber stand improvement, site preparation, and tree planting and seeding would occur in stands with inadequate tree stocking for regeneration or species diversity needs, or where underplanting would enhance a moderate but declining overstory. Some underplanting would occur along area streams and creeks to improve riparian habitat and watershed function.

More specifically, Alternative 2 would increase the young age class by approximately 12,230 acres of which 1,200 acres of aspen would be converted to jack pine or long-lived conifer, 3,000 acres would receive diversity planting, while the remaining 7,500 acres would be reforested through natural regeneration. Predictions from climate change models were considered when deciding on regeneration methods and species. Alternative 2 would also increase the within-stand diversity in mature stands on 6,820 acres and in regenerated stands on 900 acres (through riparian planting and release); along with reducing hazardous fuels on approximately 1,750 acres (see Tables 2-1 and 2-2).

Additional actions in this alternative include improving habitat for sensitive species, conducting prescribed burns, utilizing mechanical hazardous fuel treatments, and constructing temporary road or improving existing routes to access management areas. Recreation activities would be enhanced by improving some ATV trails and campsites.

SUMMARY OF ACTIONS

The summary of acres in Table 2-1 is by primary treatment type while Table 2-2 is the summary of acres by secondary treatment type. Unit acres listed are based on the acres in our vegetation database for each stand proposed for treatment. Treatment acres are an estimate of what would actually be implemented because of further refinement of unit boundaries and operable areas during implementation.

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

- Alternative 2 Proposed Treatment Maps displays the locations of the proposed treatments and temporary roads in the project area.
- Appendix A gives a definition for each of the treatment types and mitigation measures.
- Appendix B lists the specific treatments and mitigation measures proposed for each unit.

- Appendix C describes past, present, and reasonable foreseeable future actions for the Pearl Project Area.
- Appendix E gives a description of the financial efficiency of the project, comparing FS direct expenditures with estimated financial revenues.

Table 2-1: Summary of Proposed Action by Primary Treatments

Treatment Description	Acres
Harvest Treatments - Creating Young Forest	
Clearcut with Reserves	5,760
Coppice Cut	4,327
Shelterwood	2,150
Harvest Treatments - Maintaining and Enhancing Older Forest	
Thinning	6,300
Uneven aged cut	520
Non-harvest Treatments	
Prescribed Fire – Broadcast Burn	350
Prescribed Fire - Underburn	1,070
Fuels Treatment	1,750
Release	280
Riparian	620
TSI* – herbicide broadcast application	40
TSI – herbicide hand application	150
TSI - mechanical	70
Browse Shearing	80
Total of all Treatment Types	23,467

*TSI stands for Timber Stand Improvement

Table 2-2: Summary of Proposed Secondary Treatments and Reforestation

Treatment Description	Acres
Post-harvest Treatments in Younger Forest	
TSI* – herbicide hand application	490
Site Preparation	4,040
Site Preparation - Burn	260
Site Preparation - herbicide broadcast application	500
Post-harvest Treatments in Older Forest	
TSI – herbicide broadcast application	190
Prescribed Fire - Underburn	6,080
Riparian	100
Post non-harvest Treatments in Older Forest	
TSI – herbicide hand application	10
Prescribed Fire - Underburn	44
Fuels Treatment	260
Reforestation and Planting	
Natural Regeneration	7,470
Diversity Planting	3,080
Conversion Planting and/or seeding	1,180

*TSI stands for Timber Stand Improvement

Biomass removal could occur on harvest units with secondary treatments of slash disposal or site preparation, and on non-harvest units with primary treatments of understory fuel reduction or site preparation. Biomass removal would not occur on units where soil mitigations call for retaining slash. Biomass removal would include tops and limbs (from harvest operations), brush, and non-merchantable stems but not include stumps or existing coarse woody debris. Biomass removal would follow Operational Standards and Guidelines as described in the Forest Plan G-FW-1, p. 2-7 and in the MFRC document MFRC-BM-1 through 16, pp. 21-30

SUMMARY OF ACTIONS-TRANSPORTATION (INCLUDING SPECIAL USE AUTHORIZATION)

Temporary and permanent road access would be needed to accomplish proposed vegetation management activities and provide special use authorizations to access other ownership.

Table 2-3: Summary of Transportation Proposed Actions

Proposed Action	Miles
Add as long-term special use	0.3
Change from special use to OML* 2 road	0.4
Add as OML1 road	0.5
Trail change from open to Class I ATVs to open to Class II ATVs	0.6
Decommission	0.8
Existing trails to be used as temporary road access for management activities	4.6
Existing roads to be used for temporary road access for management activities	12.4
Unclassified roads to be used for temporary road access for management activities that were to be decommissioned under TMR (U5059, U537804C, U542801A, U514602)	1.17
Construction of temporary roads	47.5

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

Temporary roads: Approximately 47.5 miles of new temporary roads would be constructed to access approximately 6,000 acres of proposed treatment units. All temporary roads would be effectively closed to motorized traffic between treatments when some type of secondary treatment is needed. Decommissioning of these roads would occur once all treatments are completed and access is no longer needed. Please refer to the Forest Plan for temporary road and decommissioning direction (pp. 2-47 to 2–50).

Decommissioning is defined in the Forest Plan as "activities that result in the stabilization and restoration of unneeded roads to a more natural state" (p. Glossary-22). This includes all new temporary roads and existing unclassified roads. Figure 2-1 was taken from monitoring conducted on 25 temporary roads across the west zone of the Forest in 2011 (project record). There were only two instances of recent motorized vehicle use after the roads were deemed closed. This is similar to the 2009 Monitoring and Evaluation Report, which concluded that the Superior National Forest is 80 percent effective in preventing motorized recreation vehicle travel on temporary roads. (Forest Monitoring Reports: FY 2005, pp. 183-194 and 200-208; FY 2006, pp.94-104; FY 2007, pp. 87-93).

Figure 2-1: Effective road closure. Picture was taken immediately after decommissioning following a recent timber sale. Multiple berms and tree transplants were used. There was no RMV use.

SUMMARY OF ACTIONS-RECREATION

As discussed in Chapter 1-Purpose and Need, the Pearl Project proposed action is to officially recognize, designate, and manage camping areas at Beetle and Dunnigan Lakes as dispersed recreation campsites. In addition, a 0.6 mile segment (51085B) of the Stony Spur Trail between FR 388 and FR 377E that is currently only open to Class I ATVs would be opened to Class II ATVs.

2.4 ALTERNATIVES CONSIDERED AND NOT CARRIED FORWARD FOR DETAILED ANALYSIS

Some of the comments submitted by the public regarding the Proposed Action included suggestions for alternatives. Some of the public's suggested alternatives were already part of, or incorporated into, the design of the proposed action and the no action alternative. Other comments were considered outside the project's Purpose and Need or would not comply with Forest Plan direction or applicable environmental regulations. The IDT considered Alternatives A, B, C and D but 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 Pearl Project
- Issue driving the alternative would be resolved during project implementation
- Was a duplication within the existing alternatives
- Effects related to the issue are limited in scope, duration or intensity

ALTERNATIVE A: PROPOSED ACTION FROM SCOPING REPORT

In November 2013, a Scoping Report was distributed to the public informing them of the Pearl Project. The Scoping Report included a "Proposed Action" which outlined management activities the interdisciplinary team had determined would best accomplish the Purpose and Need

for Action as described in the report. As explained during scoping, the interdisciplinary team continued to refine the proposal in collaboration with interested parties during the development of issues and alternatives. The interdisciplinary team modified the Proposed Action based on a review of comments received and further evaluation of the existing condition. The primary modifications are:

1. Three units totaling 90 acres of clearcut and coppice harvest were deleted from the Proposed Action because they were identified to be goshawk fledging areas.
2. Three units totaling 97 acres of clearcut and coppice harvest were added to the Proposed Action to eliminate the need for long-term OML1 road construction. Once these units are harvested the temporary access will be decommissioned.
3. An existing unclassified road that is not part of a previous decision will be decommissioned (0.8 miles).
4. There are 749 acres of regeneration harvests (coppice, clearcut, shelterwood) that were dropped because they exceeded Forest Plan standards and guidelines within Lynx Analysis Unit 11 (LAU 11). While analyzing and summarizing data for the Biological Assessment (BA), it was determined that, within LAU 11, unsuitable habitat would exceed the 15 percent threshold over a ten year time period (Forest Plan, S-WL-1). An additional 42 acres were changed from coppice cut to riparian treatments, to reduce the amount of unsuitable lynx habitat but still improve the stand conditions for riparian purposes.
5. An additional 314 acres of regeneration harvests (coppice, clearcut, shelterwood) were dropped from the biological assessment analysis because they did not meet the minimum allowable age for even age regeneration harvests (S-TM-5).

The 1,105 acres discussed in numbers 4 and 5 above were dropped from lynx, MIH, and large mature patch analyses for the BA; however, they were included in all other resource analyses and discussions in Chapter 3. These units are denoted with an asterisk in Appendix B and displayed on the Alternative 2 map. There are approximately 2.5 miles of new temporary roads that may not be needed in association with the dropped units.

This original Proposed Action was not carried forward for detailed analysis primarily because the interdisciplinary team obtained more stand information and conducted further analysis which required modifications be made to better meet the project objectives (Purpose and Need).

ALTERNATIVE B: NO HERBICIDE USE FOR VEGETATION MANAGEMENT ACTIVITIES

Concerns were raised during scoping on proposed herbicide treatments for vegetation management activities. The Sierra Club stated that the proposal is primarily for economic reasons and raised concerns about water resources, sensitive plants, and their habitats. The 1854 Treaty Authority requested that locations be identified, limited as much as possible, and that a summary be outlined in one location in the document. Another commenter, Dick Artley, expressed concern over herbicide use in correlation to toxins to the environment. One commenter supported the use of herbicide along with other treatments to bring back a healthy forest.

This alternative was not considered in detail because the potential effects would be limited in scope and intensity due to the application of design features and mitigation measures described in Appendix B and evaluated in Chapter 3. In addition, a 'no herbicide use for vegetation management activities' alternative was evaluated in detail in comparison to an alternative that proposed herbicide use for the Skibo Vegetation Management Project EA on the Superior National Forest (Project Record). This detailed evaluation in Skibo indicated no significant impacts from use of herbicide and that the similar or identical design features and mitigation measures to those in the Pearl Project would be adequate to limit and avoid adverse effects associated with this issue. The project proposal for Pearl is similar to that of Skibo, and the evaluation for the Skibo Project provides further basis for the conclusion that the effects would be limited in scope and intensity and that the Pearl Project Alternative 2 design features and mitigation measures adequately addresses this issue. Finally, the effects of not using herbicide in a no action scenario are disclosed under Alternative 1.

ALTERNATIVE C: NO NEW TEMPORARY ROAD CONSTRUCTION TO ACCESS VEGETATION TREATMENT UNITS

Public comments raised concern that temporary roads would increase unauthorized camping, trash, and resource abuse; increase soil and water concerns, decrease forest health, contribute to a decline of forest species, increase trespassing, contribute to the spread of non-native invasive species, increase threats to the BWCAW, fragment the forest, etc. Another member of the public was happy to see the proposal for an increase of roads to access forest areas and for general recreational purposes.

This alternative was not considered in detail for several reasons. First, it substantially reduces the ability to meet the Purpose and Need for the project as approximately 7,500 acres of the primary treatments would not be accessible. Of these 400 acres of aspen forest types would not be harvested and converted to jack pine, which is a desired forest type across the upland LEs within the project area. Additionally, 770 acres of diversity planting would not occur. The ability to provide sustainable forest products would also be reduced. Second, Alternative 1 addresses the effects of no new temporary road construction in a no action scenario. Third, effects of temporary road construction were already considered in the Forest Plan EIS and the Forest Plan contains direction to manage temporary roads and minimize effects. These management requirements are incorporated into the Pearl Project proposal (for example, see Appendix A and Forest Plan p. 2-50). The effects of temporary road construction from the Pearl Project are within the scope of effects from temporary roads anticipated in the Forest Plan EIS.

ALTERNATIVE D: NO FUELS REDUCTION

Public comments raised a concern about the effectiveness of fuels reduction treatments in meeting the purpose and need. Alternative D was developed to respond to comments concerning the effectiveness of reducing the risk of wildfire to Wildland Urban Interface (WUI) areas through commercial timber sales and other vegetation treatments within the Pearl Project Area. Specifically, the commenter requested an alternative be analyzed in detail that implements Dr. Cohen's fire risk reduction methods.

"The EA doesn't even mention Dr. Cohen's methods to reduce the risk that wildfires will burn homes and/or kill or injure the families that live there… Analyze a Dr. Cohen fine fuels removal

fire damage risk reduction methods alternative in detail." (Dick Artley's comment letter on Pearl EA)

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

The interdisciplinary team developed an alternative based on these comments. In addition to the public education, the alternative would drop all fuel reduction treatments in the Pearl area. This would remove over 1,750 acres of fuel reduction treatment within the project area focused in the area directly adjacent to the Wildland Urban Interface. This would leave the Sand Lake, Slate/Birch, Babbit area, Isabella, and South areas with untreated fuels on National Forest System land directly adjacent to private ownership. All other treatment units in the proposed action would remain, as they do not have a primary fuel reduction objective.

Education and active implementation of fuel reduction principles and practices within the Home Ignition Zone would continue through the Lake County Community Wildfire Protection Plan, St. Louis County Community Wildfire Plan, and FIREWISE programs under Alternative D. The Superior National Forest, along with its Community Wildfire Protection Plan (CWPP) committee partners, has been actively engaging with property owners in the Wildland Urban Interface. Under Alternative D, the Superior National Forest and its CWPP partners would remain engaged with educating and assisting communities, covering topics such as how to maintain fuel reduction treatments over time and become responsible land stewards within the Wildland Urban Interface.

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

Under Alternative D, 1,750 acres of fuel treatments would not be treated, leaving current conditions to persist. Existing fuel hazards near the Wildland Urban Interface would persist and likely worsen over time as surface fuels accumulate and ladder fuels increase. If a fire were to occur in any of these areas, subsequent negative impacts to values such as private property, forest products, wildlife habitat, and recreation resources could occur.

Alternative D will not be considered further because it would not meet all components of the purpose and need for the Pearl Project. Alternative D would not decrease hazardous fuels within and adjacent to the Wildland Urban Interface in the Pearl Project Area, would not break up the continuity of hazardous fuels nor reduce concentrations of hazardous fuels, and would not create defensible space around private property or other values at risk in the event of a wildland fire. See also Response to Comment 7K in Appendix D to the Draft Decision Notice.

2.5 COMPARISON OF ALTERNATIVES CONSIDERED IN DETAIL

COMPARISON OF EFFECTS OF ALTERNATIVES BY RESOURCE

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

Treaty Rights

Alternative 1-No Action would not be responsive to tribal interests such as improving moose habitat, maintaining or increasing Forest access, or planting long-lived conifer species in riparian areas and adjacent to wild rice lakes. There would be no improvements made to Beetle and Dunnigan Lakes camping areas, nor would the access to these sites be improved.

Under Alternative 2, moose habitat and browse would increase by implementing harvest activities creating young stands and by browse shearing to create new upland forest. Both would enhance the availability of good browse habitat for moose and game animals. Access to forested areas would continue as temporary roads are constructed to access some treatment stands.

Finally, recreation improvement such as addressing resource concerns through improving and maintaining campsites at Beetle and Dunnigan Lakes would occur.

Table 2-4: Alternative Comparison of Management Actions

Indicator	Alternative 1	Alternative 2
Acres of create young forest with harvest	0	12,230
Acres of non-harvest browse shearing	0	80
Improving Beetle and Dunnigan Lakes user camping areas	0	2

Vegetation

Under Alternative 1, aspen forests would continue to age and slowly transition to a mixture of aspen-spruce fir, and eventually to stands dominated by spruce and balsam fir in both the Jack Pine-Black Spruce and Dry Mesic Red and White Pine LEs. In both the Mesic Birch-Aspen-Spruce Fir and Lowland Conifer LEs, the natural successional processes would continue with stands evolving into two-aged stands. Additionally, there would be minimal young stands in the project area, and minimal change to the within-stand diversity would occur with no action.

Forest type and age composition would be more in alignment with Forest Plan objectives through implementing Alternative 2. Within-stand diversity of tree species would increase with the action alternative. A mix of silvicultural practices would be employed to improve species diversity in stands. This would include planting to diversify stands (such as white pine and white spruce), thinning of thick stands to allow for better growth of existing species, and reserving clumps of trees to serve as seed beds for natural regeneration of the stands. Herbicide use would initially decrease stand diversity as applied to hazel or monocultures of aspen but over time enhance stand diversity creating growing space and conditions to allow for better paper birch and jack pine regeneration.

Threatened and Endangered Species

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

Terrestrial Wildlife

Alternative 1 would result in the least amount of disturbance to Regional Forester's Sensitive Species (RFSS) and generally results in a finding of no impact.

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

Aquatic species

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

Alternative 2 may impact individuals but are not likely to cause a trend to federal listing or loss of viability for ebony boghaunter dragonfly, headwaters chilostigman caddisfly, Quebec emerald dragonfly, black sandshell mussel, creek heelsplitter mussel, and northern brook lamprey.

Alternative 2 would have no impact to lake sturgeon, Nipigon cisco, or shortjaw cisco.

Plant Species

Alternative 1 may impact five RFSS plant species; however, this impact is not likely to cause a trend toward federally listing these species or loss in their population viability. None of the remaining RFSS plants would be directly, indirectly, or cumulatively impacted by Alternative 1. Alternative 2 may impact 47 RFSS plant species; however, this impact is not likely to cause a trend toward federally listing these species or loss in their population viability. None of the remaining RFSS plants would be directly, indirectly, or cumulatively impacted by Alternative 2.

Soil Productivity and Wetlands

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

Non-Native Invasive Plants

When direct, indirect, and cumulative effects are considered together, Alternative 1 emerges as the alternative with the lower risk of weed spread and subsequent negative impacts because there would be no ground disturbance with this alternative. Alternative 2 has a higher risk of weed spread and negative impacts than Alternative 1, but overall the risk for Alternative 2 would still be relatively low.

Water Resources

Alternative 1 would have no direct effects to water quality because there would be neither an increase in road miles, no new stream crossings, nor an increase in the percentage of watersheds in a young or open condition. Impacts to water quality would be minimal under Alternative 2. Potential effects from Alternative 2 may come from road construction and decommissioning which cause short-term soil erosion and point-source sediment inputs into local streams in the analysis area; however, by following Operational Standards and Guidelines and site specific mitigation measures, effects are expected to be minimal. Additionally, minimal impact from three temporary stream crossings is expected through adhering to Forest Plan and MFRC guidelines.

Scenery

Alternative 1 would have no direct impacts to scenery although vegetation treatment goals to move scenic resources to Forest Plan desired conditions of improving species diversity and increasing the component of long-lived conifers would not occur. Thus, the forest would continue to age and change according to natural processes.

Under Alternative 2, treatments would be utilized to enhance the project area's high scenic integrity objectives such as lakeshores, recreation sites, and trails. Additionally, forest visitors would notice change to scenic values directly after harvest to some of the project area from logging debris, site preparation activities, and changes in vegetation composition and structure. Over time, the harvested area would revegetate and logging slash would settle.

Recreation

Under Alternative 1 no management activities would occur therefore no short-term impacts to recreation areas from treatments would affect these sites, nor would any new recreation related projects such as new campsites, improved boat accesses, or the redesignation of trails or roads for OHV use occur.

For Alternative 2, recreational opportunities in the project area would include widening six-tenths of a mile of the Stony Spur ATV trail to accommodate Class II ATVs and create designated campsites at both Beetle and Dunnigan Lakes.

2.6 COMPARISON OF HOW ALTERNATIVES MEET PURPOSE AND NEED

This section explains how each alternative would meet the objectives of the Purpose and Need (see Section 1.4 for the Purpose and Need). The acres listed are based on the acres in our vegetation database for each unit proposed for treatment. Acres that would actually be treated are likely be less because of further refinement of stand boundaries and operable areas during implementation.

Restore Native Vegetation Communities

Alternative 1 would not treat any area in the Pearl Project Area. 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, stands with young rotation ages, such as aspen and jack pine are succeeding to balsam fir and brush species in the absence of disturbance. The loss of these components of the native vegetation communities might reduce the resiliency of the forest and further compound the effects of climate change.

Activities in Alternative 2 would increase or maintain key tree species of native vegetation communities including increasing jack pine, red pine, and paper birch and; maintaining white pine. Actions with this alternative would increase the amount of young acres with harvest, which is in line with 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 release 280 acres and plant 620 acres in riparian stands. Secondary treatments would diversity plant 3,080 acres and conversion plant and/or seed 1,180 acres. Temporary roads would be constructed to access forest units to conduct the various proposed treatments and decommissioned upon completion.

Figure 2-2: Young planted white pine after even-aged treatment

Provide Sustainable Timber Products

Alternative 1 would not provide timber 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.

Vegetation management has the potential to provide wood products for business and mills in northern Minnesota as directed by the Forest Plan. Treatments designed to meet other project objectives could be accomplished through the sale of marketable wood products, including tops of trees for biomass. Alternative 2 identifies approximately 23,000 acres of forest within the Pearl Project Area as needing some type of treatment to create young forest and improve stand condition with harvesting. Approximately 93 percent of these acres are suitable (correct age, basal area, etc.) for commercial timber harvest. Timber harvest on the suitable forestlands within the project area would meet the needs of sustaining a healthy forest and providing an economic opportunity to local communities.

Reintroduce Fire into a Fire Dependent Ecosystem

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 build-up of fuels has accumulated in parts of the project area and fire has not been allowed to play its natural role in the management of ecosystems that depend on it. Table 2-5 shows acres planned for all fuel reduction and prescribed fire treatments.

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.

Following direction from the Forest Plan, Alternative 2 includes underburning approximately 7,150 acres in older red and white pine forest to reduce the potential risk of high-intensity crown fires and allow for an increase in structural and species diversity in these stands. Some of the under burning would occur as a secondary treatment after the stands are thinned.

Introducing fire into brush and grass systems rejuvenates growth of both vegetative types resulting in improved wildlife habitat. This project proposal contains 50 acres of broadcast burning in brush and grass habitat along a tributary of the Dunka River.

Finally, approximately 300 acres of broadcast burn and 180 acres of secondary site prep burn are proposed 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.

Reduce Hazardous Fuel

The area between National Forest System land and private homes, cabins, camps, and other human development is called Wildland Urban Interface (WUI). In the Pearl Project Area there are four primary WUI areas: the Matilla Rd/Dunka Bay of Birch Lake Area, the Stony River/Wander Rd/Slate Lake/Chub Lake Area, the Camp Buckskin/McDougal Lake area, and the Sand Lake Area. 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. 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. Table 2-5 shows acres planned for all fuel reduction and prescribed fire treatments.

Alternative 1 would not change existing fuel hazards in forest stands, adjacent roadways, and near WUI areas. Existing fuel volumes would increase throughout most forested land within the project area due to dead, dying, self-pruning, and wind thrown trees. Excessive fuel loadings coupled with succession trends toward spruce/fir types could result in intense wildfires.

There is a need to reduce fuels within WUI in the project area. Alternative 2 would reduce hazardous fuel on approximately 2,010 acres in WUI areas. Fuel treatment methods include cutting of understory trees by hand or mechanical, removing biomass off site, chipping on site, pile burning on site, and prescribed understory to maintain the fuels reduction.

Table 2-5: Comparison of Fuel Reduction and Fire Reintroduction Acres by Alternative		
Treatment	**Alt. 1- Acres**	**Alt. 2- Acres**
Broadcast Burn: Management ignited fire which is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, vegetation management treatment, or both.	0	350
Underburn: A prescribed fire that consumes surface fuel but not the overstory canopy. This can be used when overstory is being retained or post-harvest as a secondary treatment.	0	7,194
Fuel Treatments: Manipulation or removal of fuel loading to reduce the potential damage and spread of a wildfire.	0	1,750
Broadcast Burn for Site Preparation: Harvest slash is consumed to reduce fuel hazard to an acceptable level. Brush and duff are reduced as well to promote successful regeneration.	0	260

Improve Riparian Function

Some riparian areas along the Stony River, Little Isabella River, Baird Lake, Shamrock Lake, Dunnigan Lake, Bear Skin Lake, Gander Lake, Alsike Lake, a tributary to Birch Lake, and a few small connector wetland in the Pearl 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.

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

Alternative 2 proposes to improve riparian areas by promoting and maintaining long-lived conifer species on 720 acres. Activities would include hand release of advanced regeneration of long-lived conifer, timber harvest (if appropriate and within Forest Plan direction and Best Management Practices), and tree planting. Any harvesting activities planned adjacent to a water body would be done so only to improve riparian function and would follow Forest Plan and MFRC Guidelines. Herbicides would not be used in riparian areas.

Improve Wildlife Habitat

Alternative 1 would not improve wildlife habitat improvement through vegetation management.

Alternative 2 would improve wildlife habitat in the project area by:

- creating young forest for moose and deer browse, and myriad other early-successional wildlife species
- increasing the conifer component of stands through diversity planting
- shearing in non-forested stands to stimulate new growth and

  managing riparian areas for long-lived conifer and mature tree species to provide future bald eagle nest sites and maintain water quality for aquatic species.

Improve Habitat for Sensitive Species

There are a high number of known sensitive plant locations in the Pearl area; however, there are not many opportunities to improve sensitive plant habitat. For most sensitive plants in the project area, the desired condition for their habitats is currently present. However two sensitive plants-least moonwort (*Botrychium simplex*) and ternate grapefern (*Botrychium rugulosum*), are both found in an old wildlife opening that is being encroached upon by small trees and shrubs. There is a need to improve habitat condition for these species that prefer more open habitat. The proposed activity is to remove encroaching vegetation using hand tools and brush saws on approximately one acre.

In Alternative 1 the wildlife opening would continue to be encroached upon and eventually create a habitat too closed for these sensitive species to survive. There would be no management actions occurring under this alternative therefore the change of current habitats would only change through succession, which would tend to be dominated by closed stands or brush and balsam fir. Alternative 2 would maintain this opening by removing the encroaching vegetation.

Improve Recreational Opportunities

There are locations within the project area that receive frequent use but are not being managed as recreation sites. Forest users have created campsites at both Beetle and Dunnigan Lakes. Both lakes receive a moderate level of use and are highly desirable fishing lakes. Both sites are also used each spring by the Finland Fisheries DNR for fish stocking. These sites are currently not managed recreation sites therefore resource damage is occurring. At Beetle Lake the slope to the water's edge is prone to erosion. At Dunnigan Lake the access road and unimproved lake access is small, brushed in, and inadequate to accommodate recreation uses other than launching a boat. Alternative 1 would allow for existing use patterns to continue without improving access or erosion issues, nor would the sites have a fire grate or latrine installed.

Alternative 2 would accommodate current use patterns, address resource damage, and assist DNR fish stocking efforts by officially recognizing, designating, and managing both of these sites as dispersed recreation campsites. Improvements would include brush clearing to improve access to the campsites, rehabilitate any existing erosion problems and install appropriate erosion control feature to prevent future problems, as well as install a fire grate and latrine.

Provide Motorized Travel Routes Including Roads and Trails

The Pearl Project Area includes most of the 26 mile long Stony Spur ATV/Snowmobile Trail and numerous low level gravel roads where recreational ATV riding is allowed. The Stony Spur Trail begins in the City of Babbitt and ends within the project area on Forest Road (FR) 377E at an ATV/snowmobile trail shelter named the Matilla Shelter. The segment of the Stony Spur Trail from Babbitt to FR 388 is open to both Class I ATVs (50" or less in width) and Class II ATVs (65" or less in width) which includes what are also referred to as side-by-side ATVs. There is a short (0.6 mile) segment (51085B) of the Stony Spur Trail between FR 388 and FR 377E that is currently only open to Class I ATVs.

Alternative 2 would open the 0.6 mile segment of Stony Spur Trail (currently open to Class I ATVs) to Class II ATVs. While under Alternative 1 this segment of the trail would be the only place along the Stony Spur Trail that does not permit Class II ATVs. The only modification needed to open segment 51085B to Class II ATVs would be wider brushing specifications from the existing 8 to 10 foot corridor to a wider 12 to 14 foot corridor.

Provide an Adequate Road System

There is a need to provide reasonable access across National Forest System land to non-NFS landowners in two locations. Both the DNR and St. Louis County have expressed the desire to access some of their lands that are currently land locked by federal land. Our proposal is to allow a 0.3 mile long-term special use road to be built to access DNR lands. We also propose to allow the county to construct a 0.5 mile road to their parcel which we would manage as a closed National Forest System road (OML 1) when not in use. A change of designation of approximately 0.4 miles special use authorization to OML 2 is needed to address the access to Beetle Lake. Currently, the road is gated to prevent public use; however, there is a user ATV trail around the gate which leads to a user developed campsite. Alternative 1 would not grant special use authorizations across Forest Service land to access other ownership under this analysis. Nor would this alternative remove the gate and change road designation to allow public use and current user patterns would continue.

Alternative 2 would change the designation of approximately 0.4 miles of existing road from "special use" (which is currently gated and closed to motorized used by the public) to "OML 2" (which would be open and drivable to the public). Additionally, the road would be widened slightly near the access trail to the campsite to allow for parking, and the gate would be moved to just past the parking area for the campsite. This alternative would also allow State and county land managers to access ownership across Forest Service lands.

Under Alternative 2 approximately 47.5 miles of temporary roads would be needed to access and accomplish many of the desired conditions and objectives. These temporary roads are minimally constructed, would be closed between uses and decommissioned upon completion of all secondary and reforestation treatments, and are not intended to be used by the public and are not considered here as they are not, nor will they become system roads under this analysis.

2.7 MONITORING

Monitoring assesses whether the project was implemented as designed and if project implementation direction were effective in protecting natural resources and their beneficial uses. Two types of monitoring are conducted on the Superior National Forest:

1) Effectiveness monitoring
2) Implementation monitoring

Effectiveness Monitoring
Effectiveness monitoring addresses how well management actions achieve desired outcomes or objectives that are identified in the Forest Plan. The National Forest Management Act (NFMA) requires that national forests monitor and evaluate their forest plans (36 CFR 219.11). Also, see Chapter 4 of the Forest Plan. This kind of monitoring is conducted over the entire Forest on a periodic basis and the monitoring results are used on future projects. Forest Plan monitoring results can be on the Forest website at
http://www.fs.usda.gov/main/superior/landmanagement/planning

Implementation Monitoring
Implementation monitoring is tied to specific projects. Implementation monitoring assesses whether the projects mitigations and design criteria were properly implemented and whether project implementation complies with the decision made on this project. Table 2-6 outlines the

kind of implementation monitoring that will be done for this project if Alternative 2 were selected for implementation.

In addition, the project interdisciplinary team will periodically review the project implementation as a whole during field trips and follow-up meetings. If monitoring indicates project implementation is not occurring as planned, measures will be taken immediately to correct the actions. For example, if timber sale layout does not correctly meet design features for a resource area or mitigations have not been met, changes will be made prior to the sale being sold. Likewise, if a sale contractor were non-compliant during contract administration, operations will cease until compliance is assured.

Table 2-6: Description of Monitoring Activities	
Harvest and Site Preparation-Layout	
Objective	Ensure that the mitigation measures and design criteria are incorporated into layout and included in contracts as provisions.
Methods	Implementation staff is provided prescriptions containing all site specific mitigations. Compare contracts to unit mitigations/design criteria.
Frequency	Every sale prior to award.
Responsibility	Timber Management Assistant, District Silviculturist, Forest Service Representative (FSR)
Herbicide Use	
Objective	Ensure mitigations and design criteria are adhered to as outlined to meet project objectives. Determine if herbicide has drifted outside the unit it was intended to treat.
Methods	Visual inspection along the edge of treatment unit to determine if herbicide drifted outside of intended unit, monitoring if utilized in area containing sensitive or rare plants, monitoring along water and riparian areas.
Frequency	After one month of herbicide application.
Responsibility	Silviculturist
Scenery/Recreation	
Objective	Minimize impacts to recreation users – especially visual impacts adjacent to lakes.
Methods	Site visits on five percent of timber sales within the project area prior to or during layout to ensure the mitigations are met.
Frequency	During the unit layout or preparation, prior to implementation.
Responsibility	Recreation Planner, Lead Sale Preparation personnel
Non-Native Invasive Plants	
Objective	Avoid or minimize an increase in the extent of non-native plant infestation in the project area.
Methods	Monitor a minimum of 10 percent of harvest units and newly constructed roads after harvest, site preparation, or construction to determine if invasive plants have colonized areas where management activities have occurred

Table 2-6: Description of Monitoring Activities	
Frequency	Year two following the harvest.
Responsibility	Forest Plant Ecologist
Sensitive Plants	
Objective	Avoid or minimize impacts to known rare plant locations in the project area.
Methods	Monitor a minimum of 75 percent of treatment units to verify that rare sites were avoided where possible.
Frequency	Year two following the harvest.
Responsibility	Forest Plant Ecologist

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter presents the 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 the alternatives. The "Environmental Consequences" portion of each section below describes the direct, indirect, and cumulative effects of the alternatives.

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

The 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, age, basal area, and site index. The database is continually updated when treatments that change stand characteristics, such as harvest, occur. The database was also updated in 2014 from stand inventories completed prior to initiating this project. Data from FSVEG Spatial was extracted in 2014 and used for this analysis.

The interdisciplinary team is aware of possible inaccuracies and limitations of the data. The forest is highly variable and constantly changing and not all stand data are current. However, the interdisciplinary team concluded it is the best available forest information and is adequate for analysis and drawing conclusions. Additional data and accuracy would add precision to estimates or better define a relationship; however, the basic data and central relationships are sufficiently well-established in the respective sciences that additional accuracy is unlikely to reverse or nullify understood relationships. Thus, additional information would be welcomed and add precision, but it is not considered essential to provide adequate information for the decision-maker to make a reasoned choice among alternatives.

For the analysis, 2014 is the existing condition, the year most of the analysis was done. The year 2024 was used to analyze the alternatives and stands ages were set to year zero. Analyses based on landscape ecosystems objectives or management indicator habitats were projected to 2020. The years 2020 and 2024 were used because most of the proposed action would be implemented within that timeframe, and it is far enough in the future to allow comparison of second decade objectives and projections in the Forest Plan (FP) and Forest Plan Final Environmental Impact Statement (FEIS).

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

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 future actions, regardless of what agency or person undertakes such further action. These actions are described in Appendix D. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

3.2 TREATY RIGHTS

3.2.1INTRODUCTION

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

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

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

Article 11 of the 1854 Treaty states that Ojibwe within the treaty area would continue to have the right to hunt and fish on lands they ceded. A court decision (Fond du Lac Band of Chippewa v. Carlson) 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 Pearl Project. Cover letters and preliminary proposed action maps were mailed to all three bands, along with scoping materials. Comments received and considered from 1854 Treaty Authority include:

- Improving moose habitat in the project's key objectives and working with other resource management to address moose issues.
- Continued access to Forest areas and support of improvements to access and camp at Beetle and Dunnigan Lakes.
- Outline our herbicide proposal (see Appendix A for design features and mitigation measures). Additionally, concerns over increase use of herbicide on the Forest.
- Wild rice population present in project area.
- Impacts to riparian areas including scenic impacts. Favor species not favored by beaver around wild rice lakes.

How Specific Comments/Concerns Raised By 1854 Treaty Authority Were Addressed.

The following comment was received from 1854 Treaty Authority in regards to moose habitat in the project area. The comment indicates that the proposed action should include improving moose habitat through coordinated efforts.

"With concern over a declining moose population and closure of hunting seasons in 2013, we strongly support the inclusion of improving moose habitat in the project's key objectives. We encourage the Forest Service to continue to work with other resource managers (tribal, state, etc.) in cooperative efforts addressing moose issues."

The Pearl Project IDT acknowledges their suggestion and agreed to include it as a key objective for the purpose and need of the Pearl Project (Pearl Scoping Report, pp. 1, 12-13). Specific actions proposed under Alternative 2 that would enhance and promote moose habitat include diversity planting of 3,080 acres of conifer to increase stand complexity and for long-term thermal cover, prescribed burning of 7,500 acres to restore and maintain the natural disturbance pattern, even-aged timber harvest on 12,230 acres for young forest providing browse, and 76 acres of shearing and follow-up burns to two locations that have been used by moose for the past two decades.

- Continued access to Forest areas and support of improvements to access and camp at Beetle and Dunnigan Lakes.

"Access to the Forest continues to be important for Band members exercising treaty rights to hunt, fish, and gather. Management of and changes to access opportunities within the Forest have the potential to impact these rights. We support proposed improvements to access and camping at Beetle and Dunnigan lakes."

Access and enjoyment to areas on the Forest and in the Pearl Project was considered by the Pearl IDT. A transportation assessment analyzing roads and trails was completed for Alternatives 1 and 2 (See Ch. 2-Transportation and Ch. 3.10-Recreation and Scenery.)

Additionally, following Forest Plan desired condition D-REC-13, the Forest will provide dispersed recreational facilities such as campsites and picnic sites for small groups. Improving these areas that are receiving heavy use with no developed site is important for the Pearl Project, Forest visitor enjoyment, and resource protection.

- Outline our herbicide proposal. Additionally, concerns over increase use of herbicide on the Forest.

"…this is not clearly outlined in one location in the document, and it would be helpful to provide a better summary. We have concern with the large applications of herbicide and potential increased use in the Forest. Applications should be limited as much as possible and specifically targeted."

a full analysis of the herbicides proposed for usage with Alternative 2 is disclosed in Chapter 3 of the EA. Additionally see Appendix A for a listing of mitigations and project design criteria for herbicide use and Ch. 3.8 in the EA for site-specific information on application areas (Figure 3.8-4).

Wild rice population present in project area.

"A number of wild rice waters are within the project area. Timber harvest units are located adjacent to two waters commonly used by wild rice harvesters."

The activities proposed near these wild rice populations should have no impact on them. Management objectives for these stands include riparian treatments, red pine thinnings, fuels treatments, etc. These treatments are intended to increase the component of long-lived conifer species such as red pine, white pine, and white spruce, reduce competition in the pine stands, and mechanically remove the balsam in fuel reduction stands, decreasing the fuel load and fire hazard. These treatments should not impair the wild rice vegetation within these waters.

- Impacts to riparian areas including scenic impacts. Favor species not favored by beaver around wild rice lakes.

As noted above, a number of treatments in stands along Pearl Project lakes are proposed to enhance the riparian and fisheries/aquatic health, stabilize the soil on the slopes, and enhance the scenic aspects of these lakes. The need to improve riparian function was identified as a Purpose and Need action for the Pearl Project (see Scoping Report, p. 11 and Ch. 1 in EA). Maintaining and enhancing existing Forest and Project scenic resources has been analyzed in the EA, section 3.6.

The planting of desired conifer species under the existing canopy of trees or the hand release of these species with a chainsaw where the species already occur, should have no impact on water quality or wild rice habitat. Our long-term goal is to ensure that the banks of these areas are stable so as to minimize erosion into these aquatic systems.

3.3 BOUNDARY WATERS CANOE AREA WILDERNESS

The Forest Service has the responsibility to protect the wilderness character of the Boundary Waters Canoe Area Wilderness (BWCAW). The Pearl Project is not adjacent to the BWCAW and based on environmental analysis and monitoring from past vegetation management projects, effects to the Wilderness would be minimal or none. In summary, the effects are the following to four qualities of wilderness character:

- Undeveloped: Alternatives 1 and 2 do not have any activities nor will create any temporary or permanent improvements within the Wilderness, the undeveloped quality of the BWCAW will not be affected.

- Untrammeled: The existing untrammeled nature of the BWCAW will be unchanged by Alternatives 1 and 2 since there are no activities proposed within the BWCAW.

- Natural: Alternative 1 would not affect the natural quality since no management activities would occur and existing ecological processes would continue. Due to the distance from the BWCAW, the nature of activities proposed (which are similar to those completed in the past in areas of the Forest outside the Wilderness), and mitigation measures; impacts to air quality, water quality, NNIS spread, vegetation, soils, and wildlife in the Wilderness would be minimal or none from Alternative 2.

- Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Alternative 1 would not affect this quality since no management activities would occur. For Alternative 2, most of the project area is over 2 miles from the BWCAW and timber harvest and other project noise is likely to be faint or inaudible from this distance. There are a few harvest units in a northern tip of the project area within a mile that may project noticeable noise into the Semi-Primitive Non-Motorized Wilderness Management Area near the Wilderness boundary from timber harvest. This would be a short term effect since the sound would end when harvest is complete. The activity would not be different from existing and ongoing forest management activities that occur outside the Wilderness. In the SPNM MA, the Forest Plan states “Opportunities for experiencing isolation and solitude are moderate to low” (Forest Plan p. 3-45). Effects from Alternative 2 would be minimal or none.

3.4 VEGETATION

3.4.1 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 Pearl Project Area as it relates to moving the Forest towards Forest Plan desired conditions. Effects are displayed by landscape ecosystem (LE). These LEs represent the most current and best scientific information to use in analyzing forest vegetation. The LEs were described and delineated as part of the Forest Plan 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 Forest Plan present vegetation objectives for the different LEs on the Forest. See Chapter 1, section 1.3 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 Forest Plan vegetation objectives apply to National Forest System (NFS) lands outside the BWCAW. Forest Plan EIS cumulative effects analysis took into account not only NFS land, but non-NFS land as well.

The Pearl Project was designed to move toward forest vegetation management objectives as described in the Forest Plan (USDA Forest Service 2004a). The action alternative (Alternative 2) follows management direction and identifies stands to provide forest products at a sustainable level (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 the Pearl Project by reviewing all stands within the project boundary. From this, stands were identified for management activity based on their condition, and how management of the stands could contribute to meeting Forest Plan desired future conditions. Many vegetation treatments were focused on increasing the number of acres in patches and maintaining the continuity of the patches. Alternative 2 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 were adjusted by the interdisciplinary team to the proposed stands considered under Alternative 2.

Appendix B includes information on the types of vegetation management activities proposed, lists units proposed for treatment, and the type of treatment.

The Pearl Project's effects analysis for the vegetation resource is tiered to the Forest Plan Environmental Impact Statement (USDA Forest Service 2004b). The Forest Plan EIS considered the role of disturbance, the range of natural variability, ecological classifications, and landscape ecosystems. The EIS also disclosed the effects of implementing the Forest-wide objectives. The

Pearl Project effects analysis discloses the effects of the project on vegetation and how each alternative would contribute towards meeting Forest Plan objectives and desired future conditions. The Pearl EA does not repeat the analysis documented in the Forest Plan EIS.

3.4.2 ANALYSIS METHODS

The Forest Plan 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 Pearl Project alternatives would move each LE toward the desired future condition described in the Forest Plan. The fourth objective is Management Indicator Habitats which are addressed in the Forest Plan.

Indicator 1: Species composition

This indicator describes the 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 the differences between alternative 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 the change in age class distribution as a result of each alternative in the project area. This indicator highlights the 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 the change in within-stand diversity as a result of each alternative. This indicator highlights the difference in alternatives because different treatment methods would result in different effects to within-stand diversity. For this analysis, within-stand diversity refers to both overall structure and species diversity. Vertical structure is the bottom to top configuration of above ground vegetation within a forested stand and varies with forest type and ages. Stand complexity changes markedly during forest succession, from a relatively simple structure in early successional stands to more complex structures displayed as stands age (Oliver and Larson 1996).

3.4.3 ANALYSIS AREA

The geographic boundary selected for analyzing the direct and indirect effects is NFS land within the Pearl 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 Pearl Project boundary. This analysis area was chosen because it shows how the actions would help to meet the objectives of the Forest Plan for each particular LE and would disclose the effects on vegetation within those LEs. While LEs span across the entire Superior National Forest, proposed actions for this project are

limited to the Pearl Project boundary; however, effects of those actions will be reflected for the entire LE.

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

The time period selected for the direct, indirect, and cumulative effects analysis is six years into the future. Data used to establish the existing condition is from 2014, which would mean the analysis period would go to 2020. This timeline was chosen because six years is a sufficient amount of time for proposed actions from this project to be implemented and analyze the changes to the age class and species composition. Using six years as a timeline also allows for comparison to Forest Plan goals and objectives for LEs, as 2020 is over the halfway point towards achieving Decade 2 objectives outlined in the Plan.

Since the existing condition is a very reliable snapshot of past cumulative effects on forest types and age class, the forest type and age class distribution of the project area in the year 2012 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.

3.4.4 AFFECTED ENVIRONMENT

The forest that exists today evolved as a result of both natural and human processes. The 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 Pearl 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 Pearl Project has objectives for species composition, age class distribution, and within-stand diversity. The Forest Plan EIS established these objectives by not only considering the historic composition and structure of the Forest, but also the desired future condition within a social, ecological, and economic context. Each affected LE 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 Pearl Project Area are a mix of species. The Forest Plan EIS (USDA Forest Service 2004b) describes some of the limitations in forest typing, recognizing that most forest types are more diverse in species composition than is indicated by their type. For example, many stands identified as 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 3.4-1 through 3.4-3 provide both Forest wide and project area species composition information. The first set of numbers shows the percent of each forest type Forest wide. The percentages are shown for the existing condition, the projected condition in 2020 (assumes implementation of Pearl Alternative 2), and Forest Plan objectives for Decade 2. The second set of numbers is specific to the Pearl Project Area. The numbers show the breakdown of forest type by acres, and include the existing condition, Alternative 1(no action), and Alternative 2 (the action alternative). The tables show this breakdown for three (upland LEs) of the five landscape ecosystems that were analyzed for species composition. The lowland landscape ecosystem species composition objectives listed in the Forest Plan 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 (refer to SNF Forest Plan, page 2-76, Table LLC-1).

Table 3.4-1 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. Forest Plan objectives also seek an increase in spruce-fir forest type over the existing condition. This table also shows that the projected condition in 2020 for aspen and jack pine forest types will not be at the desired objectives based on projects implemented through 2020; in fact they are projected to decrease from the current condition. This shows there is a continued need to decrease aspen and increase jack pine on other parts of the LE across the Forest. The spruce-fir forest types will be increasing beyond desired condition due to treatment as well as inactivity as older aspen stands transition to a spruce-fir forest type. Forest types such as red pine and paper birch will be at or near Forest Plan objectives for Decade 2 by 2020 with the exception of white pine. Although white pine would be maintained, the desired future condition is an increase for this type. Aspen occupies the most acreage across all the LEs due to past practices of harvesting other forest types and allowing aspen to occupy them, which consequently allowed this type to be much more dominant on the landscape than had naturally occurred in the past.

Table 3.4-1: Vegetation Composition in the Jack Pine-Black Spruce LE

Upland Forest Type	Forest wide [1] (Percentage)			Pearl Project Area[3] (Acres)		
	Existing Condition (2013)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2013)	Alt. 1	Alt. 2
Jack pine	23	22	32	4,978	4,711	5,699
Red pine	10	10	10	3,099	3,099	3,137
White pine	4	4	3	175	175	175
Spruce-fir	13	19	16	1,661	2,446	2,327
Northern Hardwoods	1	1	0	0	0	0
Aspen	45	40	35	8,277	7,803	6,884
Paper birch	4	4	4	934	891	902
Total[5]	**100**	**100**	**100**	**19,124**	**19,125**	**19,124**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers of acres may vary slightly due to rounding.

The next upland landscape ecosystem that is in the project area is the Dry Mesic Red and White Pine LE (Table 3.4-2). Aspen dominates the LE, making up 51 percent of the existing total acres, followed by the pines (each are a close second). Plan objectives seek a decrease in aspen forest type and a slight increase in all the other forest types. This table shows that the projected condition in 2020 for all forest types will be at or near the desired objectives based on projects implemented through 2020. It also shows that there is a successful trend in meeting desired future conditions of the plan for this LE; all forest types would be at or near Forest Plan objectives for Decade 2 by the 2020).

Table 3.4-2: Vegetation Composition in the Dry Mesic Red and White Pine LE

Upland Forest Type	Forest wide [1] (Percentage)			Pearl Project Area[3] (Acres)		
	Existing Condition (2013)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2013)	Alt. 1	Alt. 2
Jack pine	9	9	10	2,978	2,793	2,892
Red pine	12	13	13	4,553	4,553	4,595
White pine	11	11	12	1,086	1,086	1,086
Spruce-fir	8	12	13	1,697	2,839	2,653
Northern Hardwoods	1	1	1	7	7	7
Aspen	51	46	43	13,073	12,160	12,134
Paper birch	8	8	9	2,203	2,159	2,230
Total[5]	**100**	**100**	**101**	**25,597**	**25,597**	**25,597**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers of acres may vary slightly due to rounding.

Aspen also dominates the Mesic Birch/Aspen/Spruce-Fir LE, although the spruce-fir forest type also makes up a substantial portion of the LE (Table 3.4-3). The three pine types each represent anywhere from three to five percent of the acres within this landscape ecosystem. Other than reducing some aspen forest types acres, there are minimal changes needed in regards to species composition in this LE.

Table 3.4-3: Vegetation Composition in the Mesic Birch/Aspen/Spruce-fir LE

Upland Forest Type	Forest wide [1] (Percentage)			Pearl Project Area[3] (Acres)		
	Existing Condition (2013)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2013)	Alt. 1	Alt. 2
Jack pine	3	3	4	485	475	475
Red pine	5	5	5	155	155	155
White pine	3	3	4	8	8	8
Spruce-fir	25	29	26	664	927	739
Northern Hardwoods	5	5	4	0	0	0

Table 3.4-3: Vegetation Composition in the Mesic Birch/Aspen/Spruce-fir LE						
Upland Forest Type	**Forest wide [1] (Percentage)**			**Pearl Project Area[3] (Acres)**		
	Existing Condition (2013)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2013)**	**Alt. 1**	**Alt. 2**
Aspen	45	41	42	1265	1117	1205
Paper birch	14	13	14	1005	899	999
Total[5]	**100**	**100**	**99**	**3,582**	**3,582**	**3,581**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers of acres 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 3.4-4 to 3.4-8, can be displayed in a range of decades (i.e., age classes). Age class distribution tables are displayed much in the same manner as vegetation composition tables. The first set of numbers shows Forest-wide percentages in each age class, while the second set of numbers show acres in each age class, and are specific the Pearl 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. 80-100 year old aspen stand breaking up due to old age with balsam fir or white spruce saplings dominating the gaps created by dying aspen is one example of this condition. In the age class tables, these stands would be counted under the age of the overstory until it has broken apart and the understory begins to dominate.

The Jack Pine-Black Spruce LE is currently dominated by the 10-49, 50-79, and 80-109 age groupings (Table 3.4-4). Acres in 0-9 age class are mostly a result of recent past management activity within the Pearl Project boundary. Although the age groupings are slightly different, the Dry 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 groupings (Table 3.4-5). Over seventy-four percent and eighty-four percent of all the acres across the Forest in these two LEs respectively are in the 10-109 year age classes. This percentage is slightly higher in both LEs for the Pearl Project Area.

Table 3.4-4: Age Class Composition in the Jack Pine-Black Spruce LE						
Age Class	**Forest wide [1] (Percentage)**			**Pearl Project Area[3] (Acres)**		
	Existing Condition (2013)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2013)**	**Alt. 1**	**Alt. 2**
0-9	7	8	14	886	345	4458
10-49	38	39	44	8631	8111	7612
50-79	21	23	18	6031	7250	4807
80-109	25	23	17	2843	2686	1514
109-179	8	7	7	760	759	759
180+	0.10	0.09	0	0	0	0
Total[5]	**99**	**100**	**100**	**19,151**	**19,151**	**19,150**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers may vary slightly due to rounding.

Table 3.4-5: Age Class Composition in the Dry-Mesic Red and White Pine LE						
Age Class	**Forest wide [1] (Percentage)**			**Pearl Project Area[3] (Acres)**		
	Existing Condition (2013)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2013)**	**Alt. 1**	**Alt. 2**
0-9	7	11	10	1449	409	4759
10-49	39	42	46	11908	11626	11163
50-99	36	28	24	8749	9728	6903
100-139	17	17	17	3256	3719	2656
140+	0.51	1.18	2	244	123	123
Total[5]	**100**	**100**	**99**	**25,605**	**25,605**	**25,605**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers may vary slightly due to rounding.

Slightly similar percentages and groupings are also found in the Mesic Birch/Aspen/Spruce-Fir LE (Table 3.4-6). This LE is currently dominated by the 10-49 age grouping, followed by 80-109 age grouping as a close second (Table 3.4-6). Once again acres in 0-9 age class are mostly a result of recent past management activity.

Table 3.4-6: Age Class Composition in the Mesic Birch/Aspen/Spruce-fir LE						
Age Class	**Forest wide [1] (Percentage)**			**Pearl Project Area[3] (Acres)**		
	Existing Condition (2013)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2013)**	**Alt. 1**	**Alt. 2**
0-9	6	5	11	7	7	1398
10-49	38	40	48	839	994	868
50-79	17	13	10	1035	419	157
80-99	26	26	17	1133	1610	793
100+	13	16	14	568	552	367
Total[5]	**100**	**100**	**100**	**3,582**	**3,582**	**3,582**

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. **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 3.4-7 & 3.4-8) is heavily skewed towards the middle and older age classes. Most of the acres fall within the 80 (plus) age classes, and are probably of natural origin. There is a lack of acres within the 0-9 age class. Since the late eighties, lowland forest types were not actively managed on the Forest. Furthermore, many of the lowland forested stands on the Superior National Forest are not suitable for timber production, which has led to a lack of treatments in the past. Within the Pearl Project, all proposed actions would move acres from the 80-159 age class and into the 0-9 age class.

Table 3.4-7: Age Class Composition in the Lowland Conifer - A LE						
Age Class	**Forest wide [1] (Percentage)**			**Pearl Project Area[3] (Acres)**		
	Existing Condition (2013)	**Projected Condition (2020)[4]**	**Objectives[2] for Decade 2**	**Existing Condition (2013)**	**Alt. 1**	**Alt. 2**
0-9	2	5	4	128	0	2243
10-39	6	4	7	1155	729	729
40-79	20	16	14	1791	1589	1491
80-159	69	71	69	9102	9690	7588
160+	3	4	7	449	618	575
Total[5]	**100**	**100**	**101**	**12,625**	**12,626**	**12,626**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers may vary slightly due to rounding.

Table 3.4-8: Age Class Composition in the Lowland Conifer - B LE						
Age Class	Forest wide [1] (Percentage)			Pearl Project Area[3] (Acres)		
	Existing Condition (2013)	Projected Condition (2020)[4]	Objectives[2] for Decade 2	Existing Condition (2013)	Alt. 1	Alt. 2
0-9	0	1	3	22	22	219
10-39	5	4	5	15	0	0
40-79	18	10	7	313	209	209
80-159	70	75	71	3652	3747	3586
160+	7	9	14	128	151	116
Total[5]	**100**	**99**	**100**	**4,130**	**4,129**	**4,130**

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 C contains the list of Forest-wide projects included in 2020 projection. **5**) Total numbers may vary slightly due to rounding.

Within-Stand Diversity

During the 2012 field season, stand inventories were completed on many stands within the project area. In stands that were visited, structural and species diversity were 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 of the stands have gaps in the canopy with shade tolerant species such as balsam fir or spruce beginning to fill in the understory. Decadent aspen and birch are being replaced by hazelnut and balsam 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 (10-109 year age classes) of the upland LEs, within-stand diversity varies. Many of these stands were created from past logging operations. Stands that were regenerated artificially such as red pine plantations tend to have less structural or species diversity than stands that undergo natural succession. These stands are often dominated by a thick understory of hazel nut or balsam fir. 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 Forest Plan 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 substantial quantities within the Lowland Conifer LE.

ENVIRONMENTAL CONSEQUENCES

DIRECT AND INDIRECT EFFECTS

ALTERNATIVE 1 (NO ACTION)

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 and aspen forest types (Table 3.4-1). As aspen forest types age, they slowly transition over to a mixture of aspen-spruce-fir and eventually to a stand that is dominated by spruce-fir. The loss of aspen acres is attributed to this transition over to spruce-fir.

In the Dry Mesic Red and White Pine LE, similar changes would result under Alternative 1 (Table 3.4-2). Acres of old aspen would transition over to the spruce-fir forest type. This same successional process holds true for the Mesic Birch/Aspen/Spruce-Fir LE (Table 3.4-3). All other forest types within this LE would remain relatively unchanged as compared to the existing condition.

In the Lowland Conifer LEs, Alternative 1 would not have much effect on the 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 Forest Plan goals for species composition. In the Jack Pine-Black Spruce LE for example, Forest Plan objectives seek a ten percent increase in the jack pine forest type. Alternative 1 maintains jack pine acres while the Forest as a whole is projected to lose acres currently designated jack pine forest type. Alternative 1 does contribute to Forest Plan objectives as it relates to spruce-fir, as the Forest Plan 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 3.4-4 to 3.4-8). In all of the upland and lowland LEs the existing condition shows varying amounts of acres in the 0-9 age class. These acres are almost all attributed to past projects that had overlapping boundaries and or timelines (such as the Dunka EA projects) with the Pearl Project. By the end of the projection period (2020) a substantial amount of acres in the 0-9 age class move to the next age class across all LEs. The aging of individual stands results in some age groupings gaining acres, while some age groupings lose acres as the vegetation ages from the existing condition to the end of the projection period in 2020.

Alternative 1 does not contribute toward Forest Plan objectives for the 0-9 age class across all LEs. In fact, the lack of management steers these upland LEs counter to Forest Plan objectives. Alternative 1 helps other age groupings meet Forest Plan objectives, while running counter to objectives for other age groupings.

In both Lowland Conifer LEs (Tables 3.4-7 and 3.4-8), 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 forest stands to mature, thus allowing for more acres to move into the 80-159 age class in both lowland LEs. This pattern is consistent with Forest Plan 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 some stands that perpetuate balsam fir and hazelnut, within-stand diversity would be lower in this alternative. As other stand age, structural diversity and species diversity would increase. 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 few species such as aspen, 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, although this would happen at a slower rate.

Alternative 2

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 Forest Plan objectives for species composition across the varying upland LEs in the project area (Chapter 1, p 1-6). Among these changes included a need to increase the amount of long-lived conifer within the project area.

In the Jack Pine-Black Spruce LE, changes to species composition under the action alternative (Alt. 2) would be evident for the aspen (Table 3.4-1). When the existing condition is compared to Forest Plan objectives for Decade 2 and the projected condition in 2020, the percentages are very similar. The biggest difference is seen within the scale of the Pearl boundary. Although there is a two percent loss (from 43 to 41 percent) of aspen between the existing and no action alternative (due to succession into the spruce-fir types) alternative 2 further reduces the aspen acres down to 36 percent. This brings aspen very close to the Decade 2 objectives. At 2020 jack pine would increase from 25 percent (under Alternative 1) to 30 percent which also brings this type close to the Decade 2 objectives. However, the spruce-fir types do increase from 9 percent in Pearl currently to 13 percent and 12 percent (Alt.1 and Alt.2, respectively). This is due to more conversion of aspen to pine and not targeting spruce fir for conversions to pine in the Pearl Project Area.

When the existing condition within the Dry Mesic Red and White Pine LE, (Table 3.4-2), is compared to Forest Plan objectives for Decade 2 and the projected condition in 2020, the percentages are very similar. The action of Pearl Alternative 2 and natural succession increases

the amount of spruce-fir and decrease aspen in this LE. This is projected to raise the Forest-wide percentage of spruce fir slightly by 2020.

The Mesic Birch/Aspen/Spruce-Fir LE composes the smallest amount of acres in the Pearl Project Area. Most of the effects of alternative 2 in this LE are very similar to the effects for the Dry Mesic Red and White Pine LE though more emphasis was placed on increasing and maintaining spruce-fir and aspen while prescribing treatments in this LE. However, due to succession, aspen is still projected to increase in 2020.

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 of the shorter-lived forest types such as jack pine, aspen, and aspen-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 Pearl Project, natural succession of these forest types until the end of the projection period (2020) is relatively small.

The purpose and need of the Pearl Project (Chapter 1) identified a need to increase the amount of young forest, especially in the aspen and lowland black spruce/tamarack communities. The action alternative increases the number of acres in the 0-9 age class (Tables 3.4-4 to 3.4-8). These acres would be removed from varying age classes across the LEs to move age class composition towards Forest Plan Decade 2 objectives (Tables 3.4-4 through 3.4-8).

Across the Superior National Forest, there is a need to create more young forest in the Lowland Conifer LEs. In both the Lowland Conifer-A and Lowland Conifer-B LEs there are too few acres in the 0-9 age class in the existing condition (Tables 3.4-7 and 3.4-8). Alternative 2 would create more acres in the 0-9 age class from harvesting the 80-159 age class. Acres in the 80-159 age class still increase across the action alternative and acres in the 40-79 age class would transition into the 80-159 age class. Alternative 2 does not increase the acres in the 80-159 age class as much as Alternative 1 would because of the proposed harvest.

Indicator 3: Within-Stand Diversity

Tree species diversity objectives are located in the Forest Plan (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 the action alternative as desired in the Forest Plan and as stated in the purpose and need of the project. A mix of silvicultural practices would be employed to improve species diversity in stands over the existing condition. Planting would be done to diversify the species mix within a given stand. White pine and white spruce would be planted in existing stands to increase their presence in stands as they age. 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 harvest 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. Further, if the harvest is timed correctly, it 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 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. If harvesting occurs during the summer of a good seed year, the 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 2, Table 2-1), structural diversity would be expected to decrease initially because treatments such as clearcut and shelterwood harvests tend to simplify stand structure. However, these effects would be mitigated by Forest Plan 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 would initially decrease within-stand diversity of tree species and herbaceous species. Usage of herbicide would be used to target specific sources of dominant competition such as monoculture of aspen or hazel to allow desired species the ability to out compete non-desired species for resources. An example would be using herbicide to slow the growth of grasses, aspen, and brush species to allow for better paper birch and jack pine regeneration and recruitment of those species into the overstory. Using herbicide would allow for the movement of a stand into a later successional stage in a much shorter timeframe at a significantly lower cost. This would allow for greater species diversity overtime and a greater ability to treat more acres resulting in an accelerated trajectory toward Forest Plan desired future conditions.

CUMULATIVE EFFECTS

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

The project record contains a list of past federal timber sales that occurred within the project area. As of 2014, there are some federal timber sales within the project area that are still under contract for harvest. These earlier harvests and pending harvests are considered part of the existing condition; therefore, no further analysis on these past actions is necessary.

The ownership within the project area (over 113,000 acres) is very mixed; 64 percent of the area is National Forest System land. State lands encompass approximately 19 percent (22,900 acres) of the project area. Based on discussions with State resource personnel there are approximately 1200 acres that are proposed to be harvested in the next three years. The MN DNR has used herbicide on approximately 110 acres over the past three years and plan on spraying an additional 32 acres in 2014.

County encompasses 1 percent and private land encompasses 15 percent of the ownership within the project boundary. These lands are located throughout the project area. The Superior National Forest anticipates minimal harvesting on private lands within the project area since many of these properties are used for residential or recreational purposes such as private homes or resorts; managed forested tracts are relatively small and disbursed. Minimal effects from

activities on county land are anticipated as it accounts for less than one percent of the total project area.

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 input 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 compared 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.

The existing condition on federal lands show there are approximately 2,492 acres of 0-9 year old stands in the project area (2 percent). Cumulatively speaking there are 3,057 acres in this young age class (2.6 percent). In regards to the older age classes (mature: 50 years plus for uplands and 80 years plus for lowlands), there are approximately 24,618 acres of fifty plus year old upland stands on federal lands, and 13,331 acres of all mature lowlands in 2014 also on federal lands (all representing 33 percent of the area). As for the remainder of the area (non-federal lands), the existing condition of this mature age class is 15,433 (total includes upland and lowland). The cumulative totals for the project area are approximately 53,382 acres of mature forests (all representing 47 percent of the area; includes uplands and lowlands).

Based on conversations with State and county foresters, by the year 2020, the forest types on State and county lands are predicted to be similar to the current composition, though some conversions will occur. Forest types are projected to stay the same on non-industrial private land based on the following 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, esthetic enjoyment, and numerous other reasons for owning land ahead of timber production or timber income. Undoubtedly, some private landowners undertake projects that diversify or change forest types; however, this impact is believed to be minimal.

Under Alternative 1 there would be no planting or seeding to convert stands from aspen to a more desirable species, such as long-lived pine species. Thus there would be no new harvesting on federal land and with the State's planned harvests there would be very few changes to forest types between this alternative and the existing condition across the landscape of the Pearl area.

Alternative 2 would have more conifer acres than Alternative 1 because 1,180 acres are being proposed to convert from aspen to pine through planting and seeding. Cumulatively, Alternative 2 activities would slightly impact other forest types based on the conversions that have taken place in the past and conversions planned on federal, State and county lands.

Indicator 2: <u>Age class distribution</u>

Under Alternative 1 there would be a large reduction in acres in the young age class when you look at all ownership actions over the projection period. There would be no new harvesting on federal land, and while the State has minimal 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. The State proposed treatments are overwhelmingly even-aged management treatments, mostly clearcuts in aspen and black spruce forest type.

Cumulative effects to the project area over the projection period (2020) would provide for an increase in the 0-9 age class in Alternative 2 as compared to the existing condition and Alternative 1.

Currently, three percent of the project area is in young forest on all lands. Under the no action alternative this would be about 1.7 percent. However, under the action alternative, the amount of young forest in the project area at 2020 would be approximately 13 percent.

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. While there would be no harvest on federal land, in Alternative 1, harvests would still take place on State 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 thinning 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. Alternative 2 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. Thinning 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. While clearcuts would initially simplify stand structure, Forest Plan direction mitigates the effects with the layout 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, and would not substantially contribute to within-stand diversity.

3.5 THREATENED, ENDANGERED, SENSITIVE AND MANAGEMENT INDICATOR SPECIES

3.5.1 THREATENED, ENDANGERED, PROPOSED AND CANDIDATE SPECIES

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

The Pearl Project BA documents the 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 Pearl Project. The Pearl Project BA tiers to the Programmatic Biological Assessment for the revision of the Forest Plan (USDA Forest Service 2004, pp. 6-7) and provides more specific information on site-specific effects of the project to threatened and endangered species.

The findings (determination of effect) of the effects of the alternatives analyzed in detail are summarized in Table 3.5-1.

Table 3.5-1: Determination of Effects of Alternatives 1 and 2

Species	Alt 1	Alt 2	Rationale
Canada lynx	NE	NLAA	Human disturbance factors would be minimal, adequate habitat is maintained, and prey habitat improvements would take place. The Proposed Action would comply with all applicable Forest Plan management direction related to Canada lynx and its habitat.
Critical habitat	NE	NLAA	
Northern long-eared bat	NE	No Jeopardy	The effects of the Pearl Project are likely to adversely affect individuals and summer roosting habitat within the project area, but not likely to result in jeopardy to the continued existence of the northern long-eared bat. The proposed action maintains suitable summer roosting habitat and the loss of suitable summer roost habitat alone is not likely to have significant population-level effects. There will be no impact on hibernacula.

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

3.5.2 REGIONAL FORESTER SENSITIVE SPECIES

This Biological Evaluation (BE) evaluates the effects of the Pearl Project on Regional Forester-listed (R9) sensitive species (U.S. Department of Agriculture (USDA) Forest Service Manual sections 2670.3, 2670.5 (3), 2672.4). The species evaluated in this report include all species on the revised R9 sensitive species list (December 14, 2011).

The Pearl Project BE is available at www.fs.usda.gov/goto/superior/projects, under Pearl Project. The BE described anticipated direct, indirect, and cumulative effects to Regional Forester Sensitive Species. Due to the number of species analyzed in the BE only the effects of the project are briefly summarized below. Please see the full BE for the complete effects analysis.

Terrestrial Wildlife

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

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

Aquatic Wildlife

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

Alternative 2 may impact individuals but are not likely to cause a trend to federal listing or loss of viability for ebony boghaunter dragonfly, headwaters chilostigman caddisfly, Quebec emerald dragonfly, black sandshell mussel, creek heelsplitter mussel, and northern brook lamprey.

Alternative 2 would have no impact to lake sturgeon, Nipigon cisco, or shortjaw cisco.

Vascular plants, lichens, and bryophytes

Alternative 1 would have no direct, indirect, or cumulative effects for alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, American shore-grass, fall dropseed muhly, dwarf waterlily, Oakes' pondweed, awlwort, lance-leaved violet, Appalachian fir club moss, large-leaved sandwort, Arctoparmelia centrifuga, Arctoparmelia subcentrifuga, Cladonia wainoi, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, Caloplaca parvula, Cetraria aurescens, Frullania selwyniana, Menegazzia terebrata, Pseudocyphellaria crocata, Ramalina thrausta, Sticta fuliginosa, Usnea longissima, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, Caloplaca parvula, Cetraria aurescens, Frullania selwyniana, Menegazzia terebrata, Pseudocyphellaria crocata, Ramalina thrausta, Sticta fuliginosa, and Usnea longissima.

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

Proposed activities in Alternative 2 may impact individuals of alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, American shore-grass, fall dropseed muhly, dwarf waterlily, Oakes' pondweed, awlwort, lance-leaved violet, Appalachian fir club moss, large-leaved sandwort, Arctoparmelia centrifuga, Arctoparmelia subcentrifuga, Cladonia wainoi, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, Caloplaca parvula, Cetraria aurescens, Frullania selwyniana, Menegazzia terebrata, Pseudocyphellaria crocata, Ramalina thrausta, Sticta fuliginosa, Usnea longissima, small shinleaf, cloudberry, fairy slipper, ram's head lady's slipper, Caloplaca parvula, Cetraria aurescens, Frullania selwyniana, Menegazzia terebrata, Pseudocyphellaria crocata, Ramalina thrausta, Sticta fuliginosa, and Usnea longissima but are not likely to cause a trend to federal listing or loss of viability.

Conclusion

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

3.5.3 MANAGEMENT INDICATOR SPECIES

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

Bald Eagle

The Biological Evaluation discloses the effects of the Pearl Project on bald eagles and shows that nesting habitat would be protected and stand-specific mitigations would minimize human disturbance. Future nesting habitat would be improved through planting pine in riparian areas. Both alternatives maintain existing habitat and are in compliance with Forest Plan direction. Alternative 2 also creates future habitat by planting young pine.

White Pine

Table NSU-2 on page 2-59 of the Forest Plan shows a Decade 2 objective of increasing the amount of white pine by two percent. Alternative 2 of the Pearl Project is 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.

Northern Goshawk

The effects of the Pearl Project to northern goshawks are disclosed in the Biological Evaluation. There is one known nest site within the project area. However, this site was occupied in 2003 and 2004 only. Roadside and within-stand call-back surveys in 2012-2014 yielded no responses.

There is one known nest on the north edge of the project area which is close enough that the territory likely includes a small part of the Pearl Project Area. The proposed action was modified and mitigations were applied to stands in this area to minimize disturbance near the nest and retain sufficient suitable habitat.

Suitable habitat in the upland mature plus category exists throughout the project area. The effects to goshawk can be considered in the context of available mature forest, patch size, and stand complexity. Alternative 1 would provide the most mature forest habitat and would not decrease the area or number of 100-acre and larger patches. Alternative 1 would maintain current stand complexity. Alternative 2 would decrease the amount of mature forest by approximately 20 percent. The young forest created would provide habitat for important forage species such as ruffed grouse and snowshoe hares. Alternative 2 includes final harvest and partial harvest in patches that are not providing quality mature interior forest habitat and in narrow stringer stands that are not part of a main patch body. Harvest of declining mature patches would temporarily reduce the number of mature patches available. However, the project creates some larger-sized patches of young forest that would eventually grow into larger-sized mature patches.

Alternative 2 may impact individuals but is not likely to cause a trend to federal listing or loss of viability. This action alternative reduces fragmentation by positioning harvest adjacent to recent clearcuts to increase stand size, and increases stand complexity through planting and conversion.

Gray Wolf

Effects of the Pearl Project on gray wolf are disclosed in the Pearl Project Biological Evaluation. Suitable habitat for prey species is abundant and wide-spread throughout the project area. Both alternatives are in compliance with the Forest Plan and Gray Wolf Recovery Plan. Alternative 1 would maintain adequate wolf habitat and prey habitat. Young forest would not be created for prey species. Human disturbance levels would not change and unauthorized roads would remain open. Alternative 2 would improve habitat for prey species (mainly deer) by creating young forest and planting mixed conifer forest. Human disturbance would increase during project implementation, but would decrease locally in some areas due to closure of unauthorized roads. The overall effect is that Alternative 2 may impact individual wolves, but is not likely to adversely affect the gray wolf population in the project area.

3.6 MANAGEMENT INDICATOR HABITATS

3.6.1 INTRODUCTION

There are thousands of different wildlife species living in the Superior National Forest, each with its own mix of habitat requirements. To provide a simplified, practical, and reasonable approach to evaluate a wide variety of species, Management Indicator Habitats (MIH) were identified in the Forest Plan (2004) as a broad scale way to represent species. The MIH provide a landscape level means of monitoring and evaluating effects of management decisions and actions on specific species, communities, habitats, and interrelationships among organisms. Forest Plan objectives for MIH were developed to maintain viable populations of all native and desired non-native species. These objectives were considered in the planning and development of the proposed action and alternatives for the Pearl Project Area. We compared differences between the existing condition in the Pearl Project Area and desired condition identified in the Forest Plan (Kirschbaum 2013-Pearl Midlevel Report). Based on this comparison, we identified several management actions that would contribute to Forest Plan MIH objectives and wildlife habitat goals. Some Forest Plan objectives addressed by this proposal are to increase the amount of young jack pine and aspen forest, decrease mature and old aspen and jack pine forest, and increase young lowland conifer forest. These actions would result in a better mix of habitats needed by wildlife in the area.

3.6.2 ANALYSIS METHODS

The Forest Plan identified Management Indictor Habitats (MIH) to represent the main natural habitats on the Forest that are most affected by management activities. These MIH provide a broad-scale assessment, with the assumption that their representation will provide habitat for as many wildlife species as possible. Analysis of MIH provides a practical and efficient approach to assessing effects on 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, threatened, endangered, and sensitive species) provide a means for assessing species viability and habitat distribution.

MIH are generally divided into two broad groups:

Forest type and age MIH (MIH 1-9) are measured in acres and percent of young, mature, and old forest types. These indicators allow us to analyze the amount, distribution, and trends of forested habitat types for a wide variety of species.

Spatial pattern MIH (MIH 11-13) measure the amount of large, mature patches, interior habitat, and density of edge habitat. These indicators allow us to address the size, shape, and arrangement of habitats.

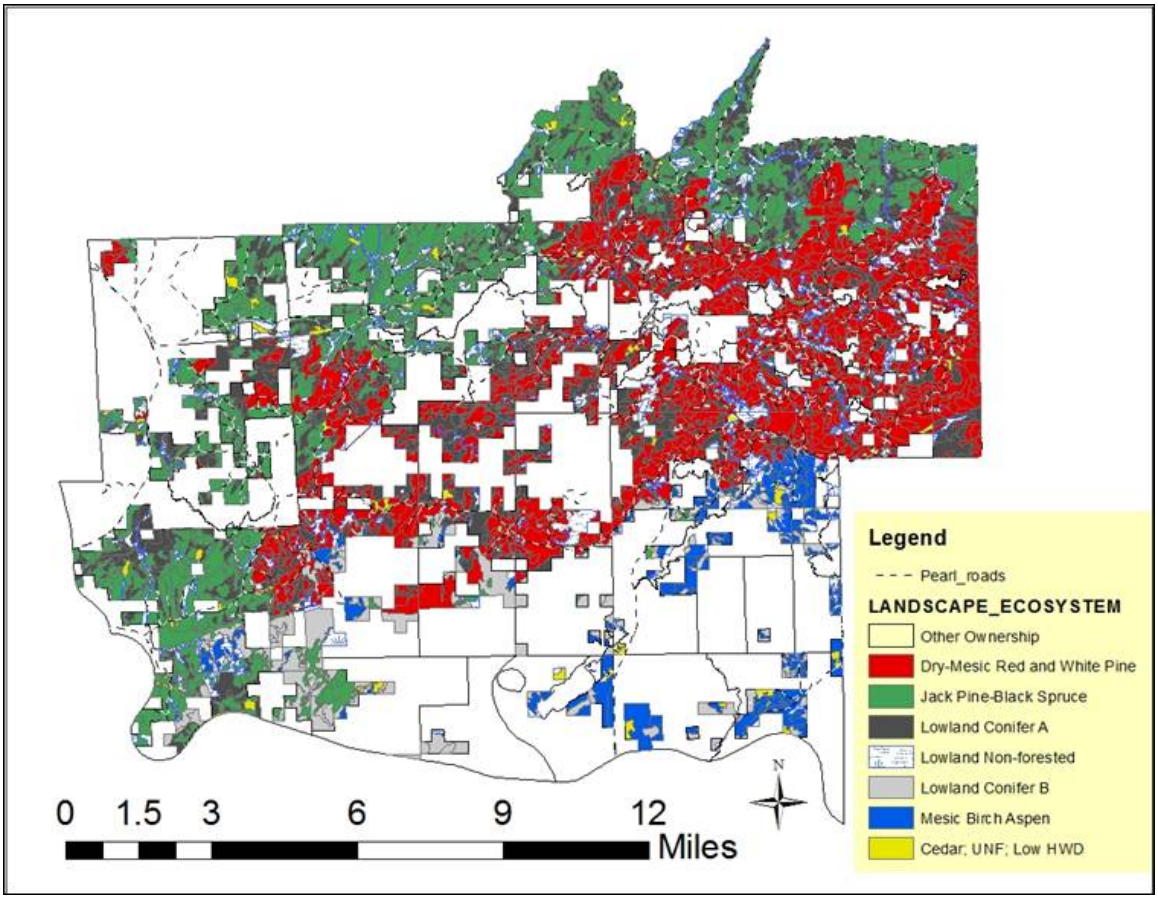
Some species require or benefit from specific spatial arrangements, including large patches of contiguous habitat and linkage of habitat patches or juxtaposition of young and old forest patches. Moving toward Forest Plan objectives for MIH will achieve long-term desired conditions for amount, quality, and distribution of habitats along with their associated species. In this analysis, the MIH listed in Table 3.6-1 were identified as focus areas and are compared by alternative and measured against Forest Plan objectives.

Table 3.6-1: Management Indicator Habitats		
Number	**Name**	**Measure**
Forest Type and Age Indicators		
1	Upland Forest	Acres and Percent
4	Aspen-birch Forest	
5	Upland Conifer Forest	
6	Spruce-fir Forest	
7	Red and White Pine Forest	
8	Jack Pine Forest	
9	Lowland Black Spruce-Tamarack Forest	
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

A more complete description of each MIH and its associated suite of wildlife species can be found in the Forest Plan Final Environmental Impact Statement (FEIS) Volume I pages 3.3.1-1 to 3.3.1-62, 3.3.2-1 to 3.3.2-8 and Volume II Appendix D pages D-1 to D-70. In addition, documentation of the Management Indicator Species (MIS) and associated species selection process is described in greater detail in Forest Plan FEIS Volume II, pages B-24 to B-31.

3.6.3 ANALYSIS AREA

The Pearl Project Area contains three primary LEs; Jack Pine Black Spruce (JPB), Dry Mesic Red and White (DRW), and Mesic Aspen/Birch/Spruce-fir Landscape Ecosystems (LE), as well as Lowland Conifer-A (LLC-A) and Lowland Conifer-B (LLC-B). The following map shows the landscape ecosystems found within the Pearl Project Area.



The forest type and age MIH (1-8) analysis area for this project is National Forest System lands in the Jack Pine Black Spruce (JPB), Dry Mesic Red and White (DRW), and Mesic Aspen/Birch/Spruce-fir Landscape Ecosystems (LE), as well as Lowland Conifer-A (LLC-A) and Lowland Conifer-B (LLC-B) Landscape Ecosystems (LE) (Forest Plan p. 2-57). This analysis area allows for comparison to Forest Plan predicted effects and objectives for the second decade of the Forest Plan.

The spatial pattern MIHs are analyzed at two scales; project area and Forest-wide Patch Zones 1 and 3 (Forest Plan p. 2-25), as the Pearl Project overlaps both of these zones. The project-area spatial scales allows for more sensitive detection of changes whereas the patch zone analysis allows for comparison to Forest Plan direction. The temporal scale for MIH analyses is the year 2020 because this timeframe allows a reasonable amount of time for all proposed projects to be implemented and for expected effects to occur. This timeframe also allows for comparisons with objectives and predicted effects from the second decade of Forest Plan implementation. The vegetation data used in these analyses incorporates past actions, including past NEPA decisions in the analysis area.

3.6.4 MANAGEMENT INDICATOR HABITATS 1-9: FOREST TYPE AND AGE

Jack Pine Black Spruce LE

A comparison of the existing conditions to Forest Plan objectives in the Jack Pine Black Spruce LE shows that young forest is underrepresented, whereas pole, mature, and older forest are overrepresented (Kirschbaum 2013). Upland conifer forest is underrepresented. Mature and older aspen birch, older jack pine, mature spruce-fir forest and young spruce-fir and red and white pine are overrepresented. Young aspen-birch and jack pine, and older spruce fir are underrepresented. The amount of young aspen-birch and jack pine, as well as mature and older aspen-birch and mature spruce-fir are trending counter to Forest Plan objectives.

To begin to move the Jack Pine Black Spruce LE toward Forest Plan objectives, this project focused on harvesting mature and older aspen and jack pine stand to create young forest, and conversion of some older aspen stands to young jack pine on ecologically appropriate sites.

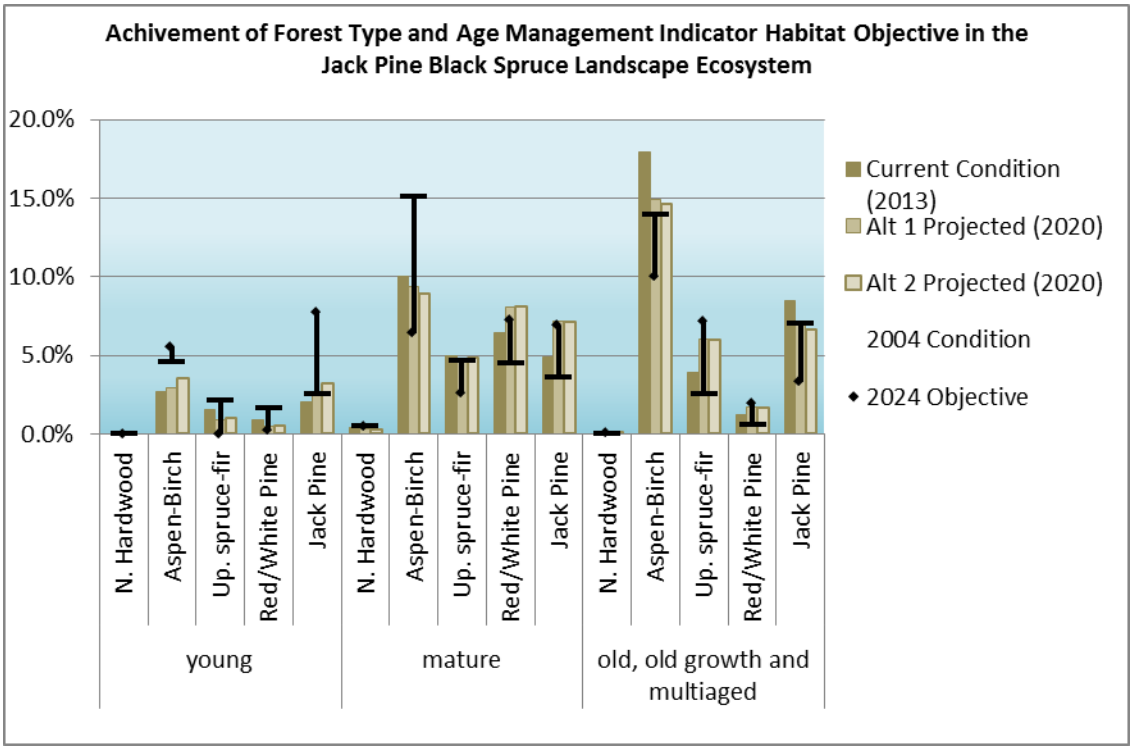
The following chart compares existing and projected age class distribution with Decade 2 objectives within the Jack Pine Black Spruce LE.

Table 3.6-2: Comparison of Forest-wide Decade 2 Objectives for MIH1 vs. Existing (2013) and Alternatives 1 and 2 Projected (2020) Condition in the Jack Pine Black Spruce LE

Age Class	Existing (2013) (% of LE)	Decade 2 Objective (% of LE)	Alternative 1 Projected (2020) (% of LE)	Alternative 2 Projected (2020) (% of LE)
Young	7.0	13.5	6.8	8.2
Mature	26.7	23.6	29.8	29.2
Old, old-growth, & multi-age	31.5	22.5	29.6	28.9

Under the no-action alternative, the amount of young forest in the JPBS LE is projected to decrease trending counter to Forest Plan objectives. Under Alternative 2, the amount of young forest is projected to increase, moving the JPBS LE toward Forest Plan objectives. Under both alternatives, the amount of mature forest is expected to increase, and the amount of old forest is expected to decrease.

The following chart displays the Forest-wide existing and Alternatives 1 and 2 projected conditions of MIHs, along with the condition at the time of Forest Plan signing (2004) and Decade 2 (2024) Forest Plan objectives within the Jack Pine Black Spruce LE.



Under both Alternatives 1 and 2, the amount of young aspen-birch and young jack pine forest increase, though the degree of increase toward Forest Plan objectives is greater under Alternative 2. Similarly, the amount of mature and old aspen-birch forest and old jack pine forest all decrease under both alternatives, though they decrease more under Alternative 2 moving the LE further toward Forest Plan objectives.

Dry Mesic Red & White Pine LE

A comparison of existing conditions to Forest Plan objectives in the DRW LE found that in general, projected conditions (2020) are approaching Decade 2 objectives in this LE. (Kirschbaum 2013). However, young aspen birch and older spruce-fir are currently or are projected to be underrepresented. Overrepresented MIHs are: young spruce-fir, mature red & white pine, and older aspen birch and jack pine.

Based on available forest types in the Pearl Project Area, proposed vegetation management in this LE focused on final harvesting mature and older aspen birch and jack pine to move the DRW LE toward Forest Plan objectives.

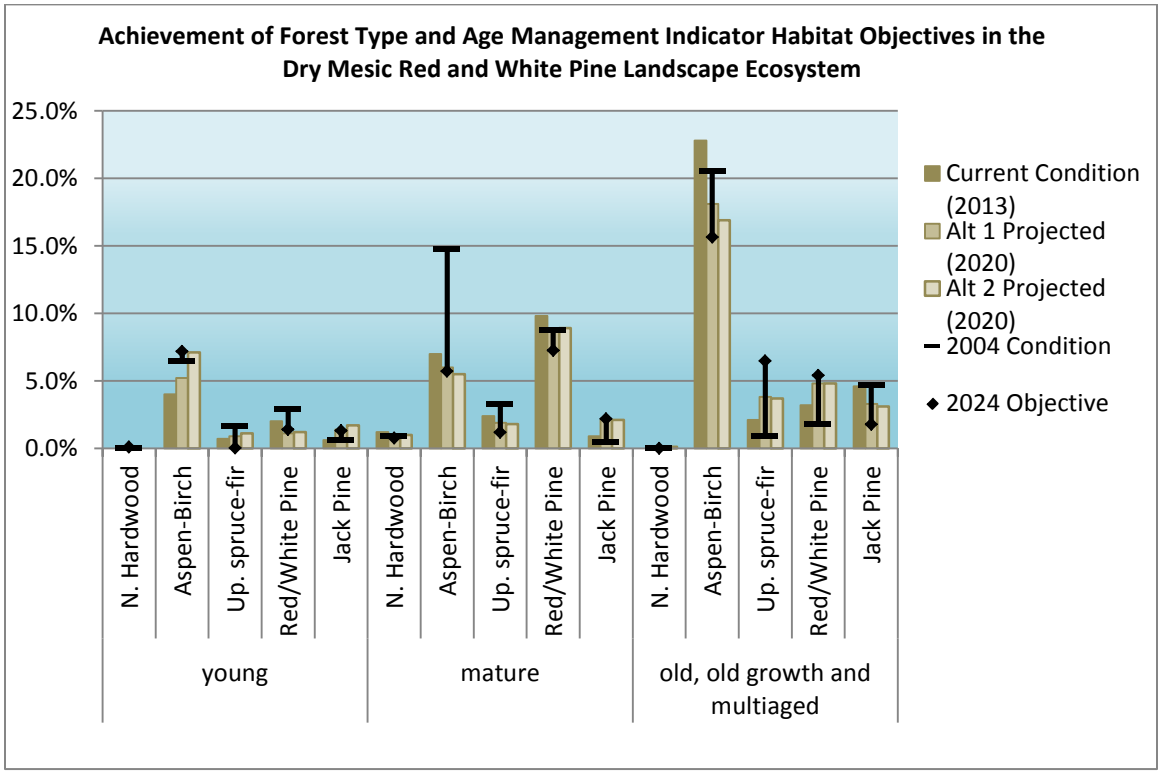
The following chart compares existing and projected age class distribution with Decade 2 objectives within the DRW LE.

Table 3.6-3: Comparison of Forest-wide Decade 2 Objectives for MIH1 vs. Existing (2013) and Alternatives 1 and 2 Projected (2020) Condition in the Dry Mesic Red & White Pine LE

Age Class	Existing (2013) (% of LE)	Decade 2 Objective (% of LE)	Alternative 1 Projected (2020) (% of LE)	Alternative 2 Projected (2020) (% of LE)
Young	7.4	10.0	8.7	11.1
Mature	21.3	17.1	19.9	19.3
Old, old-growth, & multi-age	32.8	29.3	30.1	28.7

Under the no-action alternative, the amount of young forest would increase, and the amount of mature and old forest would decrease, moving the LE toward Forest Plan objectives. Under Alternative 2, the amount of mature and old forest would both decrease, moving toward Forest Plan objectives. Under this alternative, the amount of young forest is projected to increase to slightly beyond Forest Plan objectives. However, a review of past projects on the West Zone of the SNF (Kawishiwi, Laurentian, and LaCroix Districts) shows that on average, half of the acres included in NEPA decisions for large vegetation projects are not implemented (Chad Kirschbaum, personal communication, 2011). These acres are dropped from implementation for a number of reasons, including inaccessibility, buffers left for riparian areas and wetlands, low volume stands that are unmerchantable, shallow soils, Shipstead-Newton-Nolan areas, ownership corrections, and a number of other issues. The Pearl Project proposes approximately 4,300 acres of final harvest in the DRW landscape ecosystem. Assuming half of these acres are implemented, Alternative 2 would result in an amount of young just below the Decade 2 objective (9.9 percent).

The following chart displays the Forest-wide existing and Alternatives 1 and 2 projected conditions of MIHs, along with condition at the time of Forest Plan signing (2004) and Decade 2 (2024) Forest Plan objectives within the DRW LE.



Under both alternatives, the amount of young aspen-birch forest and young jack pine forest decrease, mature aspen-birch forest decreases, and old aspen birch and jack pine forest decrease, all trending toward Forest Plan objectives. Under Alternative 2, the increase in young aspen-birch forest, and the decrease in old aspen-birch and jack pine forest move the LE further toward the Forest Plan objectives.

Mesic Birch/Aspen/Spruc-Fir LE

A comparison of existing conditions to Forest Plan objectives in the MBA LE found that in general, age class distributions in this LE are trending away from Decade 2 objectives (Kirschbaum 2013). The amount of young upland forest in the LE is well below Decade 2 objectives and the amount of mature and older forest in this LE is well above Decade 2 objectives. Young aspen birch, jack pine, and red and white pine are underrepresented. Overrepresented MIHs are: mature aspen birch, upland spruce fir and northern hardwoods; older aspen birch and upland spruce fir.

Based on available forest types in the Pearl Project Area, proposed vegetation treatments in this LE focus primarily on final harvesting mature and older aspen birch and spruce-fir. Most of this would be allowed to regenerate as aspen-birch, but some stands would be converted to pine (jack, red or white).

One percent of the Forest-wide DRW LE occurs within the Pearl area; where it makes up six percent of the project area. Due to the small proportion of the LE occurring in the Pearl Project Area, implementation of the proposed action would have a limited impact on MIH trends in the MBA LE.

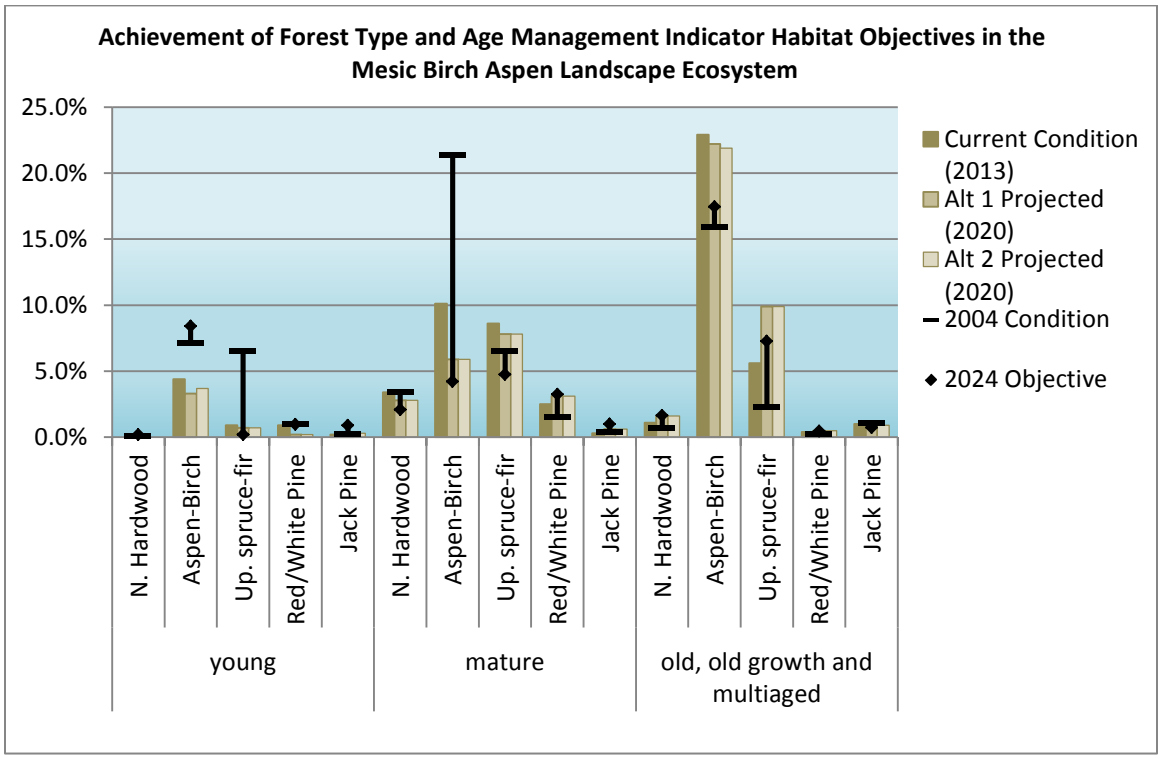
The following chart compares existing and projected age class distribution with Decade 2 objectives within the MBA LE.

Table 3.6-4: Comparison of Forest-wide Decade 2 Objectives for MIH1 vs. Existing (2013) and Alternatives 1 and 2 Projected (2020) Condition in the Mesic Birch/Aspen/Spruce-Fir LE

Age Class	Existing (2013) (% of LE)	Decade 2 Objective (% of LE)	Alternative 1 Projected (2020) (% of LE)	Alternative 2 Projected (2020) (% of LE)
Young	6.4	10.6	4.4	4.9
Mature	24.9	15.3	20.3	20.3
Old, old-growth & multi-age	30.9	27.5	35.1	34.7

Under both alternatives, the amount of young forest is projected to decrease, and the amount of old forest is projected to increase, trending away from Forest Plan objectives. In both cases there is less movement away from Forest Plan objectives under Alternative 2 compared to the no-action alternative.

The following chart displays the Forest-wide existing and Alternatives 1 and 2 projected conditions of MIHs, along with condition at the time of Forest Plan signing (2004) and Decade 2 (2024) Forest Plan objectives within the MBA LE.



Under both alternatives, the amount of young aspen birch is projected to decrease, trending away from Forest Plan objectives. Under both alternatives, the amount of old aspen birch is projected to decrease toward Forest Plan objectives, to a slightly greater degree under Alternative 2.

Lowland Conifer-A and Lowland Conifer-B LEs

Thirteen percent of the Forest-wide LLC-A is located within the Pearl Project Area, making up around one fifth of the project area. The vast majority (87 percent) of this portion of the LE is mature and older lowland black spruce tamarack forest. One percent of this portion of the LE is in a young forest condition.

Four percent of the Forest-wide LLC-B is located within the Pearl Project Area, making up six percent of the project area. Nearly all (99 percent) of this portion of the LE is mature and older lowland black spruce tamarack forest. Less than one percent of this portion of the LE is in either young forest or sapling condition.

A comparison of existing conditions to Forest Plan objectives found that both of these lowland conifer LEs, the amount of young black spruce tamarack forest and the amount of older black spruce tamarack forest are underrepresented, whereas mature forest is overrepresented. To address this, the Pearl project proposed action includes final harvesting mature lowland black spruce/tamarack to create young lowland forest.

The following table compares the Forest-wide existing condition, the Decade 2 (2024) Forest Plan objective, and the projected conditions under Alternatives 1 and 2 within the LLC-A LE.

Table 3.6-5: Comparison of Forest-wide Decade 2 Objectives for MIH9 in all Lowland conifer LEs vs. Existing (2013) and Projected (2020) Condition in the Lowland Conifer-A Landscape Ecosystem

Age Class	Existing (2013) (% of LLC-A)	Decade 2 Objective (% of LE)	Alternative 1 Projected (2020) (% of LLC-A)	Alternative 2 Projected (2020) (% of LLC-A)
Young	2.4	6.4	3.3	5.6
Mature	60.9	49.9	52.4	50.9
Old, old-growth, & multi-age	25.0	38.0	35.5	34.6

Under both alternatives, the age class distribution in the LLC-A LE is projected to move toward Forest Plan objectives. However, the young and mature age classes are project to move notably more toward Forest Plan objectives under Alternative 2 compared to the no-action alternative.

The following table compares the Forest-wide existing condition, the Decade 2 (2024) Forest Plan objective, and the projected conditions under Alternatives 1 and 2 within the LLC-B LE.

Table 3.6-6: Comparison of Forest-wide Decade 2 Objectives for MIH9 in all Lowland conifer LEs vs. Existing (2013) and Projected (2020) Condition in the Lowland Conifer-B Landscape Ecosystem

Age Class	Existing (2013) (% of LLC-B)	Decade 2 Objective (% of LE)	Alternative 1 Projected (2020) (% of LLC-B)	Alternative 2 Projected (2020) (% of LLC-B)
Young	1.6	6.4	1.8	2.0
Mature	66.3	49.9	59.0	58.8
Old, old-growth, & multi-age	24.8	38.0	32.9	32.8

Similar to LLC-A, under both alternatives, the age class distribution in the LLC-B LE is projected to move toward Forest Plan objectives. The young and mature age classes are projected to move slightly more toward Forest Plan objectives under Alternative 2 compared to the no-action alternative. However, the impact of the proposed action is limited due to the small amount of the LE (4 percent) located within the Pearl Project Area.

3.6.5 MANAGEMENT INDICATOR HABITATS 11-13: SPATIAL PATTERNS

Upland edge and interior habitats (MIH 11 & 12)

Under the no action alternative, forests in the Pearl Project Area would continue to mature, and no new management-induced edge would be created. Mature interior forest would increase, though the quality of some patches of mature forest would decline as old birch and aspen decline. The effect of this change would be additional habitat for wildlife species such as black-throated blue warbler, goshawk, boreal owl, three-toed woodpecker, and Connecticut Warbler that use conditions such as interior forest. However, large mature upland forest patches are currently well-represented and distributed in the area. The beneficial impact of additional interior forest habitat to species that need this type of spatial arrangement of habitat would be minimal.

Under the no-action alternative, young forest patches on federal lands would remain rare. Habitat for species that use young forest and edge, including many game species, would remain limited in the project area. In addition, as existing mature forest ages, the quality of interior forest patches in the project area will decline. Without the creation of young forest patches, high quality mature interior forest would become less available in the project area within a few decades.

Under Alternative 2, young upland and lowland forest would be created, leading to an increase in edge habitat. However, the project was designed to locate harvest units near existing young forest or near other harvest units when possible, reducing fragmentation in the project area, as measured by MIH 11. This would reduce the amount of forest edge created through vegetation management in accordance with Forest Plan guidance.

The amount of mature interior forest habitat would decrease under Alternative 2. However, over 4,000 acres of mature interior forest habitat would remain in the project area under this alternative, providing sufficient habitat for interior forest-associated species. In addition, this

alternative would create large patches of young forest, which reduces overall fragmentation in the future, and would create large patches of forest to provide mature interior forest in the future.

Table 3.6-7: Pearl Area Upland Edge and Upland Interior Habitats (MIH 11 and 12)

	MIH	Indicator	2014	2020	
			Existing condition	Alt 1 (No action)	Alt 2
Project-wide	11	Upland Edge Habitat (mi./sq. mi)	31.7	31.7	21.9
Project-wide	12	Interior Mature Forest Habitat (acres)	5,221	6,888	4,178

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

Upland mature patches (MIH 13)

The quality and condition of existing large mature patches in the Pearl Project Area were evaluated using ground-based and aerial surveys. These surveys revealed that many of the existing mature patches are declining in quality, or are providing marginal interior forest habitat (Kirschbaum 2013). Alternative 2 was designed to address this by including final harvest and partial harvest in patches that are not providing quality mature interior forest habitat and in narrow stringer stands that are not part of the main patch body. Harvest of declining mature patches would create new young patches that would become mature patches in the future.

The total number of mature patches would remain relatively stable under the no-action alternative. The acres of mature patches would increase notably under this alternative. Under Alternative 2, the total number of mature patches over 300 acres would decrease from 21 to 15, and the acres of mature patches would decrease by about 2,600 acres. While this decrease would reduce the amount of mature habitat in the project area, the habitat that would be removed is largely that which is not providing high quality interior habitat. Large mature upland forest patches would remain well-represented in the project are area; thus, negative impacts to species that need this type of spatial arrangement of habitat would be minimal. Existing red and white pine patches would remain under both action alternatives.

Table 3.6-8: Pearl Project Area Acres and Number of Large Mature Forest Patches (MIH 13)				
		2014	2020	
		Existing condition	Alt 1 (No action)	Alt 2
		Number and Acres of All-Upland Mature Patches		
Patch Zone 1	≥ 300 acres	11 5,641 acres	11 6,182 acres	4 2,064 acres
	>1000 acres	0	0	0
Patch Zone 3	≥ 300 acres	10 23,912	9 29,602 acres	11 24,837
	>1000 acres	4 20,869 acres	5 27,706	4 21,215 acres
	>10,000 acre	0	1 15,697 acres	1 10,724

Table 3.6-9 displays the existing and projected number and acres of mature forest patches Forest-wide in Patch Zones 1 and 3.

Table 3.6-9: Forest-wide Acres and Number of Large Mature Forest Patches (MIH 13)					
		2014	2020		
		Existing condition	Alt 1 (No action)	Alt 2	Plan Direction
		Number and Acres of All-Upland Mature Patches			
Patch Zone 1	≥ 300 acres	77 48,681 acres	98 61,857 acres	90 57,388 acres	Maintain a minimum 44,700 acres of mature and older upland forest in patches of >300 acres
	>1000 acres	7 14,254 acres	10 17,372 acres	10 17,372 acres	Maintain 8 or more patches >1000 acres
Patch Zone 3	≥ 300 acres	161 207,504 acres	154 205,174 acres	156 200,409 acres	Strive to minimize the decrease
	>1000 acres	54 153,810 acres	52 151,365 acres	51 144,874 acres	Strive to minimize the decrease
	>10,000 acre	3 39,737 acres	2 28,011 acres	2 23,038 acres	Strive to minimize the decrease

The acres and number of mature forest patches are projected to increase in both patch zones under both Alternative 1 and Alternative 2, resulting in continued positive movement toward

Forest Plan objectives. This means that both alternatives would generally contribute to forest conditions on the landscape 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 patch habitat and interior habitat such as goshawks, boreal owl, lynx, black-throated blue warblers, bay-breasted warblers, three-toed woodpecker, Connecticut warbler, and various other species.

Cumulative Effects

Currently in the Pearl Project Area, upland patch sizes on other ownership are generally small due to the inter-mix of different owners. Young forest would be added to the landscape by regeneration harvesting of approximately 1,200 acres on other ownership. Mature forest patches would continue to occur on nonfederal land; however, these mature patches would be small. Alternative 2 attempts to reduce forest fragmentation by locating harvest units adjacent to young forest (current and planned) on both federal and nonfederal lands. The result would be an increase in patch size blending across all ownerships and a more realistic emulation of natural disturbance in the 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 expected change in spatial patterns on nonfederal lands.

Other projects listed in Appendix C such as mineral exploration or changes resulting from the Travel Management Project, would be unlikely to contribute to cumulative spatial effects because these other projects do not propose to change vegetation spatial patterns. Minerals exploration activities could result in small canopy gaps in otherwise mature forested stands; however, this is not expected to contribute to cumulative effects because of their small size. Activities listed in Appendix C that could contribute to cumulative effects are better addressed at the species scale and will be addressed in the BE and BA.

3.7 SOILS

3.7.1 INTRODUCTION

This section addresses concerns that proposed management activities may impact soil quality and productivity through erosion, compaction, displacement, and nutrient drain. An analysis of these impacts for implementing the Forest Plan was also performed in Chapter 3.6 of the Chippewa and Superior National Forests Forest Plan Revision Final Environmental Impact Statement, Volume I (USDA Forest Service 2004). Attachment 4 in the Pearl Scoping Report available on the SNF Projects webpage (www.fs.usda.gov/goto/superior /projects, then Pearl Project), 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, Attachment 4 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.

3.7.2 ANALYSIS METHODS

Indicator 1: Acres proposed for mechanical treatment for management activities

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

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

This indicator examines the difference in the amount of road that would be used for vegetation management, and the potential impacts from erosion, compaction, and displacement. In addition, this indicator examines the amount of road being decommissioned, resulting in land being returned to a productive status.

3.7.3 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 Pearl Project Area where management activities are proposed. Ecological landtypes are mapped soil units whose natural boundaries best define site-specific soil resource information for the SNF. Potential effects to the soil resource are logically confined to the soil directly beneath where the activity takes place. An example would be a piece of heavy equipment causing soil compaction that reduces pore space for air, water, and roots within a section of a treatment area. This would not impact pore space on adjacent areas.

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

3.7.4 AFFECTED ENVIRONMENT

The classification system used for the Pearl 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.

The Pearl Project Area is composed of the Northern Superior Uplands Section (212L). The subsections in the project area primarily consist of the Laurentian Highlands Subsection (212Le) with the Border Lakes Subsection (212La) on the north part of the project area (USDA Forest Service 1998).

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

3.7.5 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 Pearl 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.

If no fuel treatments occur, 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: PROPOSED ACTION

Direct and Indirect Effects

Indicator 1: Acres proposed for mechanical treatment for management activities

Alternative 2 would result in future vegetation management activities. By following Operational Standards and Guidelines described in Appendix B and Attachment 4 of the scoping report, these treatments would result in minimal impacts to the soil. For example, the 2009 monitoring report (USDA-FS, 2009 Monitoring and Evaluation Report, p. 3.1-2) concluded that the standards and guidelines have been adequate in protecting the soil resource.

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

To determine overall impacts to soil quality, the amount of area impacted and the degree of impact was analyzed. Table 3.7-1 shows the acres of harvest, prescribed fire, fuel treatments, and mechanical site preparation that would occur on harvested sites.

Table 3.7-1: Acres of Treatment on Harvest Sites for the Pearl Project

Treatment Type	Alternative 1-Acres	Alternative 2-Acres
Harvest[1]	0	19,057
Prescribed Fire	0	7,544
Fuel Treatments	0	2,010
Site Preparation[2]	0	4,300
Herbicide Application	0	880

[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 3.7-2.

Table 3.7-2: Pearl Project Landings and Skid Trails by Alternative		
	Alt. 1	**Alt. 2**
Landings[1]	0	191 acres
Skid Trails[2]	0	572 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 7-9,11, 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. ELTs 11 and 17 are the primary low-nutrient soil types in the Pearl Project Area.

The focus of fuel treatments is the removal of ladder fuels, primarily balsam fir. Since there would be other trees and shrubs remaining on the site to contribute to the nutrient base, the effects would be minimal and well within USDA Forest Service and Minnesota Site–Level Management Guidelines. Since the objective is to promote pine in the fuel treatment areas, often long-lived pine, the length for the rotation age harvest will be increased and pine require less nutrients than hardwoods (Grigal 1992).

Nutrient removal associated with harvest activity is a potential impact to site productivity. Results of the five-year analysis of treatment areas in the long-term site productivity study on the Marcell Experimental Forest in northern Minnesota, indicated that total tree harvest had no impact on site productivity. Aspen stands where total tree harvest occurred within the study area produced 40,400 suckers per hectare. This is well within the typical range of 25,000 to 50,000 per hectare (Stone and Elioff 1997). Impacts to site productivity associated with harvest activity in the Pearl Project Area are expected to be minimal by following guidelines from tables G-WS-8 and 8a (see Attachment 4 in Pearl Scoping Report and Forest Plan). These guidelines state that nutrients will be retained by maintaining or converting the pine/conifer type, allowing slash to remain on the ground and/ or extending the rotation age.

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

possible. Depending on the soil conditions, pile burning could cause severe burning of the soil; however, the area burned would be isolated to the area beneath the pile, thus minimizing the impacts in other areas.

The proposed herbicide application has low potential to affect the groundwater by leaching through the soil. The amount and type of herbicide, timing of application, soil type, and method of application would minimize that effect. A risk assessment for the Forest Service has been conducted for the proposed herbicides – Glyphosate, Sulfometuron Methyl, and Triclopyr (SERA, 2003a, SERA TR 03-43-17-02c and SERA 2003b respectively). Glyphosate has a very high soil adsorption coefficient, which means it binds very tightly to the soil so there is little chance for leaching or runoff. Glyphosate also has very low movement rating, which means it degrades quickly and binds very well to soil so there is a low risk of delivery to ground or surface waters. Sulfometuron Methyl has a low soil adsorption coefficient and does not bind readily to the soil and degrades at a moderate rate; so the risk is slightly higher for delivery to ground or surface waters. However, according to one study conducted in the field, Sulfometuron Methyl degrades rapidly and was determined to be slightly mobile, confined to the upper 6 inches (Trubey, Bethem and Peterson, 1998). Triclopyr has a moderately low soil adsorption coefficient, which means it does not bind as tightly to soil so there is a higher chance for leaching. However, triclopyr degrades relatively quickly in the soil. For all three herbicides - when applied in conjunction with herbicide label instructions, project mitigations, MFRC Guidelines, and the fact that the stands selected are away from water bodies and spraying would not be in wetlands, there is a very low risk of delivery into groundwater and no risk into the surface water (see Appendix A-mitigations and project design criteria and the Water Resources section 3.87 for more information).

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

Some existing roads within the project area are not needed for management activities or there are concerns about resource damage. These roads would be decommissioned under the action alternative. Road decommissioning would allow for that land to be returned to a productive status. These roads would be constructed to a standard to minimize impacts to other resources. The amount of road that would be added to the system and decommissioned through the implementation of each alternative is shown in Table 3.7-3. The roads that are added as shown in Table 3.7-3, are not newly created roads, but already are in existence.

Table 3.7-3: Transportation Activities by Alternative for the Pearl Project

	Alt. 1		Alt. 2	
	Miles	Acres	Miles	Acres
Roads added to the system	0	0	1.2	2.9
Roads being decommissioned	0	0	0.8	1.9
New temporary roads	0	0	50.3	121.9

[1]Acreage calculated using a 20 foot road width

Impacts of temporary road construction include compaction and displacement of soil, and potential sediment delivery to nearby wetlands and waterways. However, impacts would be

minimized by using existing corridors where possible. Impacts would also be greatly reduced through the use of BMPs along with Forest Plan standards and guidelines (S-TS-3, G-TS-13). Most of these impacts would be short term (less than fifteen years). Temporary roads totaling 50.3 miles need to be constructed to facilitate resource management; 17 miles would be on existing roads or trails. Some logging access roads would be winter roads over frozen soil, due to the need to cross wetlands. All temporary roads would be decommissioned after use. Once treatment activities are completed, the road would be rehabilitated and revegetated. Also, see Water Resources (3.8) in the EA for additional information on sediment delivery from temporary roads.

Conclusion – Direct and Indirect Effects all Alternatives

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

Vegetation and road management activities proposed in Alternative 2 would result in minimal impacts to the soil resource. Effects to soil resources would be minimal since MFRC Site-level and Forest Plan guidelines would be followed for fuel reduction treatments. If a wildfire did occur, Alternative 2 would reduce the impact to soil resources compared to the No-action Alternative. The amount of land affected by landings and skid trails (Table 3.7-2) would be minimized by following MFRC Site-level and Forest Plan guidelines. Actions taken to decommission existing roads in Alternative 2 would eliminate impacts caused by their current use, returning those areas of land to a productive status.

CUMULATIVE EFFECTS

Effects from past action have been considered in the existing condition. Other than three prospecting drill sites there are no present or reasonably foreseeable future actions that would occur within the cumulative effects analysis area that would affect soil productivity or wetlands. See Appendix C and the minerals section (p. C-5) for a discussion on the size of the pads and their corresponding temporary roads. From a soil perspective the area would be detrimentally impacted but the amount would be minimal. While there are other timber sales and actions in the project area, they do not overlap the proposed treatment units therefore their effects are not additive or cumulative.

Minimal impacts are anticipated from management activities on State and county lands through the implementation of BMPs. Pile burning could detrimentally impact the soil, but since the affected area is directly beneath each pile, the affected area is minimal. Monitoring of impacts from timber harvest on public and private land in Minnesota show minimal amounts of erosion and rutting as a result of timber harvest activities. Erosion that resulted in sediment delivery to a wetland or waterbody 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 Forest Plan standards and guidelines and the use of BMPs.

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

analysis for long-term site productivity completed as a portion of the Generic Environmental Impact Statement (GEIS) done for timber harvest in the state of Minnesota. In his review of the GEIS, he concluded that updated nutrient budgets and results of long-term studies indicate the nutrient capital is sufficient to tolerate numerous biomass removals and harvest rotations with minimal impacts to site productivity for most mineral soils in Minnesota. Known past and reasonably foreseeable future management actions that would occur on land impacted by proposed management activities would have minimal cumulative impacts to the soil resource.

3.8 WATER RESOURCES

3.8.1 INTRODUCTION

Harvesting timber, timber stand improvement (TSI) using mechanical and chemical methods, constructing temporary roads, decommissioning roads, changing the Objective Maintenance Level (OML) of roads, and adding new roads to the existing National Forest System are all activities that are proposed in the Pearl Project. Sources of potential adverse effects to water quality related to these activities include road construction, stream crossings construction, TSI activities, and harvest (creating young forest) that exceeds a watershed threshold. Beneficial effects on water quality could result from decommissioning roads.

The Forest Service uses best management practices and mitigation measures to protect water resources. These include controlling access on susceptible soils and using setbacks from water resources. These measures protect water resources from increased sediment loading and related nutrient export from disturbed areas. A full description of best management practices implemented to protect water quality during vegetation management activities are described in Section 3.8.6.

3.8.2 INDICATOR-BASED ANALYSIS

3.8.2.1INDICATORS

Three indicators related to water quality and watershed health were analyzed to evaluate effects associated with two Pearl Project alternatives: the No Action Alternative (Alternative 1) and the Proposed Action Alternative (Alternative 2). These indicators help measure the potential direct, indirect, and cumulative effects (defined in Ch.3.1-Introduction in this EA) to water quality and watershed health.

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

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. Construction of temporary roads can impact water quality; therefore, effects of new roads on the water resources of the Pearl Project Area will be evaluated.

For Indicator 1, the analysis calculated miles of road construction and road decommissioning proposed within the project area for each alternative (Table 3.8-1). 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. As road salt is not used on Superior National Forest System roads, road effects to water resources are generally associated with chronic input of fine to coarse sediment and corresponding alteration of stream geomorphology. Stream burial and barrier to fish passage may occur in the event of road failure/washout. Roads affect hydrologic processes through 1) rainfall interception, in which the hard road surface collects water and may prevent infiltration; 2) flow concentration, whereby sheet flow is concentrated into a single point rather than distributing across the land surface; and 3) flow diversion, in which water on the road surface or ditch system assumes a different flow path than it would in absence of the road.

It is difficult to identify a quantitative metric for road-related impacts to water quality, especially in terms of effects on aquatic habitat and biota. In general higher road density is associated with

the potential for or a realized reduction in water quality and may influence frequency, timing, and magnitude of disturbance to aquatic habitat. Streams, rivers, lakes, or wetlands adjacent to new temporary roads with appropriate Forest Plan or Minnesota Forest Resources Council (MFRC) best management practices in place are likely to experience little to no additional impact from the new temporary road. Nevertheless, differences between alternatives will be discussed in terms of potential soil disturbance, erosion, and sediment input into local streams as well as the potential for change to watershed, riparian, stream, and wetland hydrologic functions.

Indicator 2: Number of new stream crossings

For Indicator 2, the analysis identified number of new stream crossings resulting from new permanent or temporary roads constructed within the project area (Table 3.8-2). The analysis acknowledges 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, higher crossing 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. Streams, rivers, lakes, or wetlands adjacent to new road crossings with appropriate Forest Plan or MFRC best management practices in place are likely to experience little to no additional impact from the new crossing.

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

- Aquatic ecology: In-stream and riparian habitat and aquatic organisms (e.g., 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 (e.g., 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 conducted in upper Midwestern forests identified 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 60percent of the total 6th-level watershed area, that watershed was identified to be at risk for water quality impacts associated with erosion (i.e., fine sediment, nutrient loading, etc.).

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

The analysis assesses the forest condition in three states: existing (2013), future (2028) under the No-action Alternative, and future (2028) under the Proposed Action Alternative. For existing condition, young and open upland areas included:

- Stands aged less than 16 years - identified via attributes of GIS layers from USFS, State, and county sources.
- Forest, State and county roads and trails – area included roads buffered 16 feet on center; trails buffered 10 feet on center.
- Exploratory drilling or mining-related open areas such as drill pads and access roads.
- "Change detection" – a State-generated GIS layer which uses computerized comparisons of aerial photos to identify newly cut areas on privately-owned land. Production of the change detection layer was discontinued by the State in 2010; since then USFS GIS specialists have manually updated this information.
- Ecosystem land types (ELTs) mapped as non-forested upland – e.g., open fields.
- DNR prescriptions – GIS information provided by the State showing areas proposed for timber management. It is assumed that these prescriptions have been executed.

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

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

The Indicator 3 analysis identifies the proportion of upland open and upland young forest within each 6th level watershed that occurs within or intersects the Pearl Project Area with three percent or greater coverage across the project area. Less than three percent coverage is considered negligible and is not included in the analysis. For the Pearl Project Area, 93.5 percent was assessed as part of the young & open analysis.

A distinct management threshold (60 percent young and open) is built into Indicator 3. Upland open and upland young forest on all ownerships of less than 60 percent for each 6th level watershed is considered acceptable to protect water quality and watershed health (see Forest Plan direction on p. 2-13; S-WS-1). Clearly some impacts, such as those related to natural events (e.g., fire, blowdown) cannot be known in advance and their occurrence is random enough to preclude modeling. We did not include expectation of fire or blowdown in either future area analysis.

3.8.3 ANALYSIS AREA AND TIMESCALE

Indicator 1: <u>Miles of new road construction and road decommissioning</u>

The analysis area for direct, indirect, and cumulative effects for Indicator 1 extends to the project boundary and includes the amount of known road construction and decommissioning 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 timescale selected for the direct, indirect, and cumulative effects for Indicator 1 is ten years. Effects from road construction are generally expected to diminish over time; after ten years the 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 crossing within the project area. This includes stream reaches within the project area and within one mile outside the project area. This analysis area was chosen because effects to water quality from stream crossings, including inputs of fine sediments, may be observed up to one mile downstream from stream crossing sites (Verry et. al. 2000).

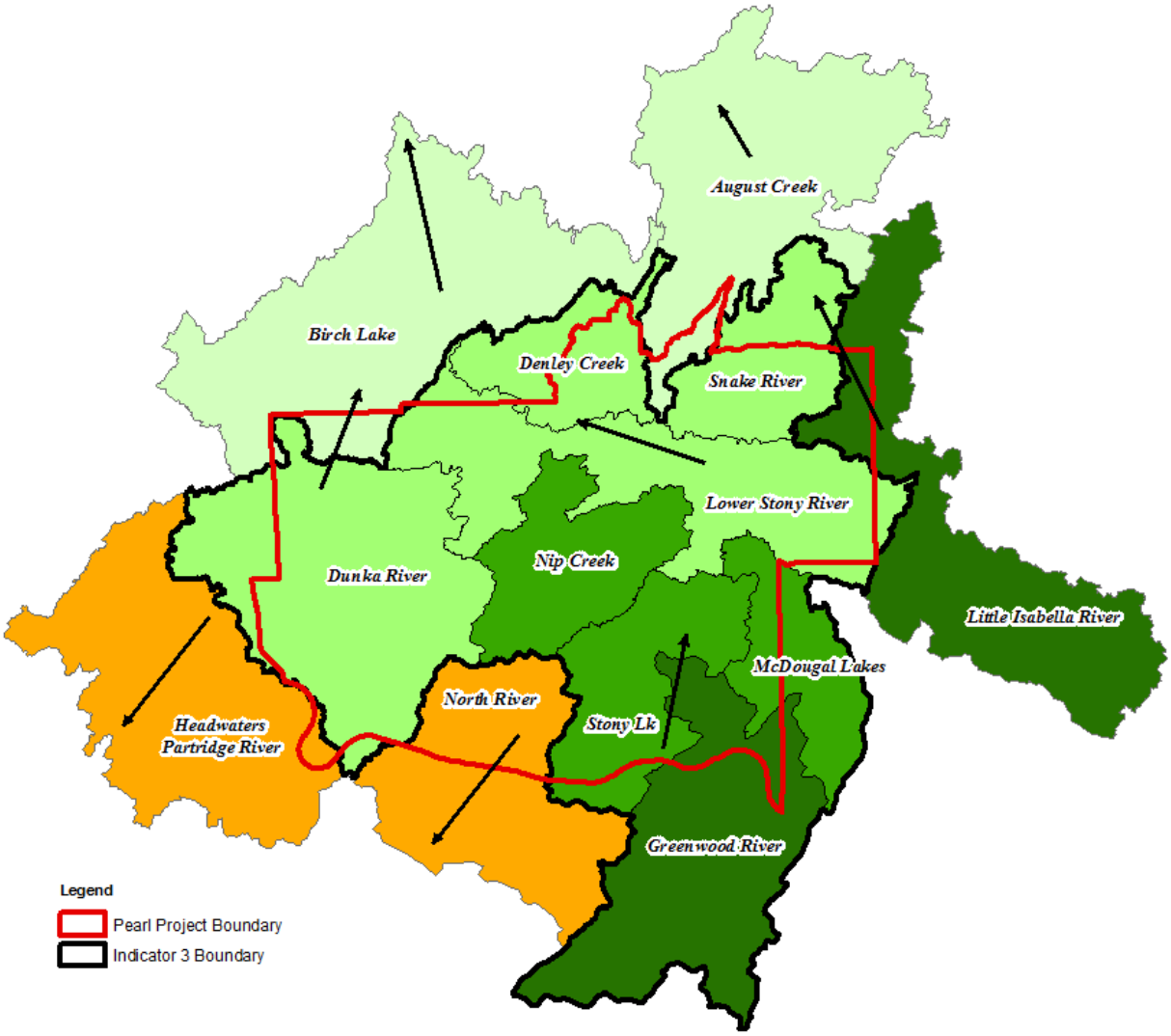
The timescale selected for the direct, indirect, and cumulative effects for Indicator 2 is ten years. All construction is expected to be completed within this time and subsequent effects would no longer be measurable.

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

The analysis area for direct, indirect, and cumulative effects for Indicator 3 includes all ownerships within each of the 6th level watersheds that occur within or intersect the Pearl Project Area, cover at least three percent of the project area, and contain less than 60 percent wetland or lowland (Figure 3.8-1). The analysis area was chosen because potential effects from proposed vegetation activities and other projects and actions occurring in each watershed should be evident at the watershed scale. The 6th level watershed measure is also consistent with Forest Plan analysis.

The timescale selected for the direct, indirect, and cumulative effects for Indicator 3 is eighteen years. This length of time was selected to reflect the impact of on-going harvest on nonfederal lands and allows sufficient time for the new young stands created pursuant to Pearl project activities (modeled as completed in 2016/year 4) to age out of the “young” category. The timescale assumes a constant rate of new young and open upland creation on nonfederal lands.

Figure 3.8-1: Pearl 6th Order Watersheds and Water Resources Analysis Area. Pearl 6th order watersheds, analysis area for Indicators 1 and 2 (Pearl Project Area, in red) and analysis area for Indicator 3 (6th order watershed boundary, in blue). Green watersheds drain north with dark green being higher in elevation than light green. Orange watersheds drain south.



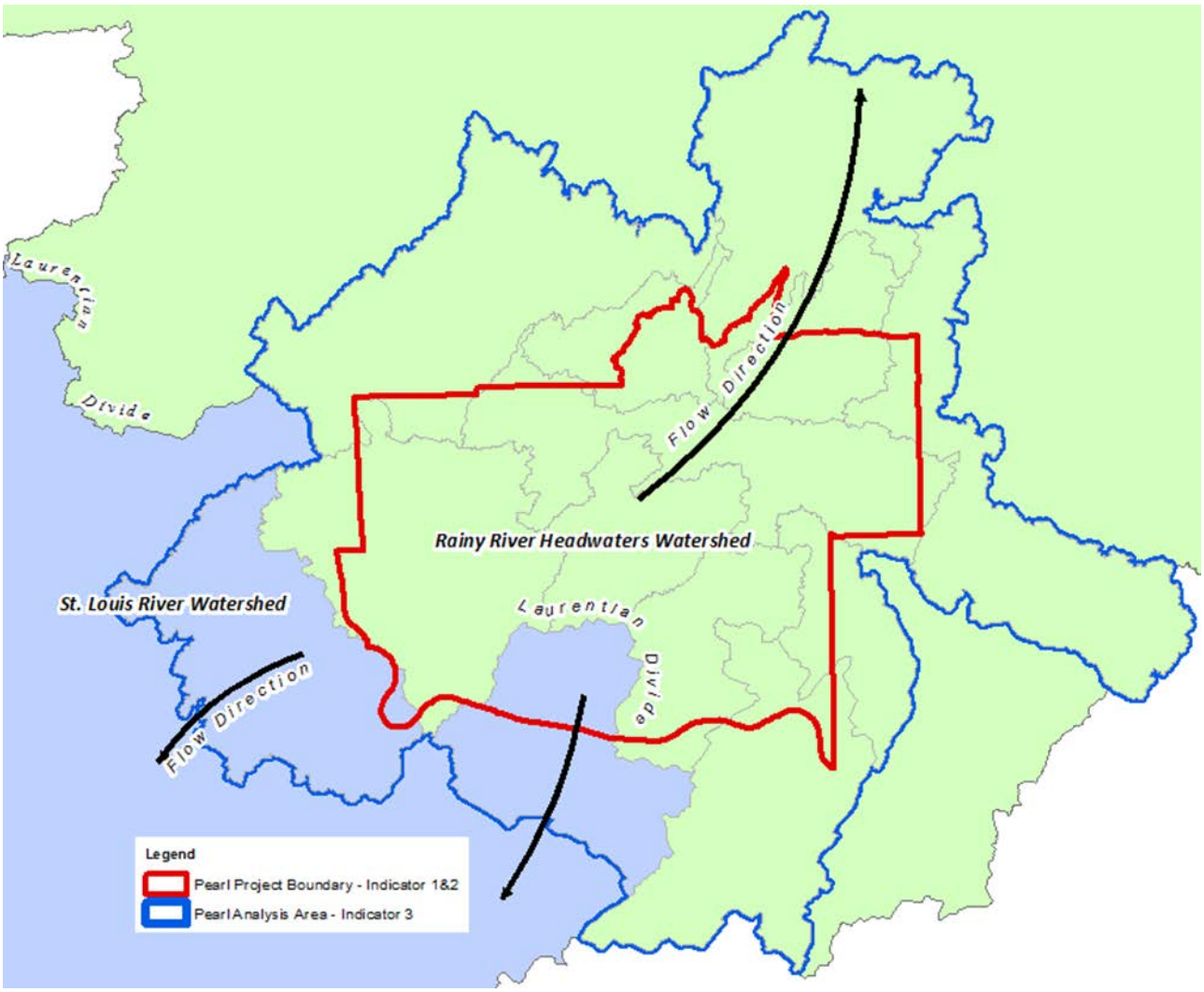
3.8.4 AFFECTED ENVIRONMENT

Water resources and watersheds within the Pearl Project Area generally exhibit excellent water quality and watershed health. The area is a forested environment that contains many lakes and streams, as well as some private developments and roads. Past management activities include mining, exploratory drilling, timber harvest, prescribed fire, road building, and road decommissioning. These activities are expected to continue in the future.

The Laurentian Divide – a continental divide that separates water that will eventually flow to the Atlantic through the St. Lawrence Seaway from water that will eventually flow to the Atlantic through Hudson Bay – runs through the southwest corner of the Pearl Project Area (Figure 3.8-2). Most of the project area is north of the Divide and lies within the 4th-order Rainy River Headwaters Watershed, which generally flows north. Within the southern portion of the project

area lies the 4th-order St. Louis Watershed, which flows south. All or parts of 13 6th order watersheds intersect the project area.

Figure 3.8-2: Pearl 4th Order Watersheds (Rainy River Headwaters, St. Louis River), Laurentian Divide, and Water Resources Analysis Areas.



Indicator 1: Miles road construction and decommissioning

There are currently 209 miles of permanent system road within the Pearl Project Area. Existing roads within the project area are maintained at various levels for different uses and transportation needs. If roads are not properly designed and constructed, they may affect watershed, riparian, stream, and wetland hydrologic functions such as reduced soil water infiltration, increased surface runoff, removal of stream-side vegetation and riparian habitat, and disruption of natural wetland flow. A description of potential geomorphic, hydrologic, aquatic habitat and soil displacement effects from roads and trails is contained in the Superior National Forest Land and Resource Management Plan Final EIS, pp. 3.6-11-12 (USDA Forest Service 2004d). By following required guidelines, project design features, and mitigation measures necessary to

protect water quality and watershed health, these effects are likely eliminated or substantially minimized.

Indicator 2: Number of stream crossings

Seventy-two road and trail stream crossings across all ownerships were identified 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 significant 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 51 crossing surveys in the Pearl Project Area between 2003 and 2010). This work focused on larger stream crossings and on the Forest's more heavily traveled roads due to the greater potential for impact to water resources. The stream crossing surveys show that approximately 99 percent of stream crossings do not exhibit problems with erosion and 93 percent do not exhibit problems with aquatic organism passage. Based on the surveys of road crossings within the project area, few National Forest System roads had existing crossings in need of rehabilitation or replacement, and all existing crossings have low potential for affecting aquatic organism passage or water quality. Those crossings warranting replacement are remediated on a Forest-wide basis, outside of the scope of the Pearl Project, through the Forest-wide Travel Management Project.

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

The proportion of upland open and upland young forest within 6th-level watersheds influences the hydrologic function of watersheds in several ways. In recently-harvested or open areas, losses from transpiration and interception/evaporation are low, leaving more water available for stream flow. Water that reaches the soil surface is likely to infiltrate to groundwater, which has the potential to contribute to increased water yield and peak flows (Verry 2000). Changes in forest vegetation (e.g., 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.

- Not all 13 watersheds were analyzed as part of the young and open analysis.
- If a watershed contained 60 percent or more lowland/water/wetland, the watershed was eliminated from consideration, reflecting the ability of water and lowland environment to buffer any changes in runoff. The North River, one of two 6th-order watersheds south of the Laurentian Divide, contains 78 percent wetland and is therefore eliminated from additional analysis. The Greenwood River was within a few percentage points of this threshold as well, with wetland coverage at 52 percent.
- Watersheds with less than 3 percent coverage of the Pearl Project Area were also eliminated from the analysis, reflecting the small effect of Pearl Project activities on that watershed. Watersheds excluded from analysis under this criterion included August Creek (1.5% coverage of Pearl), Birch Lake (2.1% coverage), Partridge River Headwaters (0.7% coverage) and Little Isabella River (2.2% coverage). In total 93.5percent of the Pearl Project Area was assessed under this indicator.

There are eight 6th-level watersheds occurring within or intersecting the Pearl Project Area that comprise the analysis area for Indicator 3. These watersheds range in size from 11,476 to 37,227 acres (Table 3.8-3). Six of the eight watersheds have 49 percent or more of their area inside the Pearl Project boundary.

3.8.5 ENVIRONMENTAL CONSEQUENCES

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

Direct and Indirect Effects

Effects associated with the two proposed alternatives are described below. Alternative 1 is a no action alternative, and Alternative 2 is the proposed action, which includes activities as outlined in Appendix B.

Alternative 1: No Action

Indicator 1: Miles of road construction and road decommissioning

Alternative 1 would maintain the existing road transportation system within the Pearl Project Area (Table 3.8-1). No new system or temporary roads would be constructed on USFS 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 to existing water quality and watershed health conditions from road decommissioning activities. 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.

Road construction and decommissioning 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 USFS land. 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 watershed

All watersheds are under the 60 percent benchmark in the existing condition (Figure 3.8-3; Table 3.8-3). Under the no-action alternative, there would be no additional young forest created by Forest Service vegetation management. The results of the no action alternative analysis for direct and indirect effects via Indicator 3 suggest water quality and watershed health is likely to remain high.

Alternative 2: Proposed Action

Indicator 1: Miles of road construction and road decommissioning

Alternative 2 proposes new temporary and permanent system road miles within the project area as shown in Table 3.8-1. Construction of these roads has the potential to increase short-term soil disturbances, soil erosion, and point-source sediment inputs into local streams in the analysis area, while long-term presence of roads would potentially continue to contribute sediment into local streams, potentially impacting in-stream and riparian habitat conditions. Under Alternative 2, newly-constructed temporary roads would be decommissioned after all use is completed (USDA Forest Service 2004d, p. F-9).

Approximately 48 percent of proposed temporary roads are restricted to winter use. 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.

Roads proposed to be formally added to the Superior National Forest road system have been in use under other jurisdictions for many years and have been receiving public motorized use. Adding these roads to the system would not result in additional impacts to water quality. For temporary roads, many are already in existence and effects to water quality have already occurred. Additional impacts may occur from some roads as they are maintained to standard.

Table 3.8-1: Pearl Transportation System Management

	Alt 1: No Action (Miles)	Alt 2: Proposed Action (Miles)
Length of road to be decommissioned	0	0.8
Length of new temporary road	0	50.3
Length of new OML 1 road to be added to the system	0	0.5
Length of road changed from special use to OML2	0	0.4
Length of new long-term special use roads	0	0.3

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

Within the project area, the increase of system road length by a total of 1.2 miles (Table 3.8-1; new OML road, special use road converted, new special use) represents a 0.5 percent increase in total road miles. With use of appropriate Forest Plan and MFRC protections (e.g., BMPs, design techniques) this increase is unlikely to adversely impact overall, water quality, watershed, riparian, stream or wetland hydrologic function, or aquatic habitat substantially.

Indicator 2: Number of new stream crossings

Although Alternative 2 would not increase the number of permanent stream crossings, three new crossings would be installed on temporary roads (Table 3.8-2). The added crossing structures will be removed upon decommissioning of the temporary road.

Table 3.8-2: Pearl Project Stream Crossings

	Alt 1: No Action	Alt 2: Proposed Action
Number of new stream crossings to be added on permanent system roads	0	0
Number of new stream crossings to be added on temporary roads	0	3
Number of stream crossings to be removed from permanent system roads	0	0

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

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

Based on a review and analysis of those conditions that would result from full implementation of Alternative 2, there are no watersheds within or intersecting the Pearl Project Area that would potentially exceed the 60 percent threshold (Table 3.8-3; Figure 3.8-3). Under this alternative, no expected substantial negative direct or indirect effects to water quality and watershed health as measured by Indicator 3 would occur.

Cumulative Effects

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

The Pearl Project Area includes the general area east of Babbitt, MN and two miles south of Birch Lake. The flow of surface water is to the north with the Rainy River Headwaters Watershed split by the Divide to flow southerly (Figure 3.8-2). None of the watersheds are directly within the BWCAW.

Indicators 1 and 2: Miles of road construction and road decommissioning and 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, private development, exploratory drilling, 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 Forest-wide Travel Management Project (TMP) made decisions on the future uses of known unauthorized roads across the Forest. The TMP contributes a beneficial effect to water quality and watershed health by including the decommissioning of additional roadways in the Pearl Project Area. See Appendix C: Past, Present, and Reasonably Foreseeable Future Actions for information on specific actions occurring in the project resulting from travel management. Additionally, TMP proposals were coordinated with State OHV planning.

The following instances of non-Pearl project road construction and road decommissioning on federal and nonfederal lands were identified within project area:

- 9.7 miles of road to be decommissioned under previous NEPA (Dunka EA) and TMP.
- 0.25 miles new road construction under exploratory drilling proposals,

No new stream crossings on nonfederal lands were identified within the stream crossing analysis area. The short length of new road, together with Forest Plan and MFRC best management practices and design guidelines, is unlikely to create additional impact in the project area. Additionally, proposed road decommissioning may result in improvements in water quality within the project area.

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

Cumulative effects for Indicator 3 considers new young and open upland created through timber harvest activities outside federal lands as well as hardrock mineral exploration (e.g., drill pads and access roads), recreation projects, and travel management (e.g., decommissioning system roads). A complete discussion of impacts to water quality and water resources associated with exploratory drilling can be found in the Final Environmental Impact Statement: Federal

Hardrock Mineral Prospecting Permits (May 2012). As noted in Appendix C, approximately 1,200 acres are proposed to be harvested from State-owned lands in the next few years. Minimal harvesting is anticipated on private lands within the project area since many of these properties are used for residential or recreational purposes. The number of new drill pads is also listed in Appendix C.

For Alternative 1, additional young forest creation was estimated using a historical rate of creation of young and open upland on nonfederal lands, which was assumed to continue at a constant rate into the future. Under this scenario, rate of nonfederal young and open upland creation varied from 0.03 percent to 0.82 percent watershed area per year, with an estimated range of 6 percent to 25 percent young and open upland in analyzed Pearl project watersheds by 2030. The results of the no action alternative analysis for Indicator 3 suggest water quality and watershed health is likely to remain high. Alternative 2 creates an additional 1 percent to 14 percent young and open upland (total) in analyzed watersheds, with total young and open upland (federal and nonfederal ownerships) ranging from 17 percent to 31 percent in analyzed watersheds. The action alternative is not expected to produce substantial negative cumulative effects to water quality and watershed health as measured by Indicator 3.

Vegetation management activities under Alternative 2 would follow required design features and mitigation measures contained in this document, applicable standards and guidelines in the 2004 Forest Plan (USDA Forest Service 2004b), and applicable MFRC guidelines. Design features and mitigation measures as well as Forest Plan standards and guidelines have been developed to maintain or restore riparian ecological function within near-bank and remainder riparian zones. Under these design criteria, no harvest of trees or herbicide treatments would occur within riparian areas except for the explicit purpose of maintaining or restoring riparian ecological function. Remainder riparian management zones would also be established adjacent to near-bank zones depending upon floodplain and shoreline slope conditions where vegetative management would favor extended rotation of site appropriate tree species. These criteria would serve to protect and enhance both riparian and within-stream channel habitat conditions as well as water quality and watershed health in the analysis area. Monitoring has shown that timber harvest within near bank riparian zones was completed with good compliance with relevant standards and guidelines (2006 Superior NF Monitoring Report p. 12). As discussed in Section3.8.6, these design criteria and mitigation measures, Forest Plan standards and guidelines, and applicable MFRC guidelines have been effective in the past and would continue to protect water quality and watershed health in the future.

Figure 3.8-3: Percent Upland Watershed in Young and Open Condition in the Pearl Project Area by 6th level watershed under existing conditions-the No-action Alternative and the Proposed Action

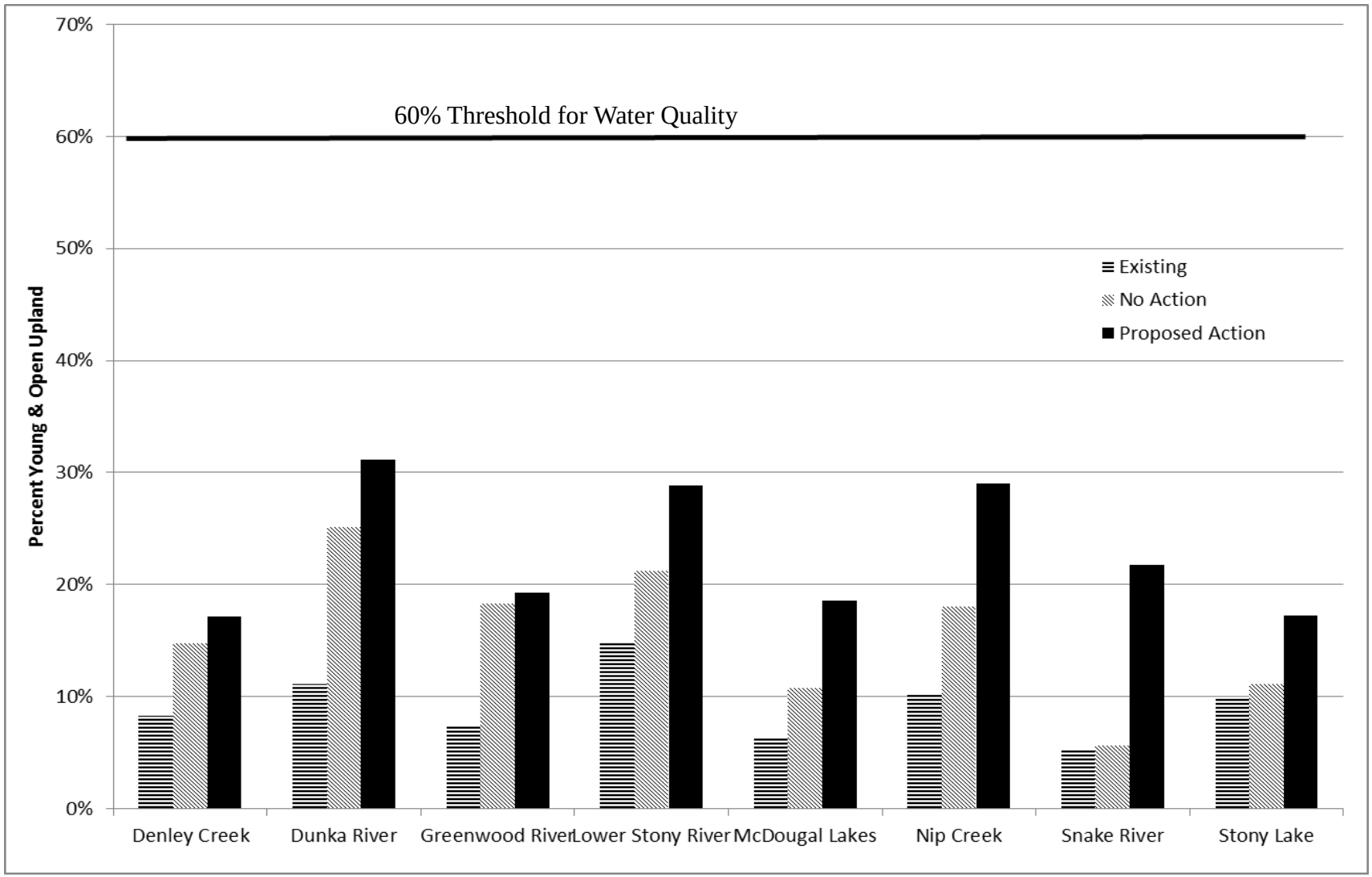


Table 3.8-3: Results of Indicator 3 (60%) Analysis

6th Order Watershed Name	General Watershed Statistics					Young and Open Upland		
	Area (acres)	Upland (acres)	Pearl project in watershed (acres)	Watershed in Pearl project (%)	Pearl project in watershed (%)	Existing Condition: 2013 (%)	Alt 1 - No Action: 2030 (%)	Alt 2 - Proposed Action: 2030 (%)
Denley Creek	11,476	9,569	5,617	49	4	8.3	14.8	17.1
Dunka River	37,227	26,585	29,697	80	23	11.2	25.1	31.2
Greenwood River	31,159	17,266	4,941	16	4	7.4	18.3	19.3
Lower Stony River	29,978	23,932	14,783	49	21	14.8	21.3	28.9
McDougal Lakes	11,700	7,197	4,240	36	3	6.3	10.8	18.6
Nip Creek	15,549	9,287	15,549	100	12	10.3	18.1	29.0
Snake River	13,495	10,765	8,180	61	7	5.2	5.7	21.7
Stony Lake	16,619	9,161	14,783	89	6	10.0	11.2	17.2

3.8.6 BEST MANAGEMENT PRACTICES

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

Design Features and Mitigation Measures

During development of the Pearl Project, the interdisciplinary team including watershed and fisheries specialists cooperated in developing design features that are necessary to avoid or minimize adverse effects to water quality and watershed health during project implementation. Project implementation includes all proposed treatment activities listed in Table A-1 (Appendix A). All alternatives would follow applicable MFRC guidelines as well as required Forest Plan Operational Standards and Guidelines and site-specific design criteria. Applicable Forest-wide desired conditions, objectives, standards and guidelines would be executed in accordance with Superior National Forest Land and Resource Management Plan during project implementation.

Riparian areas, lakes, and streams are protected using site-specific design criteria determined at the site (stand) level. The functional riparian area is delineated based on site conditions and no "management" is permitted in the riparian area unless it is for the explicit reason of restoring or improving riparian function (for example, site preparation to plant long-lived conifer along a lakeshore). In this context, "management" is defined as any activity listed as a treatment in Table A-1 (Appendix A) and includes management actions such as herbicide treatment, different harvest prescriptions, reforestation, prescribed fire, etc.

Management actions in riparian areas are prescribed to increase the presence of long-lived conifers and enhance scenic integrity. To facilitate regeneration of these species we need to increase light levels to the forest floor and reduce competition from dominant aggressive species such as balsam fir, hazelnut, and other shrubs. Commercial timber harvests and nonharvest treatments would be used to create gaps to allow light penetration which would be more favorable for natural or artificial regeneration of white pine, red pine, white spruce, and jack pine. Partial removal of the overstory dispersed across the stand may also be used to increase light levels. Harvested species typically would include aspen, balsam fir, birch, and jack pine. No more than 60 percent of the stand's tree canopy would be removed following MFRC guidelines. No more than 50 percent of the shoreline would be harvested. From the lake, the treatments would be visible in some areas as some of the gaps created would be placed down to the shoreline. In some stands or parts of stands, access with timber harvesting equipment would not be possible. To create conditions for the long-lived conifers, brush saws would be used to fell midstory trees and shrubs to increase light levels on the forest floor. Stands that do not have a natural seed source for long-lived conifers would be planted and protected from deer browse. Natural and artificial regeneration would need to be released after the initial treatment.

Mitigations on State and Private Land

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

Monitoring and Compliance

Based upon Forest Plan monitoring information collected by the SNF (2004-2006) and MFRC (2000-2002 vs. 2004-2006), there is evidence that MFRC guidelines, Forest Plan Standards and Guidelines, project area design features, and mitigation measures have been successfully implemented to help protect water quality and watershed health. Furthermore, there is evidence that these mitigation measures are effective at reducing impacts to water quality and watershed health. This is not only occurring on the Superior National Forest but also across the State of Minnesota. This monitoring shows that mitigation measures on National Forest System, State, county, and private land have been consistently applied and are effective at reducing impacts to water quality and watershed health. This is further supported by auditing of Minnesota BMPs on federal, State, county, and private land that have shown the BMPs to be effective at protecting water quality in 99 percent of situations when correctly applied (US EPA 1994). Mitigation measures derived from the 2004 Forest Plan, as well as State of Minnesota BMPs, are updated based upon additional technical information and monitoring results. New federal-level BMPs are also being applied and monitored across the SNF and across the country in accordance with federal mandate.

Possible Effects with Mitigation Measures

While effects to aquatic resources from general forestry practices such as the creation of new roads, timber harvest, and road crossing structure removal would be greatly reduced, it is still possible that there would be minimal effects after the application of mitigation measures discussed above. These effects could include:

- Minor sediment input at stream crossing sites; these impacts would occur at a very small spatial and temporal scale.
- Grubbing and clearing activities near water bodies may inadvertently contribute fine sediment and other debris into local stream channels.
- The use of temporary winter roads on “frozen ground” conditions may compact soil and riparian vegetation near lakes, streams, and wetlands. This could potentially affect stream, lake, and wetland shoreline habitats.
- The use of temporary winter roads during “frozen ground” conditions may contribute to minor sediment input at stream crossing sites when machinery crosses with dirty tracks, treads, or wheels.

The use of temporary winter roads on “frozen ground” conditions across wetlands may temporarily affect surface flow of water in wetlands due to ice and snow compaction.

3.8.7 OTHER WATER RESOURCE CONSIDERATIONS

Broadcast and hand herbicide application is proposed for use within the Pearl project. As noted in the scoping report, of the 23,460 acres proposed for treatment in the project area, primary treatment of 190 acres would utilize herbicide. Of the 190 acres, 40 would be treated with broadcast herbicide application and 150 would receive hand application of herbicide. As proposed, 1,190 acres would receive secondary treatment using herbicide (500 acres hand application; 690 broadcast application).

Hand treatments would be executed through three application techniques designed to minimize herbicide use and damage to non-target resources. Hand treatment techniques include:

- Spot-foliar application: a 3-foot sprayed radius around a desired tree.
- Basal bark application: herbicide applied around the circumference of the stem of a 2-5 inch diameter tree and 18 inches high from the base of the tree.
- Hack and squirt application: 1-2 milliliter(s) of concentrated herbicide applied directly to an incision made by a hatchet 4-5 feet above the ground on a 2-5 inch diameter tree.

Broadcast application treatments would be executed through a broadcast ground application on a tractor mounted boom. Application methods may include:

- Broadcast application following harvest in combination with a mechanical scarification treatment.
- Pre-harvest application in combination with a mechanical scarification treatment.
- Broadcast application following harvest with no other site preparation treatment.
- Pre-or post-harvest application in red pine stands to reduce dense thickets of hazel to increase plant diversity and structural diversity within the stand.

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. A risk assessment done by the Bureau of Land Management also evaluates the risk of impacts for sulfometuron methyl (ENSR 2005). 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). The Rodeo formulation would be used.
- **Triclopyr** ([{3, 5, 6-trichloro-2-pyridinyl} oxy] acetic acid): a broad-leaved selective systemic herbicide used to control woody and herbaceous broadleaf plants along right-of-ways, in forests, and in grasslands and parklands. It has little or no impact on grasses. The Garlon 3A formulation (Triclopyr TEA) would be used.
- **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 in the control the growth of broadleaf weeds and grasses. The formulation Oust or Oust XP would be used.

Herbicide would be prepared and applied in conformance with label directions, MFRC guidelines for herbicide application, Forest Service Manual 2150 (Pesticide Use Management and Coordination), Forest Service Handbook 2109.14 (Pesticide Use Management and

Coordination Handbook), the Forest Service Health and Safety Code Handbook Chapter 22.1 and all federal, State, and local regulations.

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

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

The following Figure 3.8-4 shows where herbicide would be applied within the Pearl project in relation to land type – upland, lowland, and shallow to bedrock (upland). Of 42 units proposed for herbicide use, 27 contained mapped lowlands. However, in most cases (16 out of 27), hand application of herbicide would be in use, ensuring only desired species would be targeted. In most of the stands with lowlands where broadcast herbicide would be used, lowlands are located along a boundary and are part of a larger wetland complex that would avoided in accordance with MFRC and Forest Plan guidance's.

Previous Superior National Forest projects including the Pelican EA and Skibo EA approved use of herbicide in the same manner as described above. Herbicide (triclopry and sulfometuron methyl, among others) has also been used to eliminate non-native invasive plant species Forest-wide. Although the Pelican and Skibo EAs have been approved, herbicide use has not been implemented in those areas. Past, ongoing and reasonably foreseeable future actions include the use of herbicide by MN DNR (110 acres over the past three years and a proposed additional 32 acres in 2014). Monitoring 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 the three herbicides on aquatic life has been studied in detail as part of the EPA registration process. Judgments about the potential hazards of herbicides to aquatic life are based, in large part, on the results of standard acute and chronic bioassays on fish, aquatic invertebrates, and in some cases amphibians. The SERA reports provide the following information on the specific formulations proposed for use in this project area:

Glysophate/Rodeo:

- Rodeo's impact on a variety of natural settings and habitats is well characterized. Scientists report with high confidence that Rodeo is generally considered to have low toxicity for aquatic life.
- The use of POEA surfactant may increase the toxicity of Rodeo to aquatic life (SERA 2011a).

- See Tables 28 and 29 (SERA 2011a) information regarding acute and longer-term toxicity concentrations for amphibians, fish, and invertebrates.

Triclopyr/Garlon 3A:

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

Sulfometuron Methyl/Oust or Oust XP:

The results of studies in fish suggest that frank toxic effects are not likely to be observed at concentrations less than or equal to 150 mg/L (SERA 2004).

Sulfometuron methyl also appears to be relatively non-toxic to aquatic invertebrates, based on acute bioassays in daphnids, crayfish, and field-collected species of other aquatic invertebrates.

The following figures display proposed herbicide treatment stands within the Pearl Project.

Figure 3.8-4: Proposed herbicide use associated with vegetation management in the Pearl project.

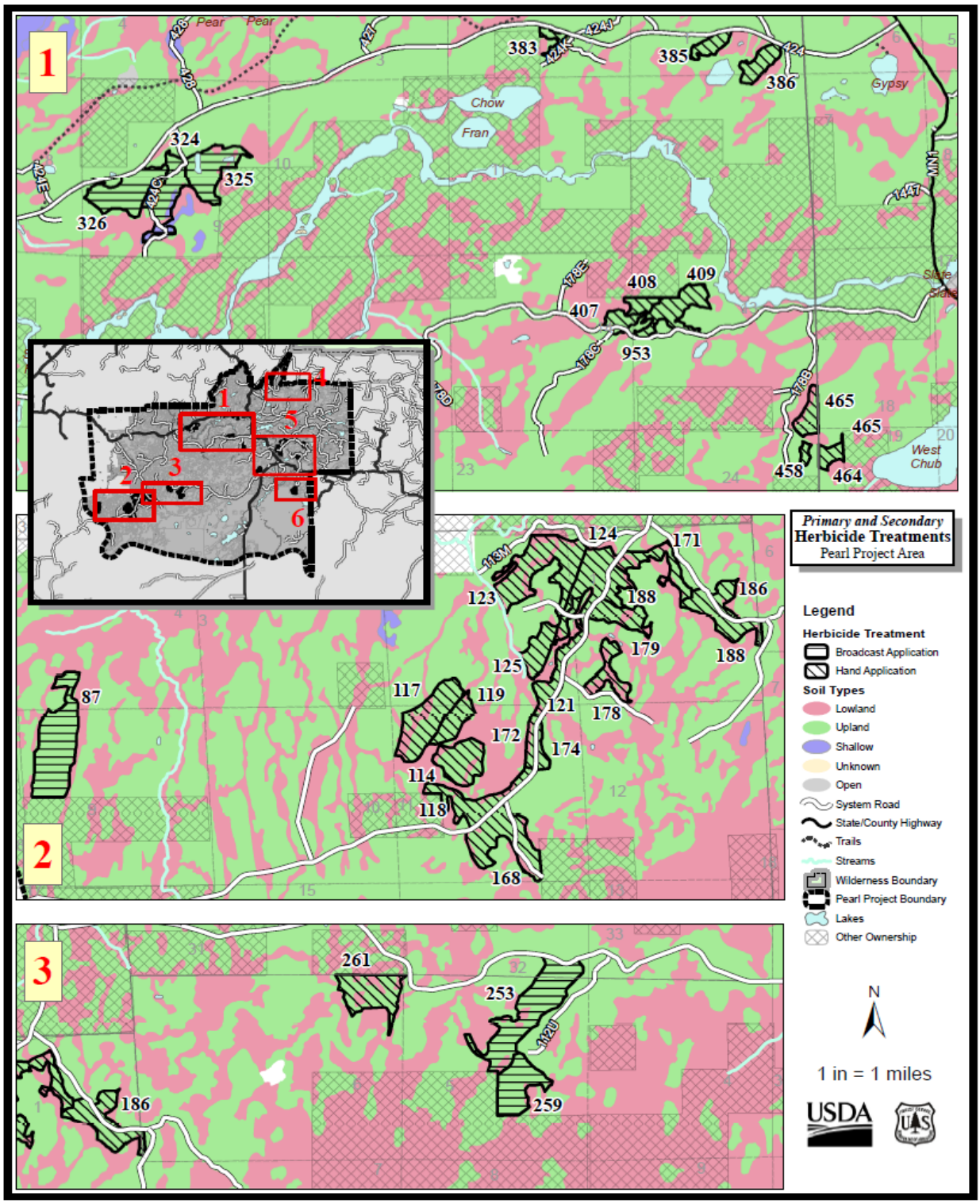
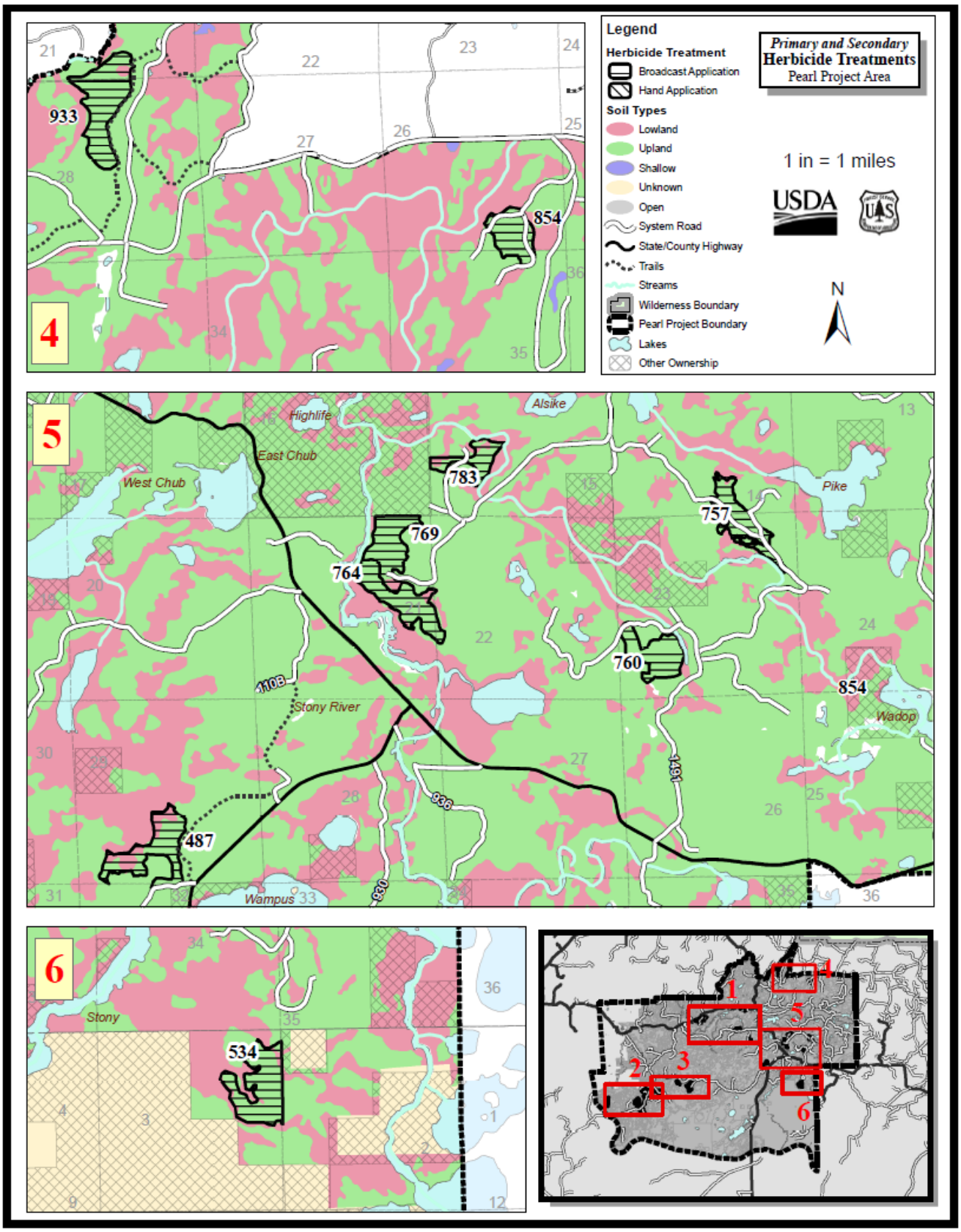


FIGURE 3.8-4: CONTINUED



3.8.8 OPINION OF DIRECT, INDIRECT AND CUMULATIVE EFFECT

The results of analysis of Indicator 1 (miles of temporary road construction and road decommissioning) and Indicator 2 (number of new stream crossings) indicate Alternative 1 (no action) has a somewhat lower potential to negatively affect water quality, aquatic life, and watershed health than the action alternative (Alternative 2).

- The no action alternative creates no new roads, while the proposed action alternative creates 0.5 mile of permanent road, 0.3 miles of long-term special use road, 0.4 miles of special use road converted to OML2, and over 50 miles of temporary road. Decommissioning of 0.8 road miles is proposed as part of Pearl.
- Alternative 2 creates three new temporary stream crossings, which would be removed upon project completion.
- Under previous NEPA (Dunka EA) and TMR projects, 9.7 miles of road would be decommissioned and 0.25 miles new road will be constructed under exploratory drilling proposals.

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

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

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

Implementation of the project may also result in positive outcomes for water resources. The proposed prescribed burns would result in fuels reduction, which reduces the likelihood of very intense fire moving through the area. Intense fire often results in the creation of bare soil and release of sediment and/or nutrients, which may enter streams or floodplains during erosive events.

Based on a review of the information presented in the SERA reports (2004, 2011a, 2011b), with MFRC and project specific mitigations in place, herbicide is unlikely to result in acute or chronic impacts to aquatic life or habitat. Herbicides with POEA surfactant pose a high risk to aquatic organisms and would not be used. Surfactant should be selected carefully, keeping in mind potential impact to water quality and follow all directions, guidelines, and mitigations as defined in 3.8.7.

From a water resources perspective, the difference between alternatives for vegetation management in the Pearl Project Area is moderate. Alternative 1, the no-action alternative, would result in maintenance of current high water quality and watershed health. Alternative 2 adds little permanent road and three new crossings; and both alternatives meet the cumulative impact threshold for young and open. Cumulative impacts associated with the proposed action, exploratory drilling, TMR, and timber harvest on other ownership requires thoughtful and careful adherence to applicable BMPs and Forest Plan guidance to prevent adverse impact.

3.7 NON-NATIVE INVASIVE PLANTS

3.7.1 INTRODUCTION

Non-native invasive species are generally defined by two characteristics: 1) they were not historically (i.e., pre-European settlement) present in a region's ecosystems; 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 Pearl Project activities could create conditions favorable to the introduction or spread of non-native invasive plants (NNIP). This potential effect is analyzed in this section, which describes the NNIP that are currently known to exist in the project area, as well as the effects of the alternatives on NNIP.

3.7.2 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 the vast majority of terrestrial non-native invasive plant impacts are along roads on the Superior National Forest. New roads are areas that are likely to be invaded by non-native invasive plants.

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

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

3.7.3 ANALYSIS PARAMETERS

The area covered by the analysis of direct and indirect effects includes all lands administered by the Superior National Forest within the Pearl 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 Pearl 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 Pearl Project boundary makes a logical analysis unit for cumulative effects.

The time period for direct effects is ten years from the time project activities begin, because no effects of project activities would occur until implementation, and because most project activities should be completed within ten years. Indirect and cumulative effects, for the most part, are also confined to this ten year time frame; however, when evaluating whether any effects are likely from climate change, long-term time frames are also considered.

3.7.4 AFFECTED ENVIRONMENT

Table 3.7-1 displays 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. The NNIP that disperse into such plant communities tend to get out-competed quickly by native shrubs, forbs, and trees. However, some NNIP are exceptions to this general observation. For example, common buckthorn, Siberian peabush, and Tatarian honeysuckle can thrive in the understory of mesic native plant communities. All three of these are present as small infestations in the Pearl 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 moderately high level of NNIP infestation (Table 3.7-1). Orange hawkweed, yellow hawkweeds, and oxeye daisy are the most abundant NNIP. They are found at low abundance levels along most roads in the analysis area and pose a moderate ecological risk to native plant species. Two high ecological risk species, spotted knapweed and Canada thistle, are less abundant totaling approximately 29.4 acres of infestations but are still found throughout the project area. The high risk species leafy spurge infests a total of four-tenths of an acre and is rather localized in the central part of the project area. The other three high risk species, Tatarian honeysuckle, common buckthorn, and Siberian peabush, are not abundant and are only found in one infested site each. The moderate ecological risk species, cypress spurge, common tansy and St. Johnswort, occupy approximately 14.4 acres in the analysis area. The following analysis only considers the effects of moderate and high risk species. The low risk species do not pose enough of a threat to native plant communities to warrant consideration in the analysis.

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

Species	MN Status*	Life History/ Habitat Summary	Acres	Ecological Risk**
Siberian peabush Caragana arborescens	No status	Perennial shrub, can spread by seed or vegetatively, used in past as reclamation species for mine tailings and as an ornamental shrub(MNDNR 2012)	0.3	High
Spotted knapweed Centaurea maculosa	P	Short lived perennial, spread entirely by seeds, dry to mesic uplands (Wilson and Randall 2002)	6.3	High
Canada thistle Cirsium arvense	P	Perennial, spread by seed and rhizome, occupies disturbed sites (Lym and Christianson 1996)	23.1	High
Bull thistle Cirsium vulgare	No status	Biennial, spread by seed, occupies disturbed sites (Lym and Christianson 1996)	1.5	Low
Cypress spurge Euphorbia cyparissias	No status	Moderately aggressive herbaceous perennial spread by rhizome and seed (Czarapata 2005)	0.4	Moderate
Leafy spurge Euphorbia esula	P	Aggressive herbaceous perennial, spread by seed and rhizome, dry to mesic uplands (Lym and Zollinger 1995)	0.4	High
Orange hawkweed Hieracium auranticum	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Callihan et al. 1982)	90.2***	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)	90.2***	Moderate
St. Johnswort Hypericum perforatum	No status	Herbaceous perennial; spread by seed and lateral roots, dry to mesic uplands (Krueger and Sheley 2002)	0.05	Moderate
Oxeye daisy Leucanthemum vulgare	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Krueger and Sheley 2002)	90.2***	Moderate
Common buckthorn Rhamnus cathartica	R	Perennial, small tree, spread by bird-dispersed berries; can colonize in forest areas. (Czarapata 2005)	0.0002	High

Siberian peabush Caragana arborescens	No status	Perennial shrub, can spread by seed or vegetatively, used in past as reclamation species for mine tailings and as an ornamental shrub(MNDNR 2012)	0.3	High
Common tansy Tanacetum vulgare	P	Herbaceous rhizomatous perennial, spread mostly by seed; disturbed uplands (LeCain and Sheley 2011)	13.9	Moderate
Tatarian honeysuckle Lonicera tatarica	No status	Perennial shrub spread primarily by bird dispersed berries, can colonize in forest areas (Czarapata 2005)	0.002	High

* **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.

3.7.5 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1: NO ACTION

Direct and Indirect Effects

Although all the indicators are zero for Alternative 1 and no ground disturbance would occur, this alternative would still have direct effects on NNIP. Any non-native invasive plant in the analysis area would continue to exist and would probably be spread in the analysis area along typical corridors for weed dispersal such as roads, trails, gravel pits, and parking lots. Any public or administrative vehicle use in the analysis area (e.g., passenger vehicles, trucks, road maintenance equipment, ATVs) would have the potential to spread NNIP. Wildlife and human foot traffic in the analysis area would also have the potential to spread NNIP, but the likelihood of spread by these means would be lower than from vehicle use. Overall, this alternative would have the least amount of ground disturbance and, therefore, the least risk of weed spread.

ALTERNATIVE 2: PROPOSED ACTION

Direct and Indirect Effects

Indicator 1: <u>Miles of new upland road construction on National Forest System land</u>

Approximately 29.2 miles of new upland temporary road would be constructed in Alternative 2. Non-native invasive plant species would be likely to spread along the sides of some of the new upland road construction in the analysis area. Some species, like oxeye daisy and orange and yellow hawkweed, are already found along most roads in the analysis area, and would probably quickly colonize the sides of some new upland roads. However, the ecological consequences of the spread of these species would be minor, since they primarily stay on roadsides and do not compete well with native upland vegetation.

Other species such as Canada thistle and spotted knapweed are not as common in the analysis area, but have a high ecological risk (Table 3.7-1). These species can outcompete native vegetation and degrade wildlife habitat. Project activities would probably cause some of these species to spread, and most new infestations would be confined to the disturbed areas. There is a

risk that these species could spread to nearby undisturbed susceptible habitat (like wetland edges for Canada thistle) and degrade native plant communities.

For four other species with high ecological risk (Siberian peabush, Tatarian honeysuckle, common buckthorn, and leafy spurge) are not common in the project area and would have a low risk of spreading and causing subsequent impacts as a result of Alternative 2. There are no proposed treatments near the Siberian peabush and Tatarian honeysuckle infestations so there would be no risk of spread of these species. For the one occurrence of common buckthorn, it was sprayed in 2013. This occurrence is in the middle of a group of fuels treatments, so to prevent it from spreading as a result of the fuels treatments, we will perform follow up treatments in 2014 and inventory for more buckthorn in the vicinity to make sure none was missed. There is a low risk of spread for the four leafy spurge sites in the project area. All were sprayed in 2013, and the sites will be treated again in 2014 to prevent them from spreading to nearby proposed action stands.

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

A number of factors would minimize NNIP impacts in Alternative 2. Some of the potential NNIP spread would be offset by the fact that all the new roads proposed in the Pearl Project Area are temporary roads and would be decommissioned after use. As native forbs, shrubs, and trees start to revegetate decommissioned roads after road use stops, these species would gradually begin to outcompete moderately invasive species like yellow hawkweed. Herbicides were used to treat weed infestations across the project area during the past two years, and some potential NNIP spread would be offset by the 0.9 acres (110 sites) and 5.5 acres (393 sites) of weed treatments conducted in 2012 and 2013, respectively; similar acreage is expected to be treated in 2014. Lastly, the risk of NNIP spread would be minimized by an operational standard and guideline that specifies treatment of known infestations prior to mechanical or burning treatments. This would also reduce the risk of spreading NNIP.

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

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

Approximately 5,699 acres of vegetation treatment units would occur within 50 feet of an inventoried NNIP occurrence in Alternative 2. For this alternative, there is a risk that NNIP occurrences near a treatment unit could spread to the unit as a result of ground disturbance associated with the treatment (e.g. timber harvest or mechanical site preparation). The risk of NNIP spread would be minimized by an operational standard and guideline that specifies treatment of known infestations prior to vegetation management activities. Furthermore, as noted above for Indicator 1, herbicides were used in 2012 and 2013 to treat invasive plant infestations in the analysis area, which will help reduce the risk of future NNIP spread. Alternative 2 would have a greater risk of weed spread associated with vegetation treatments than Alternative 1, but following Operational Standards and Guidelines would minimize the risk of ecological consequences of NNIP spread due to management activities.

Herbicide use for site preparation 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 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 stands where this treatment is proposed will be treated in 2014 and would be treated again in 2015 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.

One of the proposed treatment units is within approximately one-half mile of the Boundary Waters Canoe Area Wilderness (BWCAW) boundary but none are immediately adjacent to the boundary. The risk that vegetative treatments proposed under Alternative 2 would cause NNIP impacts to the BWCAW is low primarily because the treatment units would be some distance from the BWCAW and not immediately adjacent to the BWCAW.

Table 3.7-2: Indicators for NNIP analysis

Indicator	Alt. 1	Alt. 2
1. Miles of new upland road construction on NFS lands	0	29.2
2. Acres of treatment units within 50 feet of NNIP occurrence.	0	5,699

Cumulative Effects Common to All Alternatives

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

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

NNIP would continue to spread in the analysis area under all alternatives as a result of present and reasonably foreseeable actions on National Forest System land and lands under other ownership. The effects of NNIP would continue to be concentrated in developed areas (e.g. roadsides, trails, powerlines) and not undeveloped forestlands. Some road construction is likely on State and county lands in the analysis area. For example, some new roads could be built in connection with State or county timber harvest, and this could result in a small amount of NNIP

spread. Also, ongoing special use authorizations (Appendix C) could also contribute to some small increases in NNIP along the special use roads. Also, the Prospector ATV Loop could result in a few new ATV routes in the project area, and the Lake County OHV Plan could lead to higher OHV use which could slightly increase spread of NNIP. In contrast, the Superior National Forest Travel Management Project and Dunka Project would result in 9.7 fewer miles of road open to motorized recreation in the project area (Appendix C). Road decommissioning associated with these projects would be beneficial and result in a small reduction in potential weed spread. Overall, road or trail construction and use of existing roads or trails could lead to small increases in NNIP infestation on both National Forest System land and lands under other ownership in the cumulative effects analysis area via spread along travel corridors for Alternatives 1 or 2.

Timber harvest on non-federal ownership, such as future vegetation management on State lands (projected 1,200 acres of vegetation treatments-Appendix C) would also make a small contribution to the spread of NNIP. Ongoing federal timber sales on 225 acres within the analysis area would make a small contribution to NNIP spread as well. Site preparation approved in the Dunka and Tomahawk Environmental Assessments could also make a small contribution to the spread of NNIP. Monitoring (see below) has shown that when timber harvest results in weed spread, the new infestations tend to be small and located on access roads and landings where they can be easily treated.

Fuels treatments associated with the Pitcha Lake Fuels CE are likely to be completed in the future, and there is a small risk that NNIP could spread as a result of these treatments. Also, there is ongoing demand for gravel from gravel pits in the analysis area, which could lead to some spread of NNIP.

There are past, ongoing, and future hardrock mineral exploration projects in the analysis area that could also contribute to the spread of NNIP. Stipulations in the operating plans for equipment cleaning and follow-up treatments should help to limit this spread.

On April 27, 2006, Forest Supervisor Jim Sanders signed a decision to implement a Forest-wide NNIP management project, which would provide for treatments of NNIP in the project area (USDA Forest Service 2006) under all alternatives. In the Pearl Project Area 1.5 acres (77 sites), 0.9 acres (110 sites), and 5.5 acres (393 sites) of invasive plants were treated in 2011, 2012, and 2013, respectively; a similar amount of acreage is expected to be treated in 2014. Furthermore, in 2014 an agreement is in place for the Forest Service to treat invasive plants at approximately 30 gravel pits on the Superior National Forest. Five of these are in the Pearl analysis area. This is a beneficial effect with respect to NNIP spread which would minimize impacts from NNIP directly, indirectly, and cumulatively caused by project activities.

It is difficult to quantify a threshold for cumulative weed impacts. One way of approaching this question is to compare the abundance of NNIP on high risk sites in the project area to their abundance on high risk sites Forest-wide. There are approximately 10.8 acres of NNIP infesting sites at increased risk of NNIP invasion (i.e. ELTs 7, 9, 11, 16, 17, and 18) in the analysis area. This represents a small fraction (approximately six percent) of NNIP on high risk sites Forest-wide, which further demonstrates that Pearl Project activities would pose minimal risk of cumulative effects of weed spread.

Monitoring of a sample of Pearl Project activities for NNIP spread would help detect new infestations that arise as a result of project activities; new infestations would be treated under the 2006 Forest-wide NNIP Management EA. Monitoring results to date suggest that Superior National Forest invasive plant mitigations are successful in minimizing the spread of these

species. Monitoring of harvested stands treated under the Silver Island Environmental Assessment (Tofte Ranger District) found only 0.008 acres of new infestations that appeared tied to harvest activities (USDA Forest Service 2007). No spread was observed into forested stands; for example, one stand next to Sawbill Landing (which has a heavy spotted knapweed infestation) was thinned and burned, but no spotted knapweed was found in the treated stand. In 2007 monitoring of harvested stands treated under the Virginia EIS (Laurentian Ranger District) found only one-tenth of an acre 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 Pearl 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 Pearl Project area receives high recreational use and the cumulative effect of increased temperatures and trail use/road construction could potentially exacerbate NNIP populations in the area under future projected conditions.

3.10 RECREATION AND SCENIC RESOURCES

3.10.1 INTRODUCTION

The Pearl Project Area within the Superior National Forest offers a variety of both summer and winter recreational activities for forest visitors. Summer recreational opportunities include dispersed backcountry camping, picnicking, swimming, hiking, berry picking, fishing, wild rice harvesting, OHV riding, boating, canoeing, biking, and sightseeing. Winter use is low to moderate and includes snowmobiling, cross-country skiing, snowshoeing, ice fishing, and dog sledding. The area is also popular for fall hunting and year-round birding.

The inclusion of this section in the Pearl Project EA is important to measure the 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.

Recreation related concerns raised during the project's public comment period included the potential impact to visitors as a result of proposed activities and also varying opinions on OHV opportunities and use in the project area.

3.10.2 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" (F P, 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, 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 3.10-1, although only sites adjacent to harvest units will be analyzed for direct and indirect effects. Furthermore, only treatments that change the character or appearance of a stand 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 thinning and uneven age cuts. Effects from non-harvest 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.

3.10.3 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 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.

The time period selected for analyzing the direct and indirect effects is ten years, beginning at the time of treatment. This time frame is appropriate because the 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. 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 ten years the 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 f time as a result of taking no management action compared to taking action.

3.10.4 AFFECTED ENVIRONMENT

The Pearl Project Area encompasses approximately 130,000 acres of which 55 percent, or 71,500 acres, are National Forest System lands. Other ownership in the project area is comprised of private, State, and county lands. There are also many lakes ranging from 480 acres to just a few acres in size. Forest management activities such as timber harvest, hazardous fuels reduction, land leases, and recreation developments occur on all ownerships. The project area is sparsely populated but both residential and seasonal homeowners are present.

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 Pearl Project Area include General Forest (36% of area), Semi-primitive Motorized Recreation (34%), General Forest-Longer Rotation (28%), , and Candidate Research Natural Area (.88%). The General Forest (GF) and General Forest – Longer Rotation (GFLR) MAs emphasize land and resource conditions that provide a wide variety of goods, uses, and services including roads, timber harvest activity, and recreational opportunities.

The Semi-primitive Motorized Recreation (SPMR) MA emphasizes land and resource conditions that provide recreational opportunities in nearly primitive surroundings where motorized use is allowed. Candidate Research Natural Areas 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.

As noted in Table 3.10-1 there are many lake accesses but no highly developed recreation facilities. The recreation resources that receive the most attention in the project area are trails for a wide range of uses including snowmobiling, ATV riding, dogsledding, and skiing as well as

about a dozen well used dispersed campsites and boat accesses.

Table 3.10-1 lists all Pearl 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 Forest Plan, Chapter 3.

Table 3.10-1: Project Area Recreation Sites

Recreation Site	Primary Use	Management Area
Sand Lake campsite and picnic area	Camping, day use, and carry down boat access	General Forest (GF)
Dragon Lake	Dispersed camping	General Forest-Longer Rotation (GFLR)
Baird Lake	Dispersed camping	GF
Surprise Lake	Carry in boat access	GFLR
Grass Lake	Carry in boat access	GFLR
Beetle Lake	Carry in boat access	GFLR
Two Deer Lake	Carry in boat access	GFLR
Shamrock Lake	Carry in boat access	GF
Dunnigan Lake	Carry in boat access	GFLR
Gypsy Lake	Carry in boat access	GF
Pike Lake	Carry in boat access	GFLR
Eikela Lake	Carry in boat access	GFLR
Stony River	Carry in boat access	(GF, GFLR, Semi-Primitive Motorized Recreation-SPMR)
Stony Lake	River access	GF
Peanut Lake	Carry in boat access	GFLR
Campers Lake	Carry in boat access	GFLR
Pear Lake	Carry in boat access	GF

Table 3.10-1: Project Area Recreation Sites		
Recreation Site	**Primary Use**	**Management Area**
East Chub Lake	Boat access ramp	GF
Flathorn/Gegoka Trail	Cross-country ski trail	GFLR and Candidate Research Natural Area
Corridor Trail	Dogsled/Cross-country ski trail	GF
Tomahawk Trail	Snowmobile trail	GFLR
Stony Spur Trail	Snowmobile/ATV trail	SPMR
Stony River Overlook	Observation site	GFLR
Mattila Shelter	Snowmobile trail shelter	GF

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 Pearl EA as part of Alternative 2. These include the addition of campsites on both Beetle and Dunnigan Lakes at popular user developed sites and converting six-tenths of a mile of the Stony Spur ATV Trail from its existing designation of allowing Class I ATVs to also allowing Class II ATVs. Class I ATVs are recreational motor vehicles that are typically 50 inches wide or less where Class II ATVs are between 50 and 65 inches wide.

3.10.5 ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

There would be no new management activities initiated within the project area under this alternative. No vegetation treatment would occur; therefore, no short-term impacts to recreation sites or trails from the treatments would affect these sites, nor would any new recreation related projects such as new campsites, improved boat accesses, or the redesignation of trails or roads both open or closed to OHV occur.

Vegetation treatment goals to move scenic resources towards Forest Plan desired conditions by improving species diversity and transitioning areas of harvest towards a greater component of large, mature trees including long-lived conifers would not occur. The status of existing National Forest System roads would remain unchanged; there would be no improvements made to enhance recreational access or other recreation opportunities.

Alternative 2: Modified Proposed Action

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.

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. Over time, harvested area would be revegetated and logging slash would settle. Vegetation management activities would help move scenic resources towards Forest Plan desired conditions by improving species diversity and transitioning areas of harvest towards a greater component of large, mature trees including long-lived conifers.

Alternative 2 would also increase recreation opportunities in the project area with proposals to widen six tenths of a mile of the Stony Spur ATV trail to accommodate Class II ATVs and through the creation of designated campsites on Beetle and Dunnigan Lakes.

Lake Recreation Sites

For lakes in the Pearl Project Area that include recreation access listed in Table 3.10-1, 12 of the 17 lakes and the Stony River would have harvest units near or adjacent to them in Alternative 2.

Table 3.10-2 shows the lake and the indicator "lineal feet of mechanical treatment adjacent to lakeshores with High Scenic Integrity Objectives".

3.10-2: Lake Recreation Sites within the Pearl Project Area		
Lake Name	**Alt. 1-Linear feet of shoreline adjacent to treatment units**	**Alt. 2-Linear feet of shoreline adjacent to treatment units**
Beetle Lake	0	3,500
Dragon Lake	0	760
East Chub Lake	0	2,200
Eikela Lake	0	3,800
Peanut Lake	0	1,100
Pear Lake	0	550
Pike Lake	0	4,400
Shamrock Lake	0	1,700
Slate Lake	0	4,000
Stony Lake	0	4,780
Stony River	0	9,800
Two Deer Lake	0	2,500
West Chub Lake	0	1,900

Forest Plan direction would be adhered to for all recreation sites adjacent to mechanical treatment units. For example, desired condition DSC-2 (FP, p. 2-45) states, “In Moderate and High Scenic Integrity Objective (SIO) Areas, vegetation management that is visible from travel ways, recreation sites and lakes with access:

Enhances views, creates vistas, and features natural openings,

Retains canopies over travel routes,

Encourages vegetative diversity and seasonal color contrast and,

Enhances” big tree appearance.”

Blending of scenic integrity objectives with vegetation management objectives in all High SIO area harvest units proposed in Alternative 2 during harvest unit design and layout would ensure that high scenic quality is protected or enhanced in landscapes with outstanding scenic value and in high public use recreation areas and corridors (F P, p. 2-45, D-SC-1).

To accomplish High SIO while still meeting vegetation management objectives, no more than 50 percent of the lineal feet of shoreline units would be harvested. This would be accomplished by selecting locations to feature natural openings to enhance views while breaking up the appearance of harvest. Methods include designing curvilinear instead of straight unit boundaries, retaining groups or islands of trees, leaving seed trees and canopies of long-lived species such as pine, and not harvesting on steep lakeside slopes or other topographical features that limit access. No harvest of any live cedar, white pine, and tamarack would occur.

Each harvest unit is also reviewed by specialists representing riparian, wildlife, hydrological, and soil based resources to ensure mitigation measures are in place to protect these resources.

Standards and guidelines from the Forest Plan's Watershed Health, Riparian Areas and Soil Resources section consider operability on slopes, filter strips, and all near-bank operations including G-WS-4, 5, 6, 7 and 8 in addition to S-WS-9 and 10 on page 2-14. The inclusion of mitigations to protect these resources would be included in the 50 percent or more of untreated lineal feet of shoreline creating the appearance of a more natural and undisturbed shoreline.

Figure 3.10-1: Example of a Natural Appearing Opening Created to Enhance Scenic Integrity near Harvest Area

All harvest units adjacent to lakeshores in High SIO areas follow Forest Plan 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 (F P, p. 2-46, G-SC-1). Retaining 50 percent or more of existing tree cover in lakeside vegetation treatments units will enhance scenic resources by creating vistas and longer views into the forest, and in some cases opening views to the lake from a nearby road as well as encouraging vegetative diversity. Other benefits include promoting a more productive, diverse and healthy native plant community by providing habitat for wildlife, sustainable forest products, and improved riparian function. Each harvest unit within view of a lakeshore will be looked at carefully and given a prescription that follows the High SIO desired

conditions and FP guidelines o e while still accomplishing other vegetation management objectives.

Other lakes in the project area without established public access include Campers Lake, Gander Lake, Little Wampus Lake, Shallow Lake, and Wadop Lake. Although the Forest Plan states that High SIO boundaries lie at least one-quarter mile from the actual travel ways of bodies of water with access, the same mitigations to protect lakeside scenic resources including not harvesting more than 50 percent of vegetation would apply to these lakes.

Where lake access trails are within a proposed harvest unit, mitigations to protect them would be included in the harvest plan. Impacts from harvest activity on lake campsites would not occur because there a very few designated campsites in this area and there are none within proposed harvest unit boundaries.

Trails

Winter non-motorized trail: a one mile segment of a winter dogsled/ski trail that extends 16 miles from the Kawishiwi River to Forest Road 386 is within the Pearl Project Area. A "shelterwood" treatment is prescribed along one-half mile of this trail which is a method of regenerating an even-aged stand by removing trees to establish a new age class beneath the shelter of residual trees. Using the indicator "lineal feet of mechanical treatment adjacent to lakeshores, trails, recreation sites and roads with High Scenic Integrity Objectives"- 1,900 lineal feet of the trail could be affected by the harvest unit.

To protect and enhance scenic values along the trail, all adjacent harvest units would follow Forest Plan 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 (F P, 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.

Of the three harvest units that could affect the trail, two could be harvested any time of year and one is scheduled for "winter harvest only" due to wet soils. If harvest occurs during winter when trail use would also occur, 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 (F P, p. 2-41, G-REC-2).

Flathorn/Gegoka Ski Trail: a 17 ski mile trail system of which approximately 4.5 miles is within the Pearl Project Area on the Kawishiwi Ranger District. Of the 4.5 miles of ski trail in the project area, approximately one mile (five harvest units totaling 96 acres) or 4,800 lineal feet, are near the trail, with another 1.2 miles of trail within units proposed for prescribed fire treatments.

The ski trails are within an area designated for High SIO to enhance the recreation experience. All harvest units adjacent to trails in High SIO areas follow Forest Plan 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 (F P, p. 2-46, G-SC-1).

Of the five mechanical treatment units that include portions of the ski trail, four could be harvested during summer and have no impact on the trails during ski season. One 12 acre unit is prescribed for winter harvest due to moist soil conditions. If harvest occurs during winter when trail use would also occur, 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 (F P, p. 2-41, G-REC-2).

Portions of the trail within units designated for fuel reduction may receive pretreatment with equipment prior to burning to lower fire intensity and protect larger trees. This would likely be intermittent chainsaw work. Changes to scenic resources along the trail after the introduction of fire would be a more open understory for longer views into the forest amidst and around the larger trees which would dominate the view shed.

Tomahawk Snowmobile Trail: The Tomahawk is a 36-mile State Grant-in-Aid snowmobile trail that connects with other trail systems extending from Grand Rapids, Minnesota to the north shore of Lake Superior. Approximately six miles of the trail are within or on the border of the project area and of these six miles, 4.3 miles or 22,704 lineal feet of the trail are within or adjacent to proposed harvest units.

Where harvest occurs near the trail, the same mitigations as those used along the non-motorized trails would be implemented to protect the trail's scenic integrity and passage of trail riders. Where soil conditions permit, summer harvest of the units is prescribed to avoid a seasonal overlap of harvest and recreational activities. Of the eighteen harvest units adjacent to the trail, seven of them would need to occur during winter or frozen ground conditions which is dictated by wet soils within the harvest unit. Although it is not ideal for harvest activity to overlap with recreational activity it is not uncommon on trails such as the Tomahawk which are often routed on roads used for timber access.

Mitigation measures implemented to facilitate harvest activities yet safeguard recreational snowmobile riding on the Tomahawk Trail 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 (F P, p. 2-41, G-REC-2). Due to increased use of the snowmobile trails on weekends, harvest activity would be limited to Monday through Friday to avoid conflicts.

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.

Stony Spur ATV/Snowmobile Trail: Nineteen of the twenty six mile Stony Spur ATV/Snowmobile Trail that runs from the City of Babbitt to Forest Road 377E is within the Pearl Project Area. Of the 19 miles within the project area, approximately five miles (26,400

lineal feet) of the trail could be impacted from adjacent harvest units. Even though the Stony Spur trail accommodates summer ATV riding, summer harvest is still preferable over winter harvest to avoid damage to the well groomed snowmobile trail.

Of the eighteen harvest units adjacent to the trail, nine of them would need to occur during winter or frozen ground conditions which is dictated by wet soils within the harvest unit. Although it is not ideal for harvest activity to overlap with recreational activity, it is not uncommon on trails such as the Stony Spur which are often routed on roads used for timber access.

Mitigation measures implemented to facilitate harvest activities yet safeguard recreational snowmobile riding on the Stony Spur Trail 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 (F P, p. 2-41, G-REC-2). Due to increased use of the snowmobile trails on weekends, harvest activity would be limited to Monday through Friday to avoid conflicts.

Benefits to trail users post-harvest would include t openings in the forest which helps break up the trail riding experience between densely wooded segments of trail to areas that provide vistas. Also, harvest including brushing along some portions of the trail for logging truck access would keep the route cleared to the width specified for safety and ease of passage and grooming.

Project Area Recreation Proposals:

Convert six-tenths of a mile of the Stony Spur ATV/Snowmobile Trail to Allow Class II ATVs:

The Pearl Project Area includes most of the 26 mile long Stony Spur ATV/Snowmobile Trail and other low level gravel roads where recreational ATV riding is allowed. The trail is within a Semi-primitive Motorized Recreation MA where ATV use on designated routes is allowed.

All but six-tenths of a mile of the trail is open to both Class I ATVs (50” or less in width) and Class II ATVs (65” or less in width, also referred to as side-by-side ATVs). Because most of the Stony Spur Trail is open to Class II ATVs, as are up to eight miles of low level gravel roads to the east, opening this segment would provide longer riding opportunities for people operating side by side or Class II ATVs. Also as most of the Stony Spur Trail is on straight, flat segments of abandoned roads with open views, the additional riding opportunities on the low level roads this route would connect are forested and offer more varied terrain to provide for an enhanced riding experience. A desired condition in the Forest Plan states: The Forest provides RMV (recreational motor vehicles) road and trail riding opportunities with experiences in a variety of forest environments, while protecting natural resources (F P, p. 2-43, D-RMV-1).

The only modification or change needed to open this trail segment to Class II ATVs would be wider brushing specifications from the existing 8 to 10 foot corridor to a 12 to 14 foot corridor. The width of the trail tread for six-tenths of a mile would not need widening because this segment of trail is straight with good sight lines for safety. The segment is also characterized by bumps and rocks which promote slower speeds and it is in an area of low ATV traffic.

Effects from opening the six-tenths of a mile segment to Class II ATVs would be longer riding opportunities for anyone with a Class II ATV. Some may ride from as far away as the trail’s start in Babbitt but others benefitting from this action would be visitors who trailered their Class II

ATVs to this area of the Forest for a road and trail riding experience. Other effects would be a wider brushed-out trail for six-tenths of a mile. This work would most likely be accomplished with crews using chainsaws because the tree type along this segment is mostly small balsam fir and brush. The Motor Vehicle Use Map (MVUM), available on the SNF website, showing which routes are authorized for ATV riding would also be updated.

Beetle Lake Campsite Development:

Dispersed campsites on lakes within the Pearl Project Area typify recreational use in this part of the Forest. At Beetle Lake there exists a popular user created campsite on the north side of the lake accessed from Special Use Road SU5383H02. There are currently no other officially recognized or maintained campsites on this popular trout lake.

This proposal would create a designated campsite on the north side of Beetle Lake at the existing user created site. Designating and designing the site on durable surfaces to accommodate visitor use would help with long-term maintenance including regular visits by FS personnel. An eroding slope exacerbated by unmanaged visitor use at the site was stabilized in 2013 with the addition of timbers and the closure of an unnecessary secondary path to the lake.

Changes needed to create the site include brush clearing, flattening of tent pads, and installation of a fire ring and latrine. An associated action would be authorizing full size vehicles and ATVs on four-tenths of a mile of SUP5383H02 and the creation of a three to four vehicle parking area adjacent to the campsite. A gate currently at the beginning of SUP5383H02 would also be moved beyond the new parking area to prohibit public access to private land beyond.

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. Opening the special use road to the public for four-tenths of a mile would provide a camping destination for tent, RV, and ATV campers and provide better access for State fish stocking efforts.

Dunnigan Lake Campsite Development:

Similar to Beetle Lake, Dunnigan Lake has an undeveloped lake access and user created camping area where Forest Road 1448 (FR 1448) meets the lakeshore. This proposal would create a campsite including clearing and leveling tenting areas and installation of a fire grate and latrine near the existing boat landing. The proposal would also widen an existing parking area to accommodate three to four vehicles near the lake for day use anglers or overnight campers. The MN DNR may also contribute a cement back-in boat ramp which would help define where boats enter the lake and mitigate erosion by stabilizing the shoreline, keeping vehicle tires from spinning which exacerbates erosion.

Effects from this project would include clearing and brushing beyond the existing user created camping and parking areas. The change to the site between its existing user created condition and what a managed campsite would look like would be minimal; in fact hardly noticeable except for extra brushing and the installation of a fire grate, latrine, and boat ramp. Benefits of the project would be a managed site visited and maintained more frequently by FS personnel, the concentration of use including campfires and latrines on durable surfaces, and enhanced erosion control where boats are launched.

Conclusion – Direct and Indirect Effects

Proposed Alternative 2 vegetation management treatments near project area recreation sites and scenic resources would affect these resources, particularly during harvest activity, For both motorized and non-motorized project area trails when the season of harvest overlaps with high visitor use, mitigations put in place to minimize conflicts and provide for safety include scheduling harvest activities during mid-week instead of weekends, avoiding use of system trails for hauling/skidding logs, and placing safety signing to warn recreationists of activities in the area.

The indicator "lineal feet of mechanical treatment adjacent to lakeshores, trails, recreation sites and roads with High Scenic Integrity Objectives" was used to measure the potential impact of harvest activity on the area's scenic and recreation resources. Although the lineal feet of shoreline shown for each lake in the project area appears extensive, a host of mitigations to ensure the integrity of riparian, wildlife, hydrological, and soil near-shore resources would provide for remaining vegetation to decrease affects to scenic resources. Furthermore, a maximum of 50 percent of vegetation could be harvested along High SIO shorelines specifically to protect scenic resources and to create the appearance of natural disturbance areas.

Benefits of vegetation management in High SIO areas such as lakeshore and trails include enhanced views, vistas, and the opportunity to feature natural openings; enhanced big-tree appearance; and more vegetative diversity as old stands are replaced by new growth.

The proposal to authorize Class II ATVs on an existing six-tenths of a mile segment of the Stony Spur ATV Trail in a Semi-primitive Motorized Recreation MA where ATV use on designated routes is allowed would connect the trail to other attractive Class II ATV riding opportunities. Furthermore, it would move the project area towards Forest Plan desired conditions by providing road and trail riding opportunities with experiences in a variety of forest environments.

The proposal to create designated campsites at two existing user developed sites on Beetle and Dunnigan Lakes would provide fire grates, tent pads, and latrines for a more enjoyable and manageable camping experience, concentrating use on durable surfaces to mitigate effects of erosion and protect the lake side environment.

Cumulative Effects of Alternative 2

Effects to Recreation:

Lake Accesses: Forest Service staff and the MN DNR's Finland Fisheries staff met in January, 2014 to discuss lake accesses on federal lands. Specific lakes within the project area with limited or no public access that will be studied for future development or improvement include Slate, Swallow, and Peanut Lakes. Pearl Project planning and public involvement had already begun prior to this meeting; therefore, none of these accesses were included in the project. At this time there are no new project improvement proposals for these lake accesses by either agency.

Prospector ATV Loop: A motorized recreation route called the Prospector Loop has been proposed that would connect the communities of Babbitt, Tower, and Ely by ATV trail. Most of the route already exists as low level roads, ATV trail, or snowmobile trail. Authorization to use some higher level Forest roads currently managed for passenger vehicles and also determining re-routes of existing snowmobile trails to higher ground would be necessary to complete the trail.

Within the Pearl Project Area the trail would use the existing Stony Spur ATV/Snowmobile Trail and approximately two miles of Forest Road 388, both of which currently allow ATVs. The route would provide "destination and loop riding" opportunities for people in these communities and set a designated and well maintained trail where currently people attempt to make these connections on unauthorized routes. Cumulative effects in the Pearl Project Area if the Prospector ATV trail were developed would likely be an increase in ATV traffic between these communities on designated routes.

Lake County Comprehensive Trail Plan: This plan (currently a draft) includes proposals for hiking, mountain bike, ski, and ATV trails. None of the specific proposals are within the Pearl Project boundary but some are connected by roads already available to ATV traffic within the project area.

Lake County OHV Plan: This project is in a "draft" stage and would involve State, federal, county, private, and non-profit entities. A primary purpose of the plan is to connect North Shore communities to trail systems north of them including access to roads and trails on the Superior National Forest. Project proposals specific to the Superior include: Opening the county portion (CR 702) of the Mitawan Lake Road to Class I ATVs, opening the McDougal Lake Road (CR 704) to Class I and II ATVs, allowing Class II ATVs on Lake County 29-part of which is under USFS jurisdiction, allowing Class I and II ATVs on a half- mile segment of the Tomahawk Road (FR 377) east of the Pearl Project Area, allowing Class I and II ATVs on portions of the Tomahawk Snowmobile Trail north of the Pearl Project Area, a request to develop an ATV trailhead facility at the old Environmental Learning Center site off the end of CR 702, and a request to the USFS to revisit some decisions made in the Forest-wide Travel Management Project to provide more opportunities for Class II ATVs.

The Lake County OHV Plan has been forwarded to Superior National Forest staff as a draft and at this time no formal planning has occurred. Cumulative effects of the Pearl Project proposal to allow Class II ATVs on six-tenths of a mile of the Stony Spur Trail and the Lake County OHV Plan may eventually facilitate more riding opportunities for Class II ATVs in the future but the proposal is not tied to or relies on the Lake County Plan. If implemented, the Lake County OHV Plan would likely contribute to an increase in OHV traffic on roads and trails, primarily on the eastern edge of the Kawishiwi Ranger District and those areas of the Tofte Ranger District closer to the North Shore of Lake Superior.

Mineral Exploration: There is a high probability that exploration for hardrock minerals on federal, State, and private lands within and near the Pearl Project Area will continue for years to come. On the northern margins of the project boundary, it is reasonably foreseeable that some form of exploration activity will continue within the Kawishiwi Minerals Exploration EA analysis area (see Past, Present, and Reasonably Foreseeable Future Actions-Appendix C for more detail).

Effects to recreation from hardrock mineral exploration could include additional activity and noise near recreation sites and the use of roads and trails for exploration access. Some of these effects are mitigated by increased baffling on drill rigs to reduce noise near recreation sites and pre-exploration transportation planning that attempts to avoid heavily used trails. Effects to scenic resources could include permitted exploration activities that create forest openings; equipment on site while in operation; and the remains of exploratory drill sites including fenced

off areas, rubble, and pipes that cap the holes. These sites can be mitigated along High SIO roads and trails by designing access roads to curve around and behind groups of trees to screen the activities from view.

Effects to Scenic Resources

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 Pearl Project Area simply because most land is federal. The State of Minnesota has approximately 1,120 acres scheduled for harvest in units spread out across the project area. None of the State's proposed harvest units are adjacent to project area recreation sites or High SIO areas. Harvest activities on private land are generally small in scale and are typically not noticeable. There are no other planned or approved National Forest 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 Alternative 2 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, the cumulative effects of any past, currently proposed, and reasonably foreseeable future actions represent minimal change to the project areas High SIO resources.

3.11 OTHER DETERMINATIONS

3.11.1 AIR QUALITY

INTRODUCTION

Prescribed burning can affect air quality through the release of particulates and pollutant gases; however, it is only a temporary source of air pollution. Humans have interrupted the historical frequent, low-intensity fire regimes through suppression on all land (including the Pearl Project Area). This increased the amounts of fuel, both living and dead, that are available to burn should a wildfire occur.

ANALYSIS METHODS

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

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. Pearl 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 occur only on the day when the burn was implemented and effects would be of short duration due to wind dispersing the smoke. 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.

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 dry from long, sunny days. 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 Ontario.

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 such as Slate and McDougal.

ENVIRONMENTAL CONSEQUENCES

DIRECT AND INDIRECT EFFECTS

ALTERNATIVE 1 (NO-ACTION)

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.

ALTERNATIVE 2

Alternative 2 would utilize prescribed fire to reduce hazardous fuels, prepare sites for seed establishment, meet ecological objectives, and dispose of logging slash on sites slated for planting. Alternative 2 would underburn 6,896 acres on 265 units; pile burn fuels treatments on portions of 2,018 acres on 113 units, and broadcast burn 511 acres on 27 units.

Proposed burning is expected to generate smoke emissions but these emissions would be mitigated by using tools in the MN Smoke Management Plan (MN Smoke Mgmt. Plan 2002) and the Forest's Dispersion Index screening analysis for prescribed burns. 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. All prescribed burning would follow the Minnesota Smoke Management Plan that was developed to prevent adverse smoke impacts. In addition, prescribed burning would occur over a ten year period 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 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.

Pile burning exhibits more complete combustion (hence producing fewer emissions) since more of the burning happens in the flaming phase than the smoldering phase (NWCG 2001). Using standard Forest Service and EPA modeling tools under a "worst-case scenario", smoke coming from a pile was modeled and shown to have no potential to exceed a value that approximates the health standards. Even if multiple piles were burned at the same time and their smoke plumes overlapped, impacts would be below this same level.

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

3.11.2 GRAVEL

All saleable material from gravel pits is referred to collectively as mineral materials. They encompass common varieties of sand, gravel and rock. Aggregate from gravel pits produce materials that are used in road construction and maintenance; trail construction and maintenance; and site development for both public and private facilities. Along with utilizing these materials for Superior National Forest activities, the Pearl Project Area also has a higher concentration of

private land along Hwy 2 and State and county land along Hwy 1. This diverse property ownership landscape creates a demand for aggregate across the project area. The project proposes to approve the extraction of gravel from the forty-four existing gravel pits (the Chipmunk Lake pit is closed at this time) to meet these needs. These gravel pits are in various locations within the project area. See Table 3.11-1 for gravel pit locations.

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.

Most of the gravel pits in the Pearl Project Area are associated with the Vermillion Moraine of 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 to material with a higher level of sand and gravel content used for minor road and trail repair.

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 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 this type of material is less than 2,000 yards annually.

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

Under both action alternatives, the forty-five gravel pits would be approved for extraction of mineral material. Pit management plans would be developed per manual direction to provide direction for pit development, expansion, and rehabilitation. Some pits may not be needed for several years. Specific mitigations would be included in the pit management plan and implemented at each pit based on relevant environmental analysis documentation and information from resource specialists. Extraction of mineral material from the pits would occur in an orderly fashion. Some pits may not be developed at this time depending on future needs of

material and location of other pits in the area. See Table 3.11-1 for information on the estimated size for expansion for each pit.

The demand for gravel for projects on private land will more than likely stay the same. The demand for gravel in the project area did increase over the last several years for the Hwy 1 road work. The demand for use of mineral material for this project is completed. Use of gravel regarding implementation of the Pearl Project would be minimal. Most of the roads proposed to access stands for land management activities would be temporary and not gravel surfaced. Under Alternative 2 the recreation enhancement of a user developed campsite at Dunnigan Lake and the enhancement to allow Class 2 ATVs on a small section of the Stony Spur ATV/ Snowmobile Trail would require a minimal amount of gravel.

Gravel use is an on-going activity in the Pearl 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 over the next ten years. Currently only the Denley and Shamrock Lake pits have pit management plans. Forest Manual 2850.3.2 states than any extractions over 5,000 cubic yards require a pit management plan. Additional pit management plans may be developed as need arises.

3.11-1: Gravel Pits in the Pearl Project Area

Pit Name	Current Size (Acres)	Potential Size (Acres)	Pit Type Designation
Roaring Stony Pit	0.24	3.9	
Peeler Pit	0.72	4.7	
386D Pit	0.1	2.5	
Bandana Lake Pit	4.35	11.8	
Two Deer Pit	0.4	10.5	
Chow Lake Pit	1.1	10	
Denley Pit	8+	24.6	
424I Pit	0.63	1.4	
Compass Pit	0.47	0.6	
Stony River Pit	4.3	3.6	
178C Pit	0.1	1.6	
Pitcha Lake Pit	0.15	0.5	
Chub Lake Pit	0.54	8.4	
Beetle Lake Pit	1.1	18.9	
Kelly Trail Pit	0.02	10	
Roaring Stony West Pit.	0.3	4.5	
Dunk Pit	0.66	2.1	
Sand Pit	0.03	1	
Snort Lake Pit	4	3.5	
Beaver Hut Lake Pit	0.5	13	
Robin Pit	0.03	3.5	

3.11-1: Gravel Pits in the Pearl Project Area			
Pit Name	**Current Size (Acres)**	**Potential Size (Acres)**	**Pit Type Designation**
Alsike Pit	0	8.8	
Pike Lake Pit	0.04	9.4	
Deep Clover Pit	0.3	15.8	
Wampus Lake Pit	3.58	52.6	
NA	0	13.8	
Erie Pit	2.1	6.8	
NA	0	10.6	
Harris Creek Pit	0.2	2.5	
Sand Lake Pit	0	0	
Peeler Pit	4	0	
McDougal Lake Pit	16	0	Administrative
Bandana Pit	12	0	Continuous
Pitcha Lake Pit	1	0	Continuous
Chub Lake Pit	8	0	Continuous
Pike Lake Pit	9	0	Administrative
Snort Lake Pit	0	0	
Alsike Lake Pit	9	0	
Two Deer Lake Pit	11	0	Continuous
Chipmunk Lake Pit	0	0	Closed
Beetle Lake Pit	18	0	Continuous
Robin Lake Pit	4	0	
Denley Lake Pit	25	0	
383D Pit	3	0	Continuous
Robin Creek Pit	0	0	
Shamrock Lake Pit	5	43	Continuous

3.11.3 HERITAGE RESOURCES

Forest Plan direction for heritage resources includes: to identify, evaluate, monitor, and preserve heritage resources (O-HR-1) for, “the qualities for which they have been deemed significant” (D-HR-1); to promote heritage values in public education and outreach (O-HR-2); and to contribute relevant historical and cultural perspectives to natural resource management (O-HR-3). These desired conditions and objectives can be found in the Forest Plan on pp. 2-38 and 2-39. This project is managed for heritage resources as outlined in the Heritage Resource Standards and Guidelines in the 2004 Superior National Forest Plan and in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (36 CFR Part 800). 36 CFR 800 can be found on the web at http://www.achp.gov/regs-rev04.pdf

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

To satisfy the Forest's responsibilities under Section 106 of the NHPA to consider the effects of undertakings, a heritage resource inventory was conducted for the project area. The goal of this inventory was to identify historic properties to protect them from project activities. Results of this inventory will be documented in the Pearl EA Cultural Resources Reconnaissance Report (CRRR) 1405013 and reported to the Minnesota State Historic Preservation Officer (MN SHPO) in the 2014 Superior National Forest Heritage Annual Report.

Analysis Methods

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

Analysis Area

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

Affected Environment

Within and immediately adjacent (20 meters) to treatment units in the project area, there are 93 heritage resource sites, historic and prehistoric, located within the units for Alternative 2. Eighty-two of which are historic and consist of logging camps, homesteads/farmsteads, historic dams, Forest administration buildings, railroad remnants, and CCC camps. The additional 11 sites are prehistoric and are representative of Archaic and Woodland Periods.

Environmental Consequences

ALTERNATIVE 1: NO-ACTION

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

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

ALTERNATIVE 2: PROPOSED ACTION

DIRECT AND INDIRECT EFFECTS

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

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

Cumulative Effects

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

3.11.4 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 11.7 percent of the total population in the three Arrowhead counties (Cook, Lake, and St. Louis Counties combined) (US Census Bureau 2012 data, document updated March, 27, 2014). 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).

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

The average median income for the three counties is $ 47,917, approximately $11,209 below the State's median income (USDA Economic Research Service 2013 Data Set from 2008-2012). 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 2008-2012 (16 percent) is similar to the poverty level for the State of Minnesota (11 percent). The 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.

3.11.5 PRIME FARMLAND, RANGELAND AND FOREST LAND

All alternatives are in keeping with the intent of the Secretary of Agriculture Memorandum 1827 for prime farmland. The project area does not contain any farmlands or rangelands. Prime forestland does not apply to land within the National Forest System.

3.11.6 ECOLOGICALLY CRITICAL AREAS

The Forest Plan established several management areas that contain unique or unusual ecological or biological attributes. Areas identified as having important ecological features are designated as Candidate Research Natural Areas (CRNA) or as Unique Biological Management Areas (Forest Plan Record of Decision, p. 18). There is one Candidate Research Natural Areas located in the eastern portion of the Pearl Project Area as shown in the management area map in Ch. 1. This area represents approximately 1,112 acres or one percent of project area (Table 12-Pearl Project Scoping Report, p. 23). Most of these acres are red pine overstory. The IDT identified some units within this CRNA that would benefit from prescribed fire underburns to the brush and grass vegetation to improve wildlife habitat.). These treatments comply with Forest Plan direction (D-RNA-2, p.3-34) for this Management Area. For more information on Candidate Research Natural Areas, see Ch. 1, section 1-3-Management Areas or Ch. 3 in the Forest Plan.

3.11.7 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitments are decisions affecting nonrenewable resources such as soils, wetlands, and heritage resources. Commitments are considered irreversible when recovery of the resource would occur only over a long period of time or at great expense. Commitments are also considered irreversible when the resource would be destroyed or removed.

Loss of soil from erosion is an example of an irreversible commitment of resources. However, due to the incorporation of Forest Plan Operational Standards and Guidelines, Minnesota Forestry Resource Council Voluntary Site-Level Forest Management Guidelines, and site-specific mitigation measures indicated in this document, substantial soil loss is not anticipated as a result of proposed management activities. For more information on soil impacts, refer to the Soils section, 3.7 in this EA.

Loss of heritage resource sites resulting from accidental damage would be an irreversible commitment of resources. Operational Standards and Guidelines, surveys performed prior to activities, and site-specific mitigation measures provide reasonable assurance that there would be no loss of heritage resources. For more information on heritage resources, refer to Heritage Resources located in section 3.11.

Irretrievable commitments of natural resources are decisions that result in the loss of productivity or use of resources due to management activities proposed in the alternatives. Such opportunities are foregone for the period of time that the resource is affected.

Foregoing current harvest opportunities may represent an irretrievable commitment of resources because the volume not harvested would not result in any current economic benefits. In addition, foregoing harvest would delay the time needed to return the age class and species composition to a more desirable condition. Foregoing harvesting would represent an irretrievable rather than irreversible commitment of resources because areas not harvested at this time could be harvested in the future if they are still classified as suitable for timber harvest.

Harvest of trees also produces an immediate irretrievable change in the plant communities and the habitats that are present, converting them to earlier successional stages. On the other hand, not harvesting overmature trees would also eventually produce an irretrievable change in vegetation communities and habitat because of natural mortality, but at a slower rate than with harvest. Retention of leave trees in harvested stands would represent an irretrievable commitment of resources, because economic benefits would not be received by the trees not harvested. Conversely, an irretrievable loss of potential snags and seed sources would result from the harvest of reserve trees.

Road construction would take land out of forest production and would be considered an irretrievable loss of site productivity during the period the roads are used. Temporary roads are considered short duration commitments while the roads are being used. Temporary roads would be revegetated over time and would then return to productive forest habitat. National Forest System roads would be classified as long-term commitments.

The reduction in visual quality of an area because of timber harvest is an irretrievable commitment of resources. However, the commitment would not be considered irreversible because the visual quality of an area would typically recover after a relatively short period of time. Regenerating trees would gain height and it would not be obvious to the casual observer

that the stands were once harvested. Alternative 1 would have no irretrievable commitment of visual quality; while the commitment of resources that would result from implementing Alternative 2 would comply with the 2004 Forest Plan standards and guidelines. Site-specific prescriptions and mitigation measures in harvest units would minimize the short-term visual effects.

CHAPTER 4: LISTS AND REFERENCES

4.1 LIST OF PREPARERS AND CONTRIBUTORS

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

Linda Merriman, Resource Information Specialist and Temporary Project Team Leader
Chad Kirschbaum, Silviculturist
Kari Kirschbaum, Wildlife Biologist
Travis Durkin, Forestry Technician (WZ Fuels Technician)
James Barott, WZ Soils Scientist
John Pierce, Natural Resource Recreation Manager
Christine Nelson, Writer-Editor
Mark Stepec, Transportation Planner
Jack Greenlee, Ecologist
Heather Hoffman, Archaeologist
Emily Creighton, Hydrologist

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

Susan Catton, Wildlife Biologist and Temporary Project Team Leader
Erich Grebner, GIS Analyst
Matt Judd, NEPA Project Coordinator (Minerals)
Nicole Selmer, Lead Forestry Technician and Non-Rec. Special Uses
Eric Wirz, Geologist
Kathy Westlin, Forestry Technician (Non-Rec. Special Uses) –Mid level
Jason Butcher, Forest Fisheries Biologist/Aquatics Ecologist-Mid level
David Hernandez, Silviculturist
Tim Catton, Biological Science Technician
Alan Dohmen, former Forest Wildlife Biologist
Peter Taylor, Environmental Coordinator
Terri Thomas, WZ NEPA Coordinator and Co-Project Team Leader
Dan Ryan, Wildlife Biologist

4.2 Distribution Lists

Scoping Package

In November 2013, a scoping letter requesting comments was mailed to 420 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 www.fs.usda.gov/goto/superior/projects. The mailing lists contain the names for the Pearl scoping letter is in the Pearl Project Record.

Environmental Assessment

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

Michael Brennan
Dick Artley
Lolita Schnitzius
Kenneth and Joann Earle
Tim O'Hara-MN Forest Industries, Inc.
Brian Henry
Leslie Thomas
Mark Larson
Ray Payne
Jerry Kraft
Ray Higgins, MN Timber Producers Assoc.
Dale Hedin
Jim Jennings
Joseph Langley
Stan Passananti
Paul Kolkman
Kathleen Kowal-USEPA
Rian H. Reed-MN DNR
Bradley Sagen-Sierra Club
Darren Vogt-1854 Treaty Authority
Stacy Stratton
Daniel H. Mundt

Revised Environmental Assessment

The following individuals and organizations provided comments on the Environmental Assessment and will receive notification of the Revised Environmental Assessment and Draft Decision Notice:

Quent Lauer
Daniel Mundt
Lori Dowling-Hanson, MN Department of Natural Resources
Elanne Placich, Save Our Sky Blue Waters
Darren Vogt, 1854 Treaty Authority
Annah Gardner, Sierra Club
Dick Artley

4.3 REFERENCES AND LITERATURE CITED

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

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