United States Department of Agriculture
Forest Service

Long Lake Vegetation Management Project

Environmental Assessment

Deer River Ranger District, Chippewa National Forest, Cass County, Minnesota

August 2016

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1. Purpose and Need

1.1. Document Structure

The Forest Service (FS) has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment (EA) discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternative. The document consists of four parts:

- Introduction: The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- Comparison of Alternatives, including the Proposed Action: This section provides a more detailed description of the Long Lake Vegetation Management Project proposed action and any adaptation to that proposed action. No significant issues raised by the public and other agencies so no other action alternatives were developed. (This EA has only one action alternative the Proposed Action.) This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- Environmental Consequences: This section describes the environmental effects of implementing the proposed action. Each resource area is organized, issues, affected environment, direct and indirect effects and cumulative effects. Within each section will describe affected environment first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison to the Proposed Action that follows.
- Finding of No Significant Impact – this section provides information about the effect on the human environment of the proposed actions.
- Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- Appendices: The appendices provide additional detailed information to support the analyses presented in the environmental assessment.

Project planning record, located at the Deer River Ranger District Office in Deer River, MN provides additional documentation, including additional detailed analyses of project-area resources.

1.2. Background

This Long Lake Vegetation Management Project (LLVM) area is located in the southeast portion of the Chippewa National Forest. The legal description is T141N R25W Sec3-6, 8-9, 13-17, 20-36;T142N R25W Sec3-6,8-11,18-22,28-34; T143N R25W Sec1,3,4-6,8-17,19-24,26,28-33; T143N R26W Sec1&24; T144N R25W Sec5-9,16-23,26-36; T144N R26W Sec12-14, 23-26-36.

The project area encompasses approximately 47,106 acres with 22,630 of that in Forest Service ownership. The project area is located in the eastern portion of the Chippewa National Forest (CNF) south of the Mississippi River following highway 6, and 200 and east of Big Rice Lake to the southeast boundary of the forest. A small portion of the project area lies inside the boundary of the Leech Lake Band of Ojibwe Reservation, no activities have been proposed in the.

Landscape Ecosystems

The project area and Proposed Activities are located primarily in two LEs, the Boreal Hardwood/Conifer (BHC LE) and Dry Mesic Pine (DMP). There are small portions of three other LE's in the project area Mesic Northern Hardwood (MHN) LE, White Cedar Swamp (WCS) LE and Tamarack Swamp (TS). See the descriptions of these three listed below for full descriptions of LEs refer to the Appendix G of the Chippewa Final Environmental Impact Statement (USDA FS 2004b). Refer to the attached maps for the location of the project and proposed activities.

Dry Mesic Pine (DMP)

Historically, this LE has mature and older stands dominated by a supercanopy of red pine and white pine. The subcanopy is a mixed stand of red maple and paper birch. In the mixed subcanopy are White spruce, balsam fir, aspen, northern red oak, bur oak and bigtooth aspen. Fire was the more common natural disturbance factor in this ecosystem.

Boreal Hardwood/Conifer (BHC)

Mixed stands composed of aspen, paper birch, balsam fir, and northern white cedar historically, dominated this LE. White pine, red pine, ash, basswood, bur oak, white spruce, and elm were also present with minor amounts of red maple, sugar maple, red pine and jack pine.

Management Area Forest Plan Direction

The 2004 Forest Plan provides Forest-wide desired conditions, objectives, standards, guidelines, and Management Area (MA) direction applicable to the project area. Management Areas within the project boundary are General Forest, General Forest - Longer Rotation, Riparian Emphasis, and Unique Biological, Aquatic, Geological, or Historical Areas (UB). There are no activities proposed in the UB area.

Here is a brief summary of the management direction for each management area with proposed activities.

General Forest 21,417 acres (2858 with proposed management activities)

The General Forest Management Area emphasizes land and resource conditions that provide a wide variety of goods, uses, and services. These include wood products, other commercial products, scenic quality, developed and dispersed recreation opportunities, and habitat for a diversity of terrestrial and aquatic wildlife and fish. Numerous roads open to public travel provide access to resources and roaded recreation opportunities. Non-motorized recreation opportunities also occur.

General Forest – Long Rotation 557 acres (36 with proposed management activities)

The General Forest – Longer Rotation MA emphasizes land and resource conditions that provide a wide variety of goods, uses, and services. These include wood products, other commercial products, scenic quality, developed and dispersed recreation opportunities, and habitat for a diversity of terrestrial and aquatic wildlife and fish species. Numerous roads that are open to public travel provide access to resources and roaded recreation opportunities. Non-motorized recreation opportunities also occur.

Riparian Emphasis 503 acres (117 with proposed management activities)

Riparian ecological functions are actively restored, protected, and enhanced in areas where ecosystem processes are sensitive to degradation. This includes maintaining and restoring native vegetation communities; maintaining and restoring riparian/hydrologic functions such as shoreline stability, wildlife habitat, coarse woody debris recruitment to aquatic and riparian ecosystems, and temperature regulation; and controlling non-native invasive species. Restoration focuses on components of the ecosystem that are not functioning at or within the range of desired conditions. Those components that are functioning properly are protected.

Overview of Forest Plan Consistency

To meet 2004 Forest Plan objectives, the Long Lake Vegetation Management Project interdisciplinary team developed the project proposal to meet direction, objectives, standards and guidelines of the Forest Plan for the project area. Activities included in the Proposed Action considered in detail in this assessment are described in Chapter 2. The activities were developed to move the project area toward Forest-wide Desired Conditions and Objectives, meet Forest-wide Standards and Guidelines, and move the project area towards the objectives for the Landscape Ecosystems.

In addition to meeting the Forest standards and guidelines, the action alternative considered in detail, include mitigation measures to minimize or eliminate adverse environmental effects. Mitigation measures are shown for the Proposed Action in Appendix C.

1.3. Purpose and Need for Action

An interdisciplinary team of natural resource specialists compared the existing condition of the Long Lake Vegetation Management Project area with desired conditions and objectives in the Forest Plan. Using their analysis of the project conditions the District Ranger selected the following needs:

1) Move toward achieving Landscape Ecosystem objectives for vegetation composition and age class. The existing vegetative conditions in Dry Mesic Pine (DMP) and Boreal Hardwood/Conifer (BHC) Landscape Ecosystems (LE) are inconsistent with the objectives and desired conditions identified in the Forest Plan (Table DMP—1 & 2, BHC -1 & 2 Page 2-62 -68). Some of the greater inconsistencies are listed below.

- Forest wide in these LE's, current amounts of white spruce, white pine, oak and paper birch forest types are less than Forest plan objectives, while the amount of aspen forest type is greater than Forest plan objectives. Within the Long Lake project area there are opportunities to increase the acres of these forest types by decreasing the aspen forest type in both of these LEs.
- Likewise, this project area has opportunities to increase black spruce and other lowland forest tree species diversity in lowland hardwood forest (i.e. black ash). Currently, lowland hardwood forest is over-represented, forest wide in these LE's. Diversifying ash stands would also reduce potential impacts of Emerald Ash Borer (EAB), by keeping these sites forested in the event of an EAB infestation which kills the vast majority of ash trees in a stand.
- Forest wide in these LE's, the acres in 0-9 age class is less than Forest plan objectives for the upland forest. Within the Long Lake project area there are opportunities to increase acres of 0-9 age class with even-aged regeneration harvest.

2) Manage treatments to maintain or enhance traditional Tribal and community uses (Forest Plan p. 2-5, S-TR-3 and O-SE-1).

3) Provide commercial wood in support of the local and regional economy (Forest Plan, O-TM-1, page 2-19)

4) Provide wildlife and botanical enhancement projects and associated partnership opportunities (Forest Plan, O-WL-1, O-WL-2, O-WL-3, p 2-26; O-WL-40, p 2-33).

The project area occurs within a triangle between the population centers of Grand Rapids, Deer River and Remer, resulting in heavy hunting pressure for game species. My team and I have identified opportunities to enhance habitat for game populations through the following activities:

- Conduct oak management beneficial to bear and deer; acorns are an important and limiting food resource.
    - Emphasize oak management in the hardwood types.
    - Increase in-stand diversity in pine stands, reserving and promoting oak during any harvest to provide for additional acorn mast crops, as well as prepare for future climate change.
- There are 5 known deer winter areas in and along the border of the project area. Important during severe winters, harsh winters lead to high concentrations of deer within these areas, and starvation due to lack of food resources. Manage around these winter areas through:
    - Protecting and planting of future winter cover conifers
    - harvesting adjacent aspen and birch forest types
    - maintaining of existing forest openings
- Permanent wildlife openings established in the 1970's – early 1990's were constructed by herbicide or mechanical means, and often seeded to non-native species. The current Forest Plan indicates the acres of maintained permanent upland openings should decrease (O-VG-6), and diversity of shrubs and herbs should be restored to conditions more representative of native vegetation communities (O-VG-8).
    - A subset of existing openings will receive continued maintenance, to provide habitat component for deer, bear and woodcock, provide hunting opportunities, as well as partnership opportunities.
    - Some openings will be seeded or planted to native species to better reflect the composition of native vegetation communities, and provide opportunities for native pollinators.

One third of the Chippewa National Forest, forest birds are conifer-dependent. Increase habitat for conifer-dependent birds by moving towards achieving Landscape Ecosystem objectives for Management Indicator Habitats (MIHs).

- Forest wide in these LEs the current amounts of mature upland spruce-fir is less than Forest plan objectives. The old upland spruce-fir is also currently less than Forest plan objectives in the DMP LE. There is potential to increase the mature spruce in the Long Lake project area.

- Additionally Forest wide within the BHC LE the current amounts of old red/white pine and mature upland conifers are less than Forest plan objectives. Within this project area there are opportunities increase acres of red/white pine and upland.

Large tracts of mature forest habitat is important to a numerous wildlife species. Mature upland pine habitats are often structurally and compositionally simple, due to plantation establishment, and stand tending techniques that have fostered monocultures of evenly spaced, single-aged stands. Maintain and improve the quantity and quality of older forest habitat by (O-VG-17, O-VG-19, O-VG-21, and O-VG-22):

- Allowing forest aging to tie together more isolated pieces of large, mature forest patches.
- Maintaining structural and compositional diversity in forest stands where it currently occurs.
- Developing treatments that foster structural and compositional diversity in forest stands where it is lacking, particularly in upland pine stands.

5) Reduce hazardous fuel build up in the red pine stands.

6) Provide a transportation system that meets current and future management objectives and addresses issues in the Forest–wide Travel Analysis Report.

1.4. Proposed Action

This proposed action would conduct a variety of resource management activities directly addressing the purpose and need, including:

- Commercial harvest treatments on approximately 3,011 acres with an estimated volume of 41,300 CCF. Refer to the attached maps for locations of potential harvest units. Up to a total of one mile of temporary roads would be built to access cutting units (Purpose and Need #1 & 3).
    - 1,264 acres of clear-cutting
    - 137 acres of seed tree
    - 1,264 acres of commercial thinning
    - 200 acres of single tree cut
    - 146 acres of group selection
- Plant white pine and spruce of 298 acres (purpose and need #1).
- Plant up to 220 acres of oak for diversity within stands (purpose and need #4).
- Clearcut 428 acres of aspen and converting to other forest types (purpose and need #1)

- Plant up to 47 acres of black ask to other tree species to diversify black ash stands (purpose and need #1).
- Clearcut up to 350 acres of aspen and regenerating aspen around deer wintering areas. (purpose and need #4)
- Plant or seed up to 1,334 acres and of these 440 acres would be to convert to white pine/oak, red oak, bur oak, white spruce and white pine (purpose and need #1).
- Plant or seed up to 1,500 acres of site preparation for planting or natural seeding (purpose and need #1).
- Release of up to 1,400 acres of planted species from competing vegetation (purpose and need #1).
- Mowing up to 34 acres permanent openings to maintain these grassy areas (purpose and need #4).
- Variable density thinning of over 1,000 acres of older red pine within a large mature patch (purpose and need #4).

Decision to Be Made

This environmental assessment discloses the consequences of the alternative actions; it is not a decision document. Based on the analysis documented in this EA, the Deer River District Ranger will decide whether or not to proceed with the Proposed Action briefly described in Section 1.4, and if so, under what conditions or modifications.

Related Documents that Influence the Scope of this EA

This environmental assessment is tiered to the 2004 Land and Resource Management Plan (Forest Plan or FP) and Chippewa National Forest Final Environmental Impact Statement, and is within the scope of the Record of Decision.

Applicable Regulatory Requirements and Required Coordination

Compliance with several environmental laws is required in order for the proposed Long Lake Vegetation Management Project to proceed. The Endangered Species Act requires consultation–the Biological Assessment and Biological Evaluation for this project has been sent to the U.S. Fish and Wildlife Service for a concurrence determination concerning species listed as threatened, endangered, and sensitive affected by the project activities. Other laws that the Forest Service is required to follow include the National Historic Preservation Act, the Clean Air Act, the National Environmental Policy Act, and the National Forest Management Act. In addition, consultation is required with the Leech Lake Band of Ojibwe Tribal Historic

Preservation Office and the Minnesota State Historic Preservation Office. Results of this consultation are discussed in Chapter 3 Section.

This EA also complies with and addresses the following list of laws and regulations: Sensitive Species (Forest Service Manual 2670); Archaeological Resources Protection Act; Native American Graves Protection and Repatriation Act; Wetlands (Executive Order 11990); and Environmental Justice (Executive Order 12898).

1.5. Tribal Involvement

The District Ranger called the Leech Lake Band of Ojibwe Division of Resource Management (DRM) contact and offered a meeting date prior to scoping. The DRM requested that the scoping information be sent and no meeting was scheduled at this time. One Local Indian Council adjacent to the project area and the DRM were sent scoping letters on February 3, 2016. No comments were received from these Tribal contacts.

1.6. Public Involvement

The proposal was listed in the Schedule of Proposed Actions since January 1, 2016 and has been posted on the Chippewa National Forest website, www.fs.fed.us/r9/forests/chippewa. Scoping was initiated by sending letters and emails with details and maps of the Proposed Action to approximately 97 individuals, groups, and other agencies. A legal ad briefly explaining the Proposed Action and specifying a contact for further information was published in the paper of record, *Western Itasca Review,* on February 4, 2016.

Commenters responded with letters and email. Ten comment responses were received from other government agencies and private individuals. All scoping input and Forest Service responses are available in Appendix D.

1.7. Issues

The IDT reviewed scoping comments for key issues. Key issues are defined as issues that directly or indirectly are caused by implementing the proposed action. No Key issues were identified from the scoping comments received.

1.8. Other Issues

Other issues are not Key to the decision to be made. They consist of secondary issues and issues dismissed. Reasons regarding their categorization may be found in response to comments and in the project record.

Secondary issues

Interdisciplinary review of the proposed action identified a number of other potential issues that were important to evaluating resource impacts. These secondary issues differ from key issues in that they do not formulate alternatives; yet may warrant some level of analysis and discussion. Chapter 3 will discuss the following resource topics and indicators. Chapter 3 will also cover the effects related to cultural resources, air quality and environmental justice.

- Wildlife

  The effects of project activities on TES species and their habitats, including large blocks of mature forest habitat and interior forest.

- Plants

  The effects of project activities on plants of Regional Forester Sensitive Species (RFSS) and their habitats.

- Recreational and scenic qualities

  Impacts of harvesting on recreational opportunities and scenic qualities.

- Aquatics

  Treatments and activities have the potential to affect water quality, aquatic resources and wetlands.

- Soil

  The effects of ground disturbing activities on soils.

- Fuels

  The effects from harvest proposed on fire regime Condition Class, fuels composition and arrangement in the project area.

- Non-native Invasive species (NNIS)

  The potential introduction of non-native invasive species of concern spreading to new sites from already present known locations of invasive plant species and earthworms.

- Economics

  The relative comparisons of timber values, and costs associated with activities such as harvest, site preparation, planting, and release.

- Tribal Gathering and Traditional Uses

The effect of treatments on gathering opportunities.

Issues Dismissed

These are concerns raised that were not used to develop any new alternative. Refer to Appendix D – response to scoping comments for details.

- MFI and TFPA raised an issue about achieving the Forest Plan 0-9 age-class objective in this project. Due to a discrepancy in the numbers presented and the accompanying maps that did not correspond to the project area this issue was dismissed. For more details, see Appendix D comment responses 5.2 and 9.2.

2. Alternatives

2.1. Alternative Development

Scoping did not identify any key issues so no alternative to the Proposed Action (Alt B) was developed. Alt B considered in detail incorporates applicable laws, regulations and policies that govern land use on national forests; pertinent Forest Plan standards and guidelines; Voluntary Site-Level Forest Management Guidelines (MFRC(gold book)2005).

The ID team along with Stephen Handler from the Northern Institute of Applied Climate Science (NIACS), Northern Research Station (NRS) met in December 2015 to review climate change and this project. The team then assessed the Long Lake Vegetation Management Project using the *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers*, *GTR NRS-87, 2012 (GTR NRS-87, 2012)*. The assessment reviewed projected changes in suitable habitat for tree species and adaptation strategies and approaches (PR 5.05 & 5.06) for this project. Efforts to promote healthy, resilient stands at the project-level during this entry may help to maintain diverse vegetation and species habitat in the future. The ID team from this work in December developed a proposed action to promote diverse age classes, plant species predicted to do better with predicted changes in climate and maintaining and encouraging large upland forest patches. Additionally during conversion to a new forest type the practice will continue to plant a mixture of species, resulting in a majority of the target forest type including associated species.

The decision maker will select the alternative for implementation based on analysis of potential environmental consequences and effectiveness of meeting the purpose and need and Forest Plan management direction.

Maps of Alternative B are included in Appendix A. Appendix B identifies activities by location and stand, and associated acres. Implementation of the proposed activities, dependent on availability of adequate funding, could begin as early as February 2017.

Acreages shown for the proposed activities are approximations based on GIS (Geographical Information System) and other stand records in the Chippewa National Forest databases.

2.2. Alternative Descriptions

Alternative A - No Action

There would be no new vegetation management actions in the project area under this project. There would be no commercial harvest, planting, site preparation, Permanent Opening (PO) maintenance. Natural processes such as forest succession and stream sedimentation, and human activities such as fire suppression, recreational use, and road maintenance would

continue. This alternative provides a baseline upon which to compare the effects of the action alternative. If this alternative is selected it would not preclude future management actions in the project area.

Alternative B – Proposed Action

Changes to Scoped Proposed Action

Scoping acres for all reforestation activities were overestimated. Acres in the Patch Enhancement stands what would not include these activities were not adjusted to account for only the treatment acres.

Table 2-1 Harvest Changes to Scoped Proposed Action

Description	Revised Proposed Action acres	Scoped Proposed Action acres	Change from Scoped Acres
Site prep	590	1,500	910
Planting & Seeding	765	1,334	569
Release	775	1,400	625

Commercial Timber Harvest

Commercial timber harvest treatments on approximately 3,011 acres would result in about 41,300 CCF (hundred cubic feet) of harvest volume. Table 2-2 presents Alternative B harvest activities by current forest type. Implementation could result in further refinement of unit boundaries and operable areas, all treatment acres are an estimate.

The intent of commercial timber harvest is to provide timber products while moving toward LE objectives, and addressing other Forest-wide desired conditions and objectives. Some forest types would change due to harvest (not via planting or seeding).

Table 2-2 Harvest treatment acres by forest type

Current Forest Type	Even Aged				Uneven Aged			Grand Total
	Clearcut	Seed Tree	Commercial Thinning	Even Aged Totals	Single Tree	Group Selection	Uneven Aged Totals	
Aspen	1,138	24	18*	1,180			0	1,180
Balsam fir	36	17		53		31	31	84
Balsam poplar	35			35			0	35
Black ash / American elm / red maple				0	40	14	54	54
Eastern white pine			75	75			0	75
Hard maple / basswood				0	65	23	88	88
Jack pine	8			8			0	8
Mixed upland hardwoods				0	85	49	134	134
Paper birch		96		96		29	29	125
Red pine	5		1,146	1151			0	1,151
Sugar maple / beech / yellow birch				0	10		10	10
Tamarack	36			36			0	36
White spruce	6		25	31			0	31
Grand Total	1,264	137	1,264	2,665	200	146	346	3,011
*This aspen stand is really a red pine stand but corporate data reflects the wrong forest type								

Even-aged regeneration harvest treatments result in a young stand (0-9 years old). Natural or artificial regeneration methods would create these young stands. Some stands would regenerate to the same forest type others converted depending on current stand conditions and desired forest type objectives. See the glossary for more detailed descriptions of these harvest types.

- Clearcut with reserves
- Seed tree with reserves

Harvest treatments would include approximately 1,264 acres proposed for clearcuts with reserve trees, 137 acres for seedtree with reserve trees.

Harvest treatments that result in a change in stand density or result in an uneven-aged stand fall into either an intermediate harvest or uneven-aged regeneration harvest. Alternative B would have approximately 346 acres of group or single-tree selection harvest and commercial thinning about 1,264 acres of red and white pine and white spruce plantations. The thinning would provide space for remaining trees to grow in size as well as for additional species (diversity) to increase in size or area.

See the glossary for more detailed descriptions of these harvest types.

- Commercial thinning
- Single tree selection
- Group selection

Vegetation Composition and Conversions

Alternative B moves toward achieving vegetation composition objectives to meet the purpose and need for Long Lake Vegetation Management Project. The majority of conversions would be to reduce aspen forest type across the project area while increasing the white pine and oak components.

Table 2-3 Forest type conversions as a result of harvest with or without planting

Current Forest Type	Proposed Oak	Proposed Mixed upland hardwood	Proposed Paper birch	Proposed Red Pine	Proposed White pine/oak	Proposed White Spruce	Proposed Grand Total
Aspen	83	63	24		123	189	482
Balsam Fir			17			36	53
Hard maple / basswood	23						23
Jack pine				8			8
White pine				45*			45
Grand Total	106	63	41	53	123	225	611*

* result of thinning the stand

Patch enhancement

Large, mature upland patches are managed to maintain characteristics of mature and older native upland forest communities and promote interior forest habitat valuable for a variety of plant and wildlife species. These forests:

- are dominated by long-lived tree species,
- Include old, large trees and tree fall gaps invaded by a variety of tree, shrub, and herbaceous species,
- consist of multiple canopy layers (i.e. multi-aged) and structural diversity,
- Contain a high frequency of standing dead and dying trees and down logs.

Within the largest Long Lake patch in some 70+ year old red pine stands of plantation origin that currently have low levels of species and structural diversity , patch enhancement treatments are

proposed. This patch is currently over 1900 acres in size, and is located adjacent to Highway 6. These treatments would help these stands to develop some of the characteristics described above and introduce species currently missing from these ecosystems. Patch enhancement treatments would include the following actions:

- Thirty percent of stands would be left un-thinned (in dense areas).
- Sixty percent of stands would be thinned to varying densities. No more than one third of the existing stocking would be removed. Basal areas would range from 60-190 square feet. The primary trees to be removed would be thrifty red pine in size classes that are most common. Trees that are developing into snags would not be targeted for removal.
- Ten percent of stands would be cut in small, 3-5 acre gaps with uneven edges, similar to what an egg looks like. These gaps would be near roads to facilitate tending.
    - The center of each gap would be a clearcut about ½-3 acres in size.
    - The outer part of each gap would be cut to retain about 30-40 square feet of basal area.
    - Site preparation, planting, release, and animal damage control would occur in the entirety of each gap.
    - Gaps may overlap if they do not exceed 5 acres in size.
    - Species to be planted could include white pine, Northern red oak, and bur oak, white spruce, hackberry, bitternut hickory and possibly balsam fir and jack pine.
- Multiple small stands may be treated as one stand.

Reforestation

Planting, seeding, and Natural Regeneration

Planting of about 730 acres and seeding of approximately, 35 acres would occur after harvests to regenerate stands. Forty-seven of these acres would be planted to help address diversification of black ash stands.

Table 2-4 Planting and Seeding by current and desired forest type

Current Forest Type	Desired Forest Type													Grand Total
	Seeding		Planting											
	Tamarack	Total	Red pine	White pine	Balsam fir	White spruce	Eastern White Pine / northern red oak / white ash	Northern red oak	Bur oak	Mixed upland hardwoods	Black ash / American elm / red maple	Paper birch	Total	
Jack pine	-	-	-	8	-	-	-	-	-	-	-	-	8	8
Red pine	-	-	104	-	-	-	-	-	-	-	-	-	104	104
Balsam fir	-	-	-	-	31	36	-	-	-	-	-	-	67	67
White spruce	-	-	-	-	-	6	-	-	-	-	-	-	6	6
Tamarack	35	35	-	-	-	-	-	-	-	-	-	-	0	35
Mixed upland hardwoods	-	-	-	-	-	-	-	-	-	6	-	-	6	6
Black ash / American elm / red maple	-	-	-	-	-	-	-	-	-	-	54	-	54	54
Aspen	-	-	-	-	-	189	123	48	35	-	-	-	395	395
Paper birch	-	-	-	-	-	-	-	-	-	-	-	50	50	50
Grand Total	35	35	104	8	31	231	123	48	35	6	54	50	690*	725

*an additional 40 acres not shown in this table of the ash areas of an aspen stand would be planted with white pine and white spruce

Several planned activities would establish and maintain regeneration on harvested stands. Mechanical site preparation of 590 acres would occur. Scheduled on an “as needed basis” to ensure seedling establishment release from competing vegetation of 775 acres would occur. Additionally there may be animal damage control and pruning as needed.

One or more of the following would methods would be used to establish seedlings in this project area.

- Site preparation

- Planting
- Seeding
- Natural regeneration with harvest

Tending

Designed to enhance survival, growth, vigor and composition of each stand tending would occur. This project includes the following treatments:

- Release
- Animal damage control
- Pathological pruning

Temporary Road Construction

Twenty-one of the proposed harvest stands in Alterative B would require construction of temporary access roads. The total miles constructed in Alternative B would be one mile. Decommissioning and re-vegetated following harvest and reforestation activities would occur on these temporary roads.

Permanent Opening Maintenance

Maintenance of a number of permanent openings (34 acres) would occur in a partnership with interested parties. Maintenance would be conducted by the Minnesota DNR or other interested partners on Forest Service lands. The focus of maintaining these openings is to provide habitat components for grouse, deer, bear and woodcock. Hunters favor these areas. Mowing to reduce the encroachment of woody species into grassy areas would accomplish this maintenance. Mowing of fruiting shrubs would not occur within openings when encountered.

2.3. Adaptation Management and Mitigation Measures for Action Alternative

Clearcuts where the objective is to regenerate aspen via root suckers typically achieve a stocking of 4000+ seedlings per acre. This stocking meets the minimum Forest Plan Standard for aspen stands. However, in the recent past, a minor amount (about one percent) of aspen regeneration stands did not produce 4000+ tree seedlings per acre. Under Alternative B in stands that do not attain minimum stocking levels of aspen suckers after harvest adaptive management would occur. If third year stocking surveys show less than 4000 trees per acre, mechanical site preparation and planting to keep these forested stands forested could be used. Resulting stands would be mixed aspen/conifer species that are suited to the site. Adaptation would use monitoring data (i.e. stocking surveys) to inform and adjust implementation of the decision.

Appendix C contains tables that identify site-specific mitigation measures and design features for each stand in the action alternative. Also included in Appendix C are applicable Forest Plan standards and guidelines, and Voluntary Site-Level Forest Management Guidelines (MFRC (Gold Book) 2005). The analysis disclosed in Chapter 3 has incorporated these measures. Implementation would be during harvest and postharvest activities.

2.4. Summary of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table focuses on activities and effects where different levels of effects or outputs are quantitatively or qualitatively among alternatives distinguished.

Summary of Outputs and Activities

Table 2-5 Summaries of Output and Activities by Alternative

Activities		**AltA**	**AltB**
Estimated Total Harvest Volume (Ccf)		0	41,300
Acres of Commercial Timber Harvest	Clearcut with Reserves	0	1,264
	Seedtree with Reserves	0	137
	Commercial Thin	0	1264
	Group selection	0	146
	Single Tree Selection	0	200
	Total	0	3,011
Acres of Conversion to (proposed Forest type)	Eastern white pine(EWP) and EWP/oak	0	130
	White spruce	0	225
	Northern red oak or bur oak	0	107
	Paper birch	0	41
	Natural conversion with thinning	0	45
	Natural conversion no harvest	0	63
	Total	0	611
Acres of Planting		0	730
Acres of Seeding			35
Acres of Site Preparation		0	590
Acres of Release		0	775
Acres of Burning	Pile and burn	0	6

Activities	AltA	AltB
Miles of Temporary Road Consturction	0	1
Acres Permanent Openings Maintained	0	34

2.5. Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. The focus of the table is on activities and effects where different levels of effects or outputs are distinguishable quantitatively or qualitatively among alternatives.

Table 2-6 Alternative Comparison of Indicators for Secondary issues

Issue Indicator	Alternative A	Alternative B
	Wildlife	
Relative effect shown in BA on Canada Lynx	No effect	Not likely to adversely affect Canada Lynx or its habitat
Relative effect shown in BA on Northern Long-eared bat	No effect	Likely to adversely affect
Relative effect shown in BA on Gray wolf	No effect	Not likely to adversely affect Gray wolf or its habitat
Impact on TES animals (5 species)	No impact	May impact
Impact on remaining 20 TES animals	No impact	No impact
	Plants	
Impact on 5 sensitive species (RFSS)	may impact individuals or habitat, but not likely to cause trend toward federal listing or reduce viability of a population or species	may impact individuals or habitat, but not likely to cause trend toward federal listing or reduce viability of a population or species
Impact on remaining 11 sensitive species (RFSS)	No impact	may impact individuals or habitat, but not likely to cause trend toward federal listing or reduce viability of a population or species
	Aquatics	
Acres of Riparian Management Zone (RMZ, area within 200 ft. of lakes and streams) disturbed during vegetation management activities.	0	74
Number of Wetland Crossings by Temp Roads	0	1
	Transportation	
Miles of road with changes to road maintenance levels		
1 closed to motorized use, or frozen conditions only	19.8	55.9
2 high clearance vehicle use	90.1	54.6
3 passenger car use	8.3	8.3
4 passenger car use, moderate comfort	16.9	16.3
Miles of system roads open and closed to motorized use		
Closed to All Motor Vehicles	56.4	62.4
Open to All Motor Vehicles	68.7	65.5

Issue Indicator	Alternative A	Alternative B
Open to HLV only	10.0	7.2
Number of roads/miles of temporary road construction	0	1.1
Recreation		
Miles of trails in and/or adjacent to stands proposed for treatment (harvesting, slash/fuels)	0	3.57
Number of developed water access sites in/or adjacent to stands proposed for treatment (harvesting, slash/fuels)	0	2
Visuals		
Acres in stands within high scenic integrity objective (SIO) areas proposed for even-aged regeneration harvest	0	97
Acres in stands within moderate scenic integrity objective (SIO) areas proposed for even-aged regeneration harvest	0	556
Non-native invasive species		
Potential to contribute to further spread of already present higher priority NNIS plants	Be less in the short-term because it would not increase ground disturbance or habitat change	See Section 3.8.3
Potential to contribute to further spread of already present exotic earthworms	Continue at current levels because of fewer disturbances	Likelihood for earthworm expansion is greater in those areas where the proposed activities would create more ground disturbance
Soils		
Compaction Risk (low) acres	0	466
Compaction Risk (moderate)acres	0	2685
Compaction Risk (high) acres	0	255
Soil Displacement Risk (low) acres	0	3285
Soil Displacement Risk (moderate) acres	0	138
Soil Displacement Risk (high) acres	0	0
Nutrient Loss Risk (low) acres	0	0
Nutrient Loss Risk (moderate) acres	0	2748
Nutrient Loss Risk (high) acres	0	658
Fuels		
Acres of timber harvest.	0	3,011
Economics		
Present Net Value	0	$1,321,942.75
B/C Ratio	0	2.2

3. Environmental Consequences

3.1. Vegetation

3.1.1. Issues

This section discloses, as secondary issues, the effects of proposed activities on the amount of 0-9 year age class and forest type changes.

Indicators:

- Acres of 0-9 year age class
- Acres of aspen, white spruce/fir, white pine, oak, paper birch, lowland conifer, and lowland hardwood

3.1.2. Affected Environment

This project area includes parts of five Landscape Ecosystems (LEs) that Chapter 2 of the Forest Plan defines. This analysis addresses two LEs (Boreal Hardwood/Conifer (BHC) and Dry Mesic Pine (DMP)) in detail because existing conditions in these LEs are considerably different from the objectives set forth in the Forest Plan. Not addressed in detail are the Mesic Northern Hardwood, White Cedar Swamp, and Tamarack Swamp LEs because they make up a minor percentage of the project area (less than 2 percent).

The BHC and DMP LEs make up about 82 percent and 16 percent, respectively, of this project area. Appendix G of the Final Environmental Impact Statement (USDA FS 2004b) describes historical vegetation conditions for these LEs. The following paragraphs summarize these conditions:

Historically, wind was the dominant disturbance factor in the BHC LE. Mixed stands of aspen, paper birch, balsam fir, and northern white cedar dominated this LE. The most prevalent tree species regenerating in the understory of mature stands were red maple, aspen, black ash, and balsam fir. Aspen and black ash regeneration occurred where small pockets of several trees had blown down. Red maple and balsam fir regenerated without disturbances. This system occurred on nutrient-rich sites between sugar maple-dominated uplands and lowlands with saturated soils. Almost one-half of this landscape was comprised of older, large conifers. Patch sizes of similar tree species and age composition varied from less than one acre to thousands of acres (USDA FS 2004b, Appendix G).

In the DMP LE, fire was the more common natural disturbance factor. Super canopy red pine and white pine dominated mature and older stands. Red maple and paper birch made up the sub-canopy. Beaked hazel was the dominant shrub. Almost half of the landscape was multi-aged beyond 175 years old. Patch sizes varied from ten acres to thousands of acres. Blocks of greater than 1000 acres of young aspen occurred, as did older, multi-aged red and white pine.

The current vegetation of the entire LLVM Project Area consists of a mosaic of upland conifer and hardwood forests, lowland conifer and hardwood forests, upland openings, and wetlands on public lands. Private lands include agricultural fields, upland and lowland forests, and wetlands. This patchwork of vegetation is the result of landforms, soils, plant succession, disturbances, and land use by multiple landowners. Recent disturbances within forested stands in this project area have been predominantly human caused and are mostly associated with timber harvest and fire suppression. Natural disturbances (e.g. wind, insects, disease, drought, and fire) also affect these forests.

Table 3-1 Existing (2016) Forest Types by Age Class Groups on Forest Service Lands (acres) in LLVM Project Area.

Forest Type	0-9 years	10-39 years	40-79 years	80-179 years	180+ years	Total	Percent of forested acres
Aspen	466	4765	3464	1014	0	9709	49
Balsam fir	63	42	239	202	0	546	3
Black Spruce	0	20	49	885	1	955	5
Jack pine	10	35	23	0	0	68	0
Lowland Hardwoods	0	36	382	979	16	1413	7
Mixed Northern hardwoods	6	0	860	1475	0	2341	12
Northern red oak & bur oak	0	23	80	12	0	115	0
Paper birch	115	25	420	221	0	781	4
Red pine	0	167	1747	459	0	2373	12
Tamarack	0	5	28	108	0	141	1
White Cedar	0	0	86	740	1	827	4
White pine	0	85	31	61	0	177	1
White spruce	9	78	273	8	0	368	2
Total	669	5281	7682	6164	18	19814	100
Percent	3	27	39	31	0	100	

This table includes only forested stands; upland brush, lowland brush, and openings are included in the project file.

Aspen forest types (e.g. quaking aspen, bigtooth aspen, and balsam poplar) dominate this project area, covering about 49 percent of the area. Red pine and mixed Northern hardwoods make up about 12 percent each of the Federal lands. Lowland hardwoods, black spruce, Northern white cedar, paper birch, balsam fir, and white spruce forest types are uncommon across this landscape. White pine, tamarack, oak, and Jack pine forest types make up less than 2 percent each of the project area.

In this project area, young and immature aspen stands (0-39 years old) make up the largest portion of the Forest Service aspen resource, totaling about 54 percent of the aspen acreage. These aspen stands make up about 26 percent of the total forested acres on Forest Service lands. Mature (40-79 years old) and over mature (80+ years old) aspen stands contribute about 36 and 10 percent, respectively, of the aspen acreage.

For all forest types combined, the 40-79 year age class makes up about 40 percent of the forested acres in the project area. Each of the 10-39 and 80-179 year age classes contribute about one third of the acres. Young (0-9) and oldest (180+ years old) forests provide minimal amounts.

Management Direction

In addition to Management Area direction included in Chapter 1, the vegetation analysis focuses on BHC and DMP LE objectives as described in the Forest Plan (pages 2-62, 2-63, 2-68, and 2-69).

3.1.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

The spatial boundary used to evaluate direct, indirect, and cumulative vegetation consequences is the LLVM Project area as described in Chapter 1, Section 1.2. The Forest Plan quantifies objectives according to LE boundaries making this boundary appropriate to analyze vegetation effects because it contains similar, local vegetative conditions. The direct and indirect effects analysis looks at the effects of each alternative on Forest Service lands. The cumulative effects analysis assesses past, present, and reasonably foreseeable effects for each alternative across all public lands. Harvest activities from one previous decision (e.g. Southeast) would occur in this project area under all alternatives, including Alternative A. Details are in the project file. No data is available (except aerial photographs) for private ownerships regarding existing vegetation, harvest history, or harvest plans.

Timeframe

Activities that have occurred in the past 10 years and those projected to occur in the next 5 years are analyzed in direct, indirect, and cumulative effects. The 0-9 year age class in Table 3-1 represents even-aged regeneration harvests that have occurred in the past 10 years. In the next 5 years, proposed LLVM even-aged harvests would add to the 0-9 year age class.

Effects by Alternative

Stand-level information (i.e. overstory and understory conditions), LE objectives, and other resource considerations determined the most appropriate harvest and reforestation treatments (see glossary for descriptions). In addition, anticipated climate changes influenced adaptation

and enhancement efforts in this project area during harvest (by retaining diversity) and reforestation (via planting). White pine, Northern red oak, bur oak, hackberry, and bitternut hickory would increase on appropriate sites via planting to address these potential changes.

Table 3-2 Acres of Proposed Harvest Treatment by Alternative.

Alternative	**Harvest Treatment (Acres)**							
	Even-Aged Management			Even-Aged Total	Uneven-Aged Management		Uneven-Aged Total	Grand Total
	Clear-cut	Seed tree	Commercial Thinning		Single Tree Selection	Group Selection		
A	0	0	0	0	0		0	0
B	1264	137	1264	2665	200	146	346	3011

The following section discusses how each of the alternatives meets Purpose and Need for vegetation composition and age class indicators (as described in Chapter 1, Section 1.3).

Alternative B proposes forest type conversions to move toward LE vegetation composition objectives. Chapter 2 Table 2-3 “Forest type conversions as a result of harvest with or without planting” summarizes the proposed conversions. Forest type conversions result from harvest, planting and/or seeding.

Even-aged and uneven-aged harvests as proposed in the action alternative would move toward different age class objectives. Even-aged regeneration harvest would change the age of a stand to zero, thereby increasing the amount of young (0-9 year-old) forest and decreasing the amount of mature forest.

Data for Alternatives A and B reflect conditions in 2021, assuming it would take 5 years to accomplish proposed treatments. Conditions resulting from alternatives for vegetation composition and age class will be compared to Decade 2 objectives since Forest Plan Decade 2 objectives apply from 2014-2023.

Alternatives A and B include LLVM proposed treatments plus activities from one previous decision that are not yet accomplished in this project area.

This project proposes activities in LEs that cover over eighty thousand acres forest-wide. Because of this, proposed acre changes may not be large enough to change percentages in the forest-wide comparisons.

In both LEs, black spruce is under-represented while white cedar is over-represented. Conversion of cedar to black spruce is unlikely due to Forest Plan G-TM-4, which allows harvest of white cedar only when re-growth of cedar is likely to be successful or for research purposes. Because regeneration of cedar is extremely difficult due to high deer populations and browsing pressure, the Interdisciplinary Team did not propose conversion from cedar to black spruce.

Vegetation Composition Objectives – BHC and DMP LEs

In the BHC LE, the amount of forest-wide white spruce/fir and white pine forest types is currently under-represented while aspen is over-represented. Black spruce is under-represented, and lowland hardwood (ash) forests are over-represented. Purpose and Need Objectives for vegetation composition include:

- Increase acres of white spruce/fir and white pine forest types.
- Decrease acres of aspen forest type.
- Increase black spruce and other lowland species in lowland hardwood (black ash) stands.

In the DMP LE, the amount of forest-wide white spruce/fir, white pine, oak, and paper birch forest types is currently under-represented while aspen is over-represented. Purpose and Need Objectives for vegetation composition include:

- Increase acres of white spruce/fir, white pine, oak and paper birch forest types
- Decrease acres of aspen forest type

See Tables 3-3 and 3-4 for forest-wide Vegetation Composition Objectives, existing conditions across the forest and within the LLVM project area, and proposed changes across the forest and within this project area due to Alternatives A and B.

Table 3-3 Comparison of Vegetation Composition Objectives and Alternatives in BHC LE (Alternatives A and B reflect conditions in 2021).

Forest Types	Forest wide Objective Decade 2 (%)	Forest wide (%)			Long Lake Project Area (%)		
		Existing 2016	Alt A	Alt. B	Existing 2016	Alt. A	Alt. B
UPLANDS							
Jack pine	0	0	0	0	0	0	0
Red pine	4	4	4	4	5	5	5
White pine	4	1	1	1	1	1	1
Spruce-Fir	13	8	8	8	6	6	8
Oak	0	0	0	0	0	0	1
N. Hardwoods	13	17	17	17	18	18	18
Aspen	60	65	65	64	65	65	62
Paper Birch	6	6	6	6	5	5	6
TOTAL	100	100	100	100	100	100	100
LOWLANDS							
Black Spruce	49	39	39	39	30	30	30
Tamarack	8	10	10	10	5	5	5
L. Hardwoods	32	35	35	35	41	41	41
White Cedar	11	16	16	16	25	25	25
TOTAL	100	100	100	100	100	100	100

Table 3-4 Comparison of Vegetation Composition Objectives and Alternatives in DMP LE (Alternatives A and B reflect conditions in 2021).

Forest Types	Forest wide Objective Decade 2 (%)	Forest wide (%)			Long Lake Project Area (%)		
		Existing 2016	Alt A	Alt. B	Existing 2016	Alt. A	Alt. B
UPLANDS							
Jack pine	1	1	1	1	2	2	2
Red pine	16	15	15	15	50	50	50
White pine	6	1	1	2	2	2	4
Spruce-Fir	9	3	3	3	3	3	3
Oak	6	4	4	4	0	0	0
N. Hardwoods	15	23	23	23	1	1	3
Aspen	37	45	45	45	39	39	35
Paper Birch	10	8	8	8	3	3	3
TOTAL	100	100	100	100	100	100	100
LOWLANDS							
Black Spruce	53	39	39	39	37	37	37
Tamarack	9	10	10	10	4	4	4
L. Hardwoods	24	29	29	29	32	32	32
White Cedar	13	22	22	22	27	27	27
TOTAL	100	100	100	100	100	100	100

Alternative A

In both LEs, Alternative A (No Action) is the least responsive alternative with regard to vegetation composition objectives. Because Alternative A proposes no planting or seeding activities, acreage of each forest type within this project area would remain at current levels (e.g. no conversions would occur). Minimal scattered natural regeneration via seeding, sprouting, and/or suckering would likely cause a negligible change in species composition. Although natural conversion could occur over time due to successional changes, Alternative A would not actively move toward LE objectives in the next 5 years.

Alternative B

Increase white spruce-balsam fir: In this project area, Alternative B would increase spruce/fir by about 164 acres and 4 acres in the BHC and DMP LEs, respectively.

- In this project area: The increase in acres in the BHC LE would be enough to increase the spruce-fir forest type by about 2 percent, moving toward this vegetation composition objective. In the DMP LE, the percent of spruce-fir would not change.
- Forest-wide: The amount of spruce-fir in both LEs would not change. To meet the forest-wide Decade 2 objective in the BHC and DMP LEs, future conversions would be needed to increase these forest types by 5 percent (about 5003 acres) and 6 percent (about 4937 acres), respectively.

Increase white pine and oak: White pine and oaks were favored in certain stands because they are valuable for tree species diversity, move toward LE objectives, and would increase in suitable habitat under multiple climate change scenarios. Existing white pine and oak trees would be retained as species components in stands identified for harvest. In addition, white pine and oaks would increase as species components across the landscape as they are planted with other species in suitable sites.

- BHC LE: In this project area, Alternative B would maintain the white pine forest type in the BHC LE. Project area and Forest-wide levels of white pine would not change due to this project. To meet the Decade 2 objective, future conversions would be needed forest-wide to increase the white pine forest type by 3 percent (about 3002 acres).
- DMP LE: In this project area, Alternative B would increase the white pine and oak forest types by planting about 84 and 15 acres, respectively, in the DMP LE. This increase in acres would be enough to increase the white pine forest type in this part of the LE by about 2 percent, and increase the Forest-wide level of white pine by 1 percent (Table 3-4). Oak forest type levels would not change across the project area and Forest. To meet the Decade 2 objectives, future conversions would be needed forest-wide to increase the white pine forest type by 4 percent (about 3292 acres) and oak forest type by 2 percent (about 1646 acres).

Decrease aspen: In the BHC and DMP LEs, Alternative B would reduce aspen by about 281 acres and 168 acres, respectively. This accounts for reductions of about 3 percent in the BHC LE and 4 percent in the DMP LE within this project area.

- BHC: Conversions from aspen to other forest types via Alternative B would account for a Forest-wide decrease of about 1 percent, moving slightly toward Forest-wide LE objectives. To meet the Decade 2 objective, about 4 percent (4003 acres) of the aspen in the forest-wide uplands in this LE would need to be converted.
- DMP: Forest-wide, the percent of aspen would not change. To meet the Decade 2 objective, about eight percent (6583 acres) of the aspen in forest-wide uplands in this LE would need to be converted.

Increase black spruce and other lowland species in black ash stands: The acreage of black spruce forest type would not increase due to this project. In the BHC LE portion of this project area, Alternative B proposes to plant 54 acres of lowland hardwood (black ash) forest type with black spruce, tamarack, and other lowland species. Project area and forest-wide levels would not change due to this project; lowland hardwoods would continue to be over-represented. However, diversifying these ash stands would reduce potential future impacts from Emerald Ash Borer by establishing species that would continue to evapotranspire, thus keeping forested stands forested. To meet the Decade 2 objective, about 3 percent (923 acres) of the ash in the forest-wide lowlands in this LE would need to be converted.

Increase paper birch: In the DMP LE portion of this project area, Alternative B would maintain the amount of paper birch forest type. Across the project area and Forest-wide, the percent of paper birch would not change. To meet the Decade 2 objective, future conversions would be needed forest-wide to increase this forest type by 2 percent (about 1646 acres).

Summary of BHC and DMP Vegetation Composition Objectives:

In both LEs in the LLVM Project area, Alternative B would decrease aspen while increasing white spruce/fir and white pine to address vegetation composition objectives in the Purpose and Need. In addition, in the DMP LE, Alternative B would maintain paper birch and increase oak. Lowland hardwood levels would remain the same.

- In this project area, Alternative B is the most responsive alternative regarding vegetation composition objectives in the Purpose and Need.
- All future conversions and diversity plantings would involve considerable financial commitments.

Age Class Objectives – BHC and DMP LEs

In the BHC and DMP LEs, the amount of 0-9 year age class is currently under-represented forest-wide and in this project area in the uplands.

Purpose and Need Objective for age class include:

- Increase acres of 0-9 year age class in the uplands.

See Tables 3-5 and 3-6 for forest-wide Age Class Objectives, existing conditions across the forest and within the LLVM project area, and proposed changes across the forest and within this project area due to Alternatives A and B.

Table 3-5 Comparison of Age Class Objectives and Alternatives in BHC LE (Alternatives A and B reflect conditions in 2021).

Age Classes	Forest wide Objective Decade 2 (%)	Forest wide (%)			Long Lake Project Area (%)		
		Existing 2016	Alt A	Alt. B	Existing 2016	Alt. A	Alt. B
UPLANDS							
0-9	10	7	9	10	5	4	13
10-39	45	40	36	36	35	32	32
40-79	23	26	25	25	39	33	27
80-179	22	27	30	30	21	31	28
180+	0	0	0	0	0	0	0
TOTAL	100	100	100	100	100	100	100
LOWLANDS							
0-9	4	1	2	2	0	0	1
10-39	8	5	5	5	2	2	2
40-79	4	11	7	7	16	9	9
80-119	40	50	43	43	61	53	53
120-179	42	32	41	41	21	35	34
180+	2	1	1	1	0	1	1
TOTAL	100	100	100	100	100	100	100

Table 3-6 Comparison of Age Class Objectives and Alternatives in DMP LE (Alternatives A and B reflect conditions in 2021).

Age Classes	Forest wide Objective Decade 2 (%)	Forest wide (%)			Long Lake Project Area (%)		
		Existing 2016	Alt A	Alt. B	Existing 2016	Alt. A	Alt. B
UPLANDS							
0-9	9	5	7	7	2	0	6
10-39	40	29	26	26	24	22	22
40-79	22	28	25	25	55	40	38
80-179	29	38	41	41	19	37	33
180+	0	0	0	0	0	0	0
TOTAL	100	100	100	100	100	100	100
LOWLANDS							
0-9		0	0	1	0	0	0
10-39	5	4	3	3	0	0	0
40-79	5	9	7	7	26	4	4
80-119	45	55	49	49	70	79	79
120-179	38	31	38	38	4	17	17
180+	2	2	2	2	0	0	0
TOTAL	100	100	100	100	100	100	100

Alternative A

Both LEs: Alternative A (No Action) is the least responsive alternative with regard to age class objectives. Since Alternative A proposes no new harvest, no new acres of young age class

would result in the project area. Alternative A would result in the least amount of 0-9 year age class in this project area. Across the forest under Alternative A, the amount of 0-9 year age class would increase by about 2 percent. Alternative A would not actively move toward LE objectives in the next 5 years.

- BHC LE: Upcoming harvests from one previous decision in this project area would regenerate about 66 acres in this LE. About one percent of the existing 0-9 year acreage in this project area would grow out of this age class in the next 5 years.
- DMP LE: No upcoming harvests from previous decisions in this project area are scheduled. All of the existing 0-9 year acreage in this project area would grow out of this age class in the next 5 years.

Alternative B

By 2021, about 1,582 acres and 209 acres of upland 0-9 year old stands would exist in the BHC and DMP LEs, respectively, in this project area. About 69 percent and 98 percent of this amount (i.e. 1,089 acres and 204 acres) would be due to proposed even-aged regeneration harvests (i.e. clearcut and seed tree) in the BHC and DMP LEs, respectively.

- BHC LE: Compared to the existing condition, the percent of young upland age class in the BHC LE in this project area would increase from five to thirteen percent, exceeding the Decade 2 objective for 0-9 year age class by 3 percent. Compared to the existing condition, forest-wide levels of young upland forest in the BHC LE would increase from seven to ten percent, meeting the Decade 2 objective for 0-9 year age class.
- DMP LE: Compared to the existing condition, the percent of young upland age class in the DMP LE in this project area would increase from two to six percent, which would be about 3 percent less than the Decade 2 objective for 0-9 year age class. Compared to the existing condition, forest-wide levels of young upland forest in the DMP LE would increase from five to seven percent, which would be about 2 percent less than the Decade 2 objective for 0-9 year age class. Future even-aged regeneration harvests (about 1566 acres) would be needed forest-wide to increase the young age class to meet the Decade 2 objective.

Summary of BHC and DMP Age Class Objectives:

- In this project area, Alternative B is the most responsive alternative regarding age class objectives in the Purpose and Need.

3.1.4. Cumulative Effects

Past, Present and Future Activities

Forest Service

Reflected in Table 3-1 in the 0-9 year age class are even-aged regeneration cuts on Forest Service lands within the past 10 years. These recent harvests were primarily clearcuts with reserves in aspen stands. Planned in the next 5 years (from one previous decision in this project area) are about 66 acres of even-aged regeneration harvests in aspen and paper birch.

State of Minnesota and Cass County

There are about 11,000 acres of State and County lands (combined) in this project area. Over 60 percent of these lands are typed aspen. Clearcutting with reserves has been the primary even-aged regeneration harvest method in recent years in aspen, paper birch, balsam fir, Jack pine, and black spruce forest types. Paper birch and tamarack stands have been regenerated using seed tree harvests. Commercial thinning in red pine and white spruce stands is common. Reserving certain species from harvest, and promoting species that are currently present on site helps maintains species diversity. We expect these trends to continue into the near future. (Lilly, 2016; Stevenson, 2016).

Private lands

There are approximately 13,000 acres of private land within the project area. Information on these lands is limited and difficult to obtain. Not expected to change substantially in the near future is the amount and type of agricultural lands. There may be a decline in some farming activity resulting in some lands slowly reverting to shrubs or forest. In contrast, there may be an increase in rural or recreational home sites. Based on patterns elsewhere, these residents would likely be interested in maintaining the aesthetic values of their properties. Harvesting on non-industrial private lands and industrial lands would likely occur, however the amount of planned harvest is unknown.

Summary Cumulative Effects

Past even-aged regeneration, harvest did not overlap stands proposed in Alterative B. There are 66 acres of present even-aged harvests yet to be completed. There are no known even-aged harvests planned in the forseeable future. There may be adjacent harvest to proposed stands by other entities, and that information is not available nor does it play into meeting Forest Plan objectives which state they are for NFS lands only (FP, pgs. 2-62 and 2-68).

3.1.5. Regeneration Harvest Cutting Methods: Optimality and Appropriateness of Even-age Management

The National Forest Management Act states, "When timber is to be harvested using an even-aged management system, a determination that the system is appropriate to meet the objectives and requirements of the Forest Plan must be made and where clear cutting is to be used, it must be determined to be the optimum method."

Silvicultural requirements of species on each site, existing stand conditions, issues raised during the analysis, prior experiences in the area, and Forest Plan direction influence the choice of the optimum harvest method used for regenerating specific stands. The biological requirements of each stand and Landscape Ecosystem objectives affect silvicultural treatments. The harvest method for any given stand may differ from another stand. Resource concerns such as visual quality or desired future condition may mitigate or modify harvest methods. However, the proposed harvest method is required to be sufficient to ensure regeneration of the stand.

The Forest Plan FEIS analyzed the appropriateness of even-aged management (UDSA 2004b Chapter 3.4). Generally, tree species that require more sunlight to survive and grow do better with even-aged management. These species include aspen, paper birch, jack pine, red pine, and tamarack. Even-aged management is appropriate for species that survive under shade. These species include white spruce, black spruce, white pine, and balsam fir. The LLVM Project proposes the use of even-aged regeneration treatments – clearcut with reserves and seed tree with reserves-- in aspen, balsam fir, balsam poplar, Jack pine, paper birch, red pine, tamarack, and white spruce forest types. Alternative B proposes approximately 1,400 acres of even-aged regeneration harvest. It was determined that even-aged management was appropriate for certain stands in the LLVM project.

The Forest Plan FEIS (USDA FS 2004b, Chapter 3.4, and USDA FS 2004a, p. 2-20) analyzed the use of clearcutting. The Forest Plan (p. 2-20, G-TM-7) allows a full suite of timber harvest practices. Clearcutting provides light conditions required for aspen, paper birch, jack pine, red pine, and tamarack. It also reduces wind throw in spruce-fir and lowland conifers.

In Alternative B, clearcut with reserves is prescribed in aspen, balsam fir, balsam poplar, Jack pine, red pine, tamarack, and white spruce forest types to facilitate regeneration to red pine, white pine, white spruce, balsam fir, tamarack, Northern red oak, bur oak, and aspen. In Alternative B, about 1,264 acres of clearcut with reserves would occur. It was determined that clearcutting was optimal for these prescribed stands in the LLVM project.

3.2. Wildlife

3.2.1. Issues

Effects of project activities on Threatened, Endangered and Sensitive (TES) species and their habitats, including large blocks of mature forest habitat and interior forest are disclosed here as secondary issues.

Indicators

Relative effects on TES shown in Biological Evaluation (BE) and Biological Assessment (BA) for this project.

3.2.2. Affected Environment – TES

Management Objective

Report findings of a BA was prepared in compliance with the requirements of Forest Service Manual Directives sections 2670.31, 2670.5(3), and 2672.4, the Endangered Species Act of 1973 as amended, and the National Forest Management Act of 1976.

Report the findings of a Biological Evaluation for sensitive species identified by a Regional Forester for which population viability is a concern as evidenced by (FSM 2670.5).

Forest Service manual (FSM 2672.42) objectives for completing a BE are to:

1. Ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or animal species.
2. Ensure that Forest Service activities do not cause any species to move toward federal listing, and
3. Incorporate concerns for sensitive species throughout the planning process, reducing negative impacts to species and enhancing opportunities for mitigation.

The LLVM project area occurs primarily within the Boreal Hardwood Conifer (BHC) and Dry Mesic Pine (DMP) Landscape Ecosystems (LEs). The LE vegetation and Management Indicator Habitat (MIH) objectives of the Forest Plan (USDA FS 2004a, p. 2-65 – 2-67) set forest-wide objectives for forest vegetation composition, structure, age, and tree diversity. By moving toward these long-term desired vegetative conditions, the Forest would move towards desired conditions for amounts, quality, and distribution of important wildlife species and their habitats. Conservation objectives for TES species and their habitats are interwoven into the LE objectives. The analysis of these conditions relative to the LLVM project is contained in the BA and BE (project file). The BA and BE are available upon request.

A recent evaluation of forest-wide habitat trends of designated MIHs provides a comprehensive picture of wildlife habitat trends with implementation of the Chippewa National Forest Plan (CNF). It indicates that relatively small changes in amounts and ages of MIHs have occurred

since the inception of the Plan in 2004. Forests on the Chippewa National Forest are relatively young (86% of upland forests are less than 100 years old), but the oldest age groups are slowly increasing. About three fourths of the CNF upland forests are deciduous; one fourth are coniferous. The most prevalent upland MIH is aspen-birch, comprising over half of the CNF upland forests. Jack pine and spruce-fir are the least prevalent upland MIHs.

In a general sense, what this means for wildlife is that habitats are abundant for early successional- and young forest-associated species, such as white-tailed deer and ruffed grouse. A reflection of widespread current habitat conditions, these species are generally quite common in the modern landscape. Species more typical of upland conifers and mature forests have far less available habitats, and as a result, are less common. Some of these species are listed as Regional Forester Sensitive Species (RFSS). The BE focuses on RFSS.

In addition to composition and age objectives, the Forest Plan (USDA FS 2004a) provides guidance regarding spatial distribution of forest vegetation (pp. 2-23 through 2-24). Particularly important to a variety of TES species are objectives and guidance related to development of large forest patches, providing opportunities for interior forest habitat conditions. Of particularly high value to some TES species are objectives for large, mature forest patches.

Providing these long-term habitat opportunities through vegetation objectives and goals is part of a coarse-filter, or landscape-level approach intended to provide for the well-being of TES species on the CNF. These objectives seek to address species' needs through integrated resource management at large landscape scales. Fine filter, or site-level management needs are addressed by managing specifically for high quality potential habitat or known locations of sensitive species (USDA FS 2004a, p. 2-28). It is important to employ both of these two strategies. Providing only for species needs at the site level, through meeting Forest Plan standards, but failing to enact important guidelines, goals and objectives, would result in a failure to fully implement Forest Plan direction for conservation of TES species. Site level management cannot compensate for a failure to address landscape-level concerns.

3.2.3. Direct, Indirect and Cumulative Effects – TES Species

This section provides a summary of estimated effects in terms of Issue: Effects on TES (Threatened, Endangered and Sensitive Species) described in Section 1.8 secondary issues. The full analysis of direct, indirect, and cumulative effects to TES is contained in the Biological Assessment (BA) and Biological Evaluation (BE).

Scope of the Analysis

Spatial Framework

The spatial boundary used to evaluate direct, indirect, and cumulative effects to TES varies by species, and is included within the BA and BEs for this project.

Timeframe

Unless otherwise indicated within the BA or BEs, the direct, indirect, and cumulative analyses consider activities that have occurred in the past 10 years and are projected to occur in the next 5 years. The past 10 years were used for past effects in order to be consistent with age class distributions and to allow adequate time for past even-aged regeneration harvests and reforestation activities to be completed. The duration of most Federal timber sales is usually about 3-5 years, plus potential extensions. Information about projects beyond 5 years into the future is not readily available from any agency. Therefore, the 5-year future timeframe seems to be the most reasonably foreseeable one. Conditions resulting from this current decision (e.g. age class distribution, vegetation composition, etc.) would be in effect until the next entry.

Past, Present, and Reasonably Foreseeable Future Effects

Past, present, and reasonably foreseeable effects for each species are identified and analyzed in detail in the BA and BE.

Effects by Alternative

Alternatives A and B – Threatened Species Effects Summary

The BA (project file) documents the potential effects on federally proposed, candidate, threatened or endangered species and designated critical habitat that could result from proposed activities in the Long Lake Vegetation Management Project. The BA was prepared in compliance with the requirements of Forest Service Manual Directives sections 2670.31, 2670.5(3), and 2672.4, the Endangered Species Act of 1973 as amended, and the National Forest Management Act of 1976.

Consultation specific to the LLVM project BA was conducted with the U.S. Fish and Wildlife Service (FWS). Concurrence with the effects determinations as shown in the table below has been requested from the FWS (project file).

The LLVM project BA evaluates both alternatives for effects on Canada lynx, Northern long-eared bat, and Gray wolf, all of which are listed as threatened species. A summary of BA findings is presented in Table 3-7.

Table 3-7 Relative effects on Proposed and Threatened species (Summary of BA Findings)

Species	Alternative A	Alternative B	Rationale
Canada lynx	No effect	Not likely to adversely affect Canada lynx or its habitat	Small reductions in habitat occur which are unlikely to adversely affect Canada lynx.
Northern long-eared bat (NLEB)	No effect	Likely to adversely affect.	Individuals in stands that are summer harvested could be adversely affected, assuming that NLEB is present in the affected stands. The standard forest activities with this project are exempt from "Incidental Take" under a 4(d) rule. The amount of summer roosting habitat that would be affected (3,011 acres) is minimal in comparison to the amount of summer roosting habitat available throughout the project area (19,145 acres) and forest-wide (521,029 acres). The proposed project would affect about 16% of the currently suitable habitat in the project area, and about 0.6% of the currently suitable habitat available across Chippewa National Forest. Across the NLEB's range the effects of the LLVM project on NLEB and their summer habitat is minimal. No known summer maternity roost sites or winter hibernacula occur in the project area.
Gray wolf	No effect	Not likely to adversely affect gray wolves or their habitat.	Minimal change to prey habitat. No new system roads are proposed. Temporary roads would be effectively closed following project completion.

Neither of the alternatives would result in an adverse effect to Canada lynx or Gray wolf. Alternative B would be likely to adversely affect individual Northern long-eared bats if they are present in stands harvested in the summer. This "Incidental Take" is exempted under a 4(d) rule. Abundant NLEB summer roosting habitat would remain after project completion.

Alternatives A and B – Sensitive Species Effects Summary (animals)

Sensitive species are plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by (USDA FS 2005a, Sec .5):

- Significant current or predicted downward trends in population numbers or density.
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The BE of the LLVM project evaluates both proposed project alternatives for effects on Regional Forester Sensitive Species. Table 3-8 presents a summary of findings of the LLVM BE. The full analysis of effects on RFSS is contained within the BE (project record). The BE is available upon request.

There are 57 species listed as Regional Forester Sensitive Species on the Chippewa National Forest, 25 of which are animals (i.e. birds, mammals, amphibians, reptiles, fish, and mollusks). Neither LLVM project alternative would result in a trend to federal listing or loss of viability to a

population or species. Of the 25 sensitive animal species on the CNF, the LLVM project would have no impact to 20 species. A finding of "may impact" is associated with five species under Alternative B.

Standards, guidelines, and required mitigation measures associated with these findings are presented in the body of the BE, and in stand-specific tables in Appendix C.

Table 3-8 Summary of effects determinations for Sensitive Species (Animals)

Species	No impact	May impact but would not contribute to a trend to federal listing or loss of viability to population or species
Northern goshawk	A	B
Red-shouldered hawk	A	B
Bald eagle	A	B
Black-backed woodpecker	A	B
Great gray owl	A	B

Alternatives A and B – Key Points from the Biological Evaluation (animals)

Following are key points of interest from the analysis used to develop findings for sensitive species. The full evaluation is contained in the body of the BE (project file). The BE is available upon request.

MIH Trend Analysis: BHC and DMP MIH trend analysis for the period 2004 – 2016, which includes planned but not implemented forest management projects, includes the following aspects (project file):

- Over 80% of the mature and older upland forests in these LEs on the CNF are deciduous forests.
    - The amount of mature and older upland deciduous forest has increased somewhat (seven percent) since 2004.
        - Mature and older northern hardwoods have increased.
        - Mature and older aspen/birch forest has decreased.
- Coniferous forests comprise under 20 percent of mature and older upland forests in these LEs on the CNF.
    - The amount of mature and older upland coniferous forest has decreased (two percent) from 2004 to 2016 in these LEs.

Concerns for limited amounts of conifer forest habitat on Chippewa National Forest, coupled with the knowledge that one third of the CNF forest birds are conifer-dependent, prompted the development of the following Purpose and Need statements in the Long Lake Vegetation Management Project:

- Increase habitat for conifer-dependent birds by moving towards achieving Landscape Ecosystem objectives for MIHs.
    - In the BHC LE:
        - Increase acres in mature upland spruce-fir
        - Increase acres in old red/white pine
        - Maintain or increase acres in mature upland conifers
    - In the DMP LE:
        - Increase acres in mature and old upland spruce-fir

The table below summarizes how proposed activities in the LLVM project address purpose and need statements associated with MIHs in the BHC and DMP LEs. Analysis outputs are contained in the project record.

Table 3-9 Summary of how proposed action activities address purpose and need for the MIHs in the BHC and the DMP LEs.

Purpose and Need Statement	LE	Effect by Alternative
Maintain/Increase acres in mature upland conifers	BHC	**Alt A would best meet.** Forest-wide MIH objective is currently not being met, as mature upland conifers declined 22% from 2004 to 2016 in the BHC LE. Forest aging in Alternative A would reduce this decline to 18%. Alternative B would decline about 19%, due to forest aging and regeneration harvest of mature upland conifers. **Alt A would best meet** this objective due to regeneration harvest of mature upland conifers proposed by Alternative B.
Increase acres in mature upland spruce-fir	BHC	**Alt B does not meet.** Forest-wide MIH objective is currently not being met, as mature spruce-fir declined 50% from 2004 to 2016 in the BHC LE. Despite forest aging in Alternative A, previously planned activities would increase this decline to 54% in 2021. Alternative B would add additional regeneration harvest in this MIH, and increase the forest-wide decline of mature upland spruce-fir to 55% in 2021. **Alt B does not meet** this purpose and need, and contributes to the forest-wide trend of declining mature upland spruce-fir in the BHC LE.
Increase acres in old red/white pine	BHC	**Both alternatives meet.** Forest-wide MIH objective is currently not being met, as old red pine declined 6% from 2004 – 2016. This represents a small change in acres, as there is only a very small amount of forest in this age grouping (189 acres). Forest aging under Alternatives A and B would reduce this decline to 3%, with no regeneration harvesting of old red/white pine proposed in LLVM.
Increase acres in mature and old upland spruce-fir	DMP	**Both alternatives meet.** Forest-wide MIH objective is currently not being met, as mature and older upland spruce-fir declined 31% from 2004 – 2016 in the DMP LE. Forest aging under Alternatives A and B would reduce this decline to 24%, with no regeneration harvest of this MIH growth stage proposed by LLVM project in the DMP LE.

<u>Spatial Distribution of Forest Vegetation:</u> The high habitat values associated with large, mature forest patches prompted the development of Purpose and Need statements in the long Lake Vegetation management project. The table below provides comparison of the alternatives analyzed to the year 2021. Full details of the analysis can be found in the BE and project record.

The indicator used for MIH 13 Large patches of upland mature forest (USDA FS 2004b, Appendix C) is shown in the table below as "large" patch size classes.

Table 3-10 Mature, upland patches in the Long Lake Vegetation Management Project area, by Alternative.

Patch size class		**Existing (2016)**		**Alt. A (2021)**		**Alt. B (2021)**	
Size	**Acres**	**Number**	**Acres**	**Number**	**Acres**	**Number**	**Acres**
Moderate	41-100	26	1656	26	1610	25	1561
	101-300	17	2741	15	2394	14	2121
Large	301-500	8	3023	8	3110	7	2779
	501-1000	2	1261	4	2736	3	2167
	1001-2500	1	1947	1	2026	1	1950
Total		**54**	**10,628**	**54**	**11,876**	**50**	**10,578**

The LLVM project area currently contains (either partially within, or intersecting the project area) 11 large, mature upland patches. Forest aging would result in an increase in large, mature patch acres in both alternatives when compared to existing condition in 2016. Alternative A would result in an increase of about 1247 acres (20%) within the LLVM project boundary. Alternative B would have less of an increase due to regeneration harvesting, with additional harvests such as thinning, single-tree or group selection cuts, as well. The table below summarizes how proposed activities in the LLVM project area address Purpose and Need statements associated with large, mature upland patches.

Table 3-11 Summary of how proposed activities in the Long Lake Vegetation Management Project area address Purpose and Need statements associated with large, mature upland patches

Purpose and Need Statement	**Effects by Alternative**
Allow forest aging to tie together more isolated pieces of large, mature forest patches	Both alternatives would result in large, mature patch acre increases within project area due to forest aging. Alternative A increases acres the most. Alternative B removes 2 patches through clear-cut harvest, resulting in less connectivity between areas of mature forest.
Maintaining structural and compositional diversity in forest stands where it currently occurs	Alternative A meets. Alternative B meets if harvest prescriptions are designed to maintain or increase species diversity or structural complexity.
Develop treatments that foster structural and compositional diversity in forest stands where it is lacking, particularly in upland pine stands	Alternative B includes patch "enhancement" treatments in red pine plantations.

The indicator used for MIH 12 Upland interior forest habitat (USDA FS 2004b, Appendix C) is mature upland patches, shown in the table above as a combination of "moderate" and "large" patch size classes. Alternative A would increase the amount of forest interior habitat inside the project area. Due to proposed regeneration harvest, Alternative B would result in a slight net loss in interior habitat conditions within the project area.

<u>BE Summary Conclusions</u>: Neither alternative in the LLVM project s would result in a trend to federal listing or loss of viability to a population or species. Of the 25 sensitive animal species

on the CNF, the LLVM project would have no impact to 20 species. A finding of "may impact" is associated with five species. For a detailed analysis of these five species, see the BE (project file).

The primary difference between Alternatives A and B relate to timber harvest, especially regeneration harvesting in mature habitats, which reduces habitat available for some species such as northern goshawk, red-shouldered hawk, or great gray owl. Alternative A allows acres of mature habitats to increase.

Habitat which, occurs in larger blocks, or patches, is likely to have higher quality than that which does not. Large, mature upland patches would increase under both project alternatives due to forest aging. The increase would be greatest under Alternative A. Alternative B would remove two patches due to clearcut harvesting of aspen stands. Alternative B would also slightly reduce upland interior forest habitat due to proposed even-aged regeneration harvests. Reduction in large, mature upland patches or forest interior habitat conditions is less favorable for species like the northern goshawk, red-shouldered hawk, and great grey owl.

Forest aging increases habitat components for a number of species, such as the black-backed woodpecker. The LLVM project area has a modest number of nesting bald eagles. As red and white pine forest ages in the project area, some additional eagle nesting opportunities may eventually develop.

Conversion of abundant habitats, especially aspen, to conifers could eventually benefit some sensitive species. When these conifers eventually mature, they would benefit species like the black-backed woodpecker and bald eagle, as well as other conifer-associated forest birds. Alternative B proposes about 312 acres of conversion from aspen to conifers.

Concerns for limited amounts of conifer forest habitat on Chippewa National Forest, coupled with the knowledge that one third of the CNF forest birds are conifer-dependent, prompted the development of Purpose and Need statements to increase these mature upland conifer MIH habitat components in the two LEs in which the LLVM project occurs. Particularly in the BHC LE, one of the larger LEs on the CNF, there has been a forest-wide declining trend in mature and older upland conifers since the inception of the Forest Plan in 2004.

The LLVM project meets desired needs to increase some components of upland conifer habitat, but not others. Mature red pine would increase, but mature upland spruce-fir would not. Growth in the mature Red Pine MIH habitat component is attributable to young red pine plantations aging to beyond a minimum of 50 years old. Quality of this habitat for any number of species is highly dependent upon management practices.

The amount of harvest proposed in the LLVM project, in the mature spruce-fir MIH is quite modest. However, the addition of Alternative B harvest proposals contributes to the forest-wide trend of declining mature upland spruce-fir in the BHC LE. It is anticipated that by 2021, forest-

wide the mature upland-spruce fir MIH in the BHC LE would have declined 54 percent since 2004.

3.2.4. Cumulative Effects

The past, present, and reasonably foreseeable effects for animal species are identified and analyzed in detail in the BA for Threatened and Endangered Species and BE for RFSS Animal Species. The findings presented in Tables 3-7 and 3-8 include the consideration of cumulative effects for these species.

3.2.5. Comparison of how alternatives meet Purpose & Need

EA Chapter 1, Section 1.3 includes multiple Purpose and Need statements associated with Element 4 Wildlife and Botanical Enhancement Projects and Partnership Opportunities. The following summarizes how the LLVM project responds to these statements, which are as follows:

- Conduct oak management beneficial to bear and deer
  - Emphasize oak management in the hardwood types
  - Increase in-stand diversity in pine stands, reserving and promoting oak

Alternative A does not propose any activities responsive to oak management. Alternative B proposes to convert about 83 acres of aspen forest type to northern red oak or bur oak forest type (EA Table 2-3, Chapter 2). Alternative B also proposes treatments within some 70+ year old red pine stands which would involve variable density thinning, the creation of small gaps, and planting of species other than red pine, including white pine, Northern red oak, bur oak, white spruce, hackberry, bitternut hickory, balsam fir and jack pine (EA Chapter 2).

  - Proximate to five known deer winter areas
    - Protect and plant future winter cover conifers
    - Harvest adjacent aspen and birch forest types
    - Maintain existing forest openings

Inside of or within 1 mile of the 5 known deer winter areas:

- Neither Alternative A nor Alternative B proposes to harvest any existing winter cover conifers.
- Alternative B proposes to harvest three aspen stands (about 65 acres) and convert them to white spruce, which may provide some winter cover in the future.
- Alternative B would regenerate harvest 25 stands (about 565 acres) of aspen and birch forest types, providing deer foraging opportunities.
- Alternative B would maintain 16 existing forest openings.

- With respect to existing permanent wildlife openings, constructed 1970 – 1990 and seeded to non-native species
    - Maintain a subset of permanent wildlife openings to provide a habitat component for deer, bear and woodcock.
    - Seed or plant some openings to native species to better reflect the composition of native vegetation communities, and provide opportunities for native pollinators.

Alternative B would continue to maintain about 34 acres of these openings, any of which may be seeded/planted to native species as conditions and funding permit.

- Increase habitat for conifer-dependent forest birds by moving towards achieving LE objectives for MIHs
    - In the BHC LE:
        - Increase acres in mature upland spruce-fir
        - Increase acres in old red/white pine
        - Maintain or increase acres in mature upland conifers
    - In the DMP LE:
        - Increase acres in mature and old upland spruce-fir

The BE evaluates in detail each Alternative with respect to these objectives, the results of which are summarized in the MIH Trend Analysis (EA Chapter 3, Section 3.1.3). The LLVM project meets desired needs to increase some components of upland conifer habitat, but not others. Mature red pine would increase, but mature upland spruce-fir would not. Growth in the mature Red Pine MIH habitat component is attributable to young red pine plantations aging to beyond a minimum of 50 years old. Quality of this habitat for any number of wildlife species is highly dependent upon management practices.

- Maintain and improve the quantity and quality of older forest habitat important to numerous wildlife species by:
    - Allowing forest aging to tie together more isolated pieces of large, mature forest patches.
    - Maintaining structural and compositional diversity in forest stands where it currently occurs.
    - Develop treatments that foster structural and compositional diversity in forest stands where it is lacking, particularly in upland pine stands.

The BE evaluates in detail each Alternative with respect to these objectives, the results of which are summarized in the Spatial Distribution of Forest Vegetation analysis (EA Chapter 3, Section 3.1.3). Large, mature upland forest patches would increase under both project alternatives due to forest aging. The increase would be greatest under Alternative A. Alternative B would remove

two patches due to clear-cut harvesting of aspen stands. Alternative B includes patch "enhancement" treatments in red pine plantations, intended to foster structural and compositional diversity. Alternative B would also slightly reduce upland interior forest habitat due to proposed even-aged regeneration harvests. Reduction in large, mature upland patches or forest interior habitat conditions is less favorable for species like the northern goshawk, red-shouldered hawk, and great grey owl.

3.2.6. Management Indicator Species (MIS)

MIS are defined as species monitored over time to assess the effects of management activities on their populations and the populations of other species with similar habitat needs. MIS were identified in the Final Environmental Impact Statement for Forest Plan Revision for the Superior and Chippewa NF. Species selected include the gray wolf, bald eagle, northern goshawk and white pine. All of these species are discussed elsewhere in this EA. The gray wolf, bald eagle and northern goshawk (Regional Forester's sensitive Species) are analyzed in the BE (project record); Long Lake project effects are summarized in the section on TES species. White pine is discussed in Vegetation Composition.

3.3. Plants

3.3.1. Issues

The identified as a secondary issue is the effects of project activities on plants of Regional Forester Sensitive Species (RFSS) and their habitats.

Indicator:

- Relative effects on sensitive plants as shown in the Long Lake Vegetation Management Project Biological Evaluation (BE) for RFSS Plant Species

Management Objective

Report the findings of a Biological Evaluation for sensitive species identified by a Regional Forester for which population viability is a concern. As indicated in the 3.2 Wildlife section, Forest Service manual (FSM 2672.42) objectives for completing a BE.

3.3.2. Affected Environment – RFSS Plants

The existing vegetation in the LLVM project area consists of a mosaic of upland conifer and hardwood forests, lowland conifer and hardwood forests, upland openings, and wetlands on public lands. Private lands include agricultural fields, upland and lowland forests, and wetlands.

3.3.3. Direct and Indirect Effects

The following analyses include only those RFSS plant species that are at a moderate or high risk for possible effects from the proposed project activities as determined in the RFSS Plant BE for the project (Project File).

Scope of the Analysis

Spatial Framework

The spatial boundary used to evaluate the direct and indirect effects to sensitive plants varies by species, but analyses focused on the known RFSS sites that occur within 250 feet of the proposed project activity areas. The populations located within this distance are in close enough proximity to have some likelihood for possible effects because of the proposed ground disturbing activities. Activity areas refers to stands proposed for harvest treatments, mechanical site prep, temporary road construction, or other areas of any major ground disturbance.

Timeframe

As indicated in the Plants BE, the direct, indirect, and cumulative effects consider activities that have occurred in the past 10 years and anticipated to occur in the next 5 years. A timeframe interval of 10 years in determining past effects is appropriate in order to be consistent with age class distributions and to allow adequate time for past regeneration harvests and reforestation

activities to be completed. We anticipate that completion of most timber sales and associated management activities would occur about 5 years in the future.

Effects by Alternative

Alternative A and B – Sensitive Plant Species

The RFSS Plant BE evaluated the project alternatives for possible effects on all RFSS plant species. The BE is available upon request.

All plant species of RFSS occur within seven principal habitat types found on the Chippewa National Forest: shallow water communities, non-forest wetlands, upland disturbed forest, forested wetlands, forested wetlands-cedar, mesic northern hardwoods, and diverse habitat.

Considering the wide variety of habitat located across the LLVM project, all community groups exist in the project area. In some instances, the habitat may occur in the project area, but the project activities would not affect the associated RFSS plants because of project design (mitigation) criteria and Forest Plan direction, or due to the sensitive plant populations' location in relation to the proposed activities.

There are 57 species listed as Regional Forester Sensitive Species on the Chippewa National Forest, of which 32 are plant species, i.e. 29 vascular plants and 3 non-vascular plants. Neither alternative in the LLVM project would result in a trend to federal listing or loss of viability to a population or species. Of the 32 sensitive plant species on the Chippewa National Forest, the LLVM project would have "no impact" to 16 species. A finding of "may impact individuals or habitat, but not likely to cause trend toward federal listing or reduce viability of a population or species" is associated with 16 species. The following table displays a summary of findings for all species evaluated in detail in the Long Lake Vegetation Management Project BE for RFSS Plant Species. Analyses in the RFSS Plant BE determined that 16 plants considered as a moderate or high-risk species have some potential for possible negative effects to the plants and/or their habitat because of the proposed activities in Alternative B.

Five of the species have known populations that occur within stands proposed for harvest treatments in Alternative B. Northern bur-reed, ternate grapefern, white adder's-mouth orchid, and Beauvois' spotted felt lichen and, Bluntlobe grapefern.

Bluntlobe grapefern, Beauvois' spotted felt lichen, white adder's-mouth orchid, Narrow triangle moonwort and little goblin moonwort have additional populations located within 250 feet of a stand proposed for harvest.

All of these species' populations typically occur in small microsite habitat inclusion areas within the stands. All of the populations would receive an appropriate protection buffer zone around the plants to protect them from any physical harm and to mitigate any potential indirect effects

from the harvest activities or associated ground disturbing actions that might affect the plants or their habitat.

Other RFSS Plants do not have any known populations within the project area or are located well beyond any of the proposed project activities. Although no anticipated direct impacts would occur to these species, there is some probability for project activities having an indirect effect on their habitat or to any undiscovered plant populations.

Table 3-12 Summary of effects determinations for Sensitive Species (Plants)

Species	**No impact**	**May benefit**	**May impact individuals or habitat, but not likely to cause trend toward federal listing or reduce viability of a population or species**
Narrow triangle moonwort			A*, B
Little goblin moonwort			A*, B
Bluntlobe grapefern			A*, B
Pale moonwort			A* B
Ternate grapefern			A* B
Fairy slipper	A		B
Ram's-head lady's-slipper	A		B
Goldie's woodfern	A		B
Limestone oak fern	A		B
White adder's-mouth orchid	A		B
Bog adder's-mouth orchid	A		B
Northern bur-reed	A		B
Canada yew	A		B
Beauvois' spotted felt lichen	A		B
Spotted felt lichen	A		B
Beard lichen	A		B

* Determination of a **"may impact"** because of probable expansion of exotic invasive earthworms

3.3.4. Cumulative Effects

The past, present, and reasonably foreseeable effects for plant species are identified and collectively analyzed as a group in detail in the BE for RFSS Plant Species, which is in the project file. The findings presented in Table 3-12 include the consideration of cumulative effects for RFSS Plant Species.

3.4. Aquatics

3.4.1. Issues

Disclosed in this section, as secondary issues are the effects of proposed activities on aquatic resources.

Treatments and activities have the potential to affect water quality, aquatic resources and wetlands. The potential negative effects on aquatic organisms from increased sedimentation that often result from the below indicators are numerous. For example, sediment added to aquatic systems similar to those in the analysis area can impact fish, mussel, and invertebrate communities by altering community composition (Ryan 1991, Jones III et al. 1999), reducing carrying capacity (Burns 1972, Watters 1999), creating conditions favorable for non-native species (Dunham et al. 2003), or reducing population viability (Gleason et al. 2003, Regetz 2003). The mechanisms responsible for these impacts are numerous and often complex, therefore they will not be discussed in detail here.

Indicator 1: Acres of Riparian Management Zone (RMZ, the area within 200 ft. of lakes and streams) disturbed during vegetation management activities. (Direct/indirect effects)

This indicator is useful for distinguishing among alternatives because soil erosion from harvest related activities can lead to impaired water quality and sedimentation to aquatic organism habitat (e.g., fish; Burns 1970, Ryan 1991). Sediment derived from vegetation management activities (timber harvest) can reduce or degrade spawning habitat by filling interstitial spaces in course substrates required by lithophilous (i.e., fish that spawn on course substrates, such as walleye) spawning fishes for egg incubation (Burns 1970). These interstitial spaces also provide habitat for invertebrates that many fish feed upon. Sediment can also reduce water clarity, which impairs the foraging efficiency of some sight-feeding fishes (Berkman and Rabeni 1987). Timber harvest can also alter the water quality of streams, lakes, and wetlands through soil disturbance and compaction—this is especially true for activities conducted in the RMZ (Jones et al.1999, Williams et al. 2002). These impacts can lead to altered surface and subsurface water flow and increased sedimentation to water bodies. Harvest units that are indicated as “RMZ no harvest” are not included in the number of acres of RMA disturbed.

Indicator 2: Number of wetland crossings by temporary roads. (Direct/indirect effects)

Wetland crossings by temporary roads can potentially affect water quality. “Forest Road and skid trail crossing of wetlands have the greatest potential to affect water resources directly through soil compaction, rutting, or indirectly by funneling the movement of sediment, debris, and nutrients into the water body” (Blinn et al. 1999).

Secondary issues Identified but not further analyzed and topics dismissed

Percentage of upland in sub-watersheds in young and open condition has been tallied for each alternative. Young and open condition range by project area watershed from nine to twenty-seven percent under the only harvest alternative (Alt B). Maximum proposed harvest amounts within the watersheds range from zero to two percent. Alternative B would not approach the 60 percent effects threshold identified in the Forest Plan nor contribute a significant amount to young and open condition within the project area watersheds, thus young and open forest will not be further analyzed.

Because no permanent road building or decommissioning within the RMZ is proposed under all action alternatives, road densities within the RMZ is not used as an indicator to analyze the alternatives. Additionally, because no additional stream crossings would be made in any of the alternatives and no crossings are proposed to be decommissioned, number of stream crossing are not used as an indicator to analyze the alternatives.

There is one impoundment in the project area, Pine Tree. It is in the process of being removed under a previous decision and will not be further analyzed.

3.4.2. Affected Environment

The 47,106 acre Long Lake Vegetation Management Project Area includes proposed activities in eight 6th Level Sub-Watersheds [Hydrologic Unit Code (HUC) 12]. These watersheds, or analysis units, comprise the aquatics analysis area and total 155,188 acres. The analysis area within the Chippewa National Forest includes 224 miles of streams, 8,588 acres of lakes, 57,370 acres of wetlands (not including open water wetlands already included in lake acres), and 11,970 acres of Riparian Management Zone (RMZ). 487 miles of roads exist within the analysis area across all land ownerships, with 245 miles of those being forest service roads.

Management Direction

A variety of sources provide direction for management related to wetlands, water quality, riparian areas, and fish and aquatic habitat on the Forest. These include Executive Orders 11990 (requires protection of wetlands and defines them) and 11988 (requires protection of floodplains and defines them) for the protection of wetlands and floodplains, the Clean Water Act, National Forest Management Act (NFMA), and the Forest Service (FS) Manual (FSM; Chapters 2526 and 2527). In addition, FS policy mandates management of “riparian areas in the context of the environment in which they are located, recognizing their unique value” (FSM 2526.02) and directs managers to “give preferential consideration to riparian dependent resources when conflicts among land use activities occur” (FSM 25826.03). Forest management activities in RMZs (the area within 200 ft. of a lake, stream, or open water wetland) would only be conducted for the purposes of maintaining or restoring riparian ecological condition, and all activities would be conducted so as not to cause a reduction in existing water quality or to

impair designated uses (2004 Forest Plan Goals, Desired Conditions, and Objectives for Watershed Health, Riparian Areas, and Soil Resources). Management direction is also given in the Forest Plan for the Riparian Emphasis Management Area.

Diverse, healthy, productive, and resilient aquatic and terrestrial habitats are the desired condition for fish and wildlife habitat in the Forest Plan. The Forest Plan also states that aquatic and terrestrial wildlife habitats on NFS land shall contribute to ecosystem sustainability and biological diversity of Northern Minnesota and, for wide-ranging species, larger landscape scales. As directed by the Plan, increased emphasis is to be placed on the health, quality, and ecological function of aquatic ecosystems which will provide improved habitat conditions for fish, mollusks, invertebrates, plants, and other aquatic species. A desired condition (D-WS-8, p 2-11) within the Forest Plan is to maintain or restore hydrologic connectivity of aquatic ecosystems and wetlands to assure passage of water, sediment, nutrients, wood, invertebrates, and fish and to facilitate freshwater mussel dispersal—this includes minimizing the number of impoundments and managing existing dams as much as practical to mimic natural lake levels and seasonal flows.

The Forest Plan states the Forest road system is the minimum needed to provide adequate access to both federal and non-federal lands, and that road and trail crossings of streams, wetlands, and riparian areas will be minimized (USDA FS 2004a, O-TS-4, p 2-47) with hydrologic and riparian functions maintained or improved when roads or trails are constructed across wetlands (USDA FS 2004a O-TS-5, p 2-47). Under frozen conditions, wetlands may be used for permanent roads, temporary roads, and skid trails, provided that no fill is placed in the wetland and that these roads and trails are blocked to prevent use under unfrozen conditions. Felling trees into non-forested wetlands should be avoided except where done for purposes of habitat restoration (USDA FS 2004a, pg. 2-15).

The Forest is also committed to implementing State of Minnesota site-level best management practices (BMPs) related to timber harvest and road construction or maintenance (MFRC 2005).

3.4.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

The area examined for direct, indirect, and cumulative effects related to potential sedimentation from vegetation management activities would be the RMZ within the LLVM analysis area activity stands (Indicator 1). The RMZ of lakes and streams (in the absence of a site-specific boundary delineation, the default “near-bank” zone is the first 100 ft. from the water body and the second 100 ft. from the waterbody represents the “remainder” zone) was used to analyze the potential direct, indirect, and cumulative effects to aquatic resources from activities that can lead to sedimentation. Activities outside of the riparian areas would have

little impact on aquatic resources from sedimentation because soil erosion would be minimized by following Forest Plan Standards and Guidelines (FS ownership), the Voluntary Site-level Forest Management Guidelines developed by the Minnesota Forest Resources Council (MFRC 2005; all ownerships), and mitigations located in Appendix C of this document (FS ownership)—potential impacts from sedimentation would then be very localized.

For wetland crossing (indicator 2), the spatial framework is immediate vicinity of the proposed crossing that is directly impacted by the width of the road. Because use of the wetlands would occur under frozen conditions and no fill is permitted, residual effects would be limited to damaged or removed vegetation caused by the movement of equipment, no effects to the adjacent wetland would occur.

Timeframe

The timeframe for direct, indirect, and cumulative effects of sedimentation from RMZ activities is one to two years. The amount and the duration of sediment entering lakes and streams from harvest activities in the RMZ is highly variable and dependent upon a variety of physical and ecological factors (Swank et al. 1989). Because of this variability, predicting the duration of erosion and the resulting sedimentation at a site is difficult. Until soils are stabilized through re-vegetation the potential exists for sedimentation to nearby water bodies. Ground-covering vegetation is expected to recover quickly after vegetation management activities (Swank et al. 1989), so the effects of soil erosion and the resulting sedimentation should be short-lived (1-2 years), especially with the implementation of the Voluntary Site-level Forest Management Guidelines (MFRC 2005).

The timeframe for direct, indirect, and cumulative effects of wetland crossings is one full growing season following use. Wetland crossings used under frozen conditions without fill are expected to revegetate during the following growing season when Forest Plan and Voluntary Site-level Forest Management Guidelines (MFRC 2005) are implemented.

Direct/Indirect Effects by Alternative

Acres of RMZ disturbed (Indicator 1)

Timber harvest can potentially impact the water quality of streams, lakes, and wetlands within the project area through soil disturbance and compaction. These alterations can lead to impaired surface and subsurface water flow and increased sedimentation and nutrient input into water bodies. Harvest within the RMZ can reduce its effectiveness as a nutrient and sediment filter (Sheridan et al. 1999) and reduce coarse particulate organic matter (i.e., leaves and detritus) or woody debris inputs into lakes and streams (McHenry et al. 1998)—this can negatively impact the habitat of many aquatic organisms (Prepas et al. 2001). Some of the effects on fish and fish populations were described previously in this report. Sedimentation to

streams from activities such as logging has also been found to negatively impact mussel habitat quality, resulting in reduced population viability (Watters 1999).

Alternative A

Alternative A is the no action alternative. No vegetation management would be conducted in or adjacent to RMZs, thus direct and indirect effects would be zero. RMZs impacted by past activities would continue to move slowly towards desired riparian conditions through stand aging and natural conversion or stay the same.

Alternative B

Alternative B was designed to incorporate proactive riparian management where stand activities were compatible with the goals described in the Forest Plan for RMZ management. While posing a short term risk to water quality due to the proximity of the harvest activity to watercourses, activities that increase structural and species diversity or favor long lived tree species would have long term benefits to the water quality and the aquatic and terrestrial habitats that the RMZ is designed to protect. The components of the RMZ such as shading, large wood habitat source, nutrient inputs and stream bank composition are protected to a large extent by the near-zone RMZ. These components would be preserved through activity design criteria that enhance the RMZs function over the long term while limiting short term impacts to the RMZ components, erosion, and sedimentation identified in the Forest Plan, BMPs, and mitigations in appendix C. Harvest activities within the RMZ under this alternative is generally only permitted where they would increase within stand diversity and improve riparian functions. Probable benefits for treatments to the RMZ include:

- Increase within stand diversity by creating light conditions on the forest floor light over a considerable portion of the stand that would allow for the establishment and advancement of other tree, shrub, and herbaceous species,
- Protect existing within-stand tree species and age-class diversity, by retaining and protecting all non-featured tree species in the treatment areas, and/or
- Promote long-lived site suitable tree species in RMZ (i.e., red pine, white pine, tamarack, cedar, maple, basswood, oak, black spruce)—this includes retaining all large diameter (20+ inches) long-lived conifer species (e.g., red pine, white pine, cedar, and tamarack) in the RMZs.

In Alternative B, 30 stands intersect the RMZ. The RMZ within these stands total 74 acres, approximately 27 acres near zone and 47 acres of remainder zone. Harvest activities in the near zone generally include a no cut buffer of either the bank slope or 50 feet and one or more of the following: single tree selection, feathered edges, species designation removal, thinning, and group select or clearcuts with planting of long lived conifer species. Clearcutting of aspen, where proposed in Alt B, would not be permitted within the near zone of the RMZ because

riparian needs for this activity have not been identified. The activities in the remainder zone may include those within the near zone with the addition of long rotation of site appropriate tree species. Heavy site prep is generally not permitted in either RMZ unless necessary for a conversion driven by riparian composition needs. Alternative B, activities within the near zone include up to 17 acres of group selection of ash for riparian enhancement and 8 acres of thinning. Less than 2 acres of near-zone RMZ is proposed for stand regeneration harvest, which would be left unharvested or enhanced through partial harvest, conversion to long lived species, or planting alone. Each of these activities would increase age and structural diversity; increase tree vigor for faster recruitment as a shade, nutrient, or large woody debris component to watercourses; and favor development of a self-sustaining RMZ.

Alternative B proposes activities on three stands for the primary purpose of proactive riparian management:

- Stand 204023 is an aspen stand with large pockets of ash in the RMZ. Stand 204057 is a black ash stand dominated by RMZ protecting a stream. Group selection and diversity planting on up to half of the 27 acres identified would increase resilience to emerald ash borer and preserve riparian and hydrologic function.
- Stand 246002 is characterized as a paper birch stand, but it also contains pockets of pure ash and portions of the riparian are lacking in long lived conifer species despite adequate soil conditions. A mixture of treatments ranging from group selection in the ash and paper birch dominated areas to creating small openings for white pine and white spruce plantings would be used in the approximately 10 acres of Lake Vermillion RMZ.

Table 3-13 RMZ Activity Indicator and Related Data

Activity in RMZ	Alt. A	Alt. B
Acres of riparian management zone (area within 200 ft. of lakes and streams) potentially disturbed during vegetation management activities (i.e., timber harvest, reforestation)	0	74
Acres of RMZ in near zone (1st 100 ft.) where siliviculture presctiptions could include harvest.	0	27
Acres of RMZ included in special RMZ enhancement proposal	0	37

Source: GIS data, 2016.

Summary of Indicator 1

No alternative is expected to have effects on the RMZs ability to provide protection for aquatic resources. Alternative B is consistent with Forest Plan direction on RMZ management. Because of the proactive Riparian management proposed and described earlier in this section, any activities within the RMZ is expected to have benefits that outweigh the near term risks to water quality. Between the two alternatives, potential sedimentation to water courses that

lowers water quality and habitat quality for aquatic organisms is expected to be highest for Alternative B due to proposed management activities in the RMZ. Alternative A would have the lowest potential for sedimentation. The cause-effect relationship among vegetation management activities, soil erosion, and sedimentation to watercourses is well described in the literature (Riekerk et al. 1988, Marion and Ursic 1993, Swank et al. 2001). However, the amount of sediment entering lakes and streams from vegetation management activity is highly variable and dependent upon the amount of soil exposed, the soil type, steepness of slope, weather conditions, and the treatments following disturbance (Swank et al. 1989). Because of the variability in these factors, predicting the amount of sedimentation is impracticable. Placement of reserve areas would favor RMZ locations where harvest prescriptions are incompatible with proactive riparian management, thus acres of silviculture treatments would further be reduced, however the amount is dependent on a variety of resource and operational concerns. Voluntary Site-Level Forest Management Guidelines (MFRC 2005) would be implemented to ensure that water quality is maintained, through the use of filter strips. Research on the use of similar filter-strip buffers has shown that they are very effective in reducing sediment and nutrient inputs into streams and lakes that are derived from logging and other ground-disturbing actions (Osborne and Kovacic 1993, Gharabaghi et al. 2000, Aust and Blinn 2004, Croke and Hairsine 2006). Impacts to water quality through soil disturbance and compaction is expected to be minimal since sensitive stands would be harvested during winter, under frozen conditions, or during summer on dry or well-drained soils under the action alternative. Similarly, the aforementioned harvest conditions would minimize potential negative impacts to aquatic organism and their habitats from sedimentation and increased flows resulting from compacted soils. The mitigations and BMPs in Appendix C would also minimize any effects of harvest on water quality, RMZs, streams, lakes, wetlands, and aquatic organisms.

Number wetland crossing of and miles of wetland crossed by temporary roads (indicator 2)

Alternative A

No temporary wetland crossings would occur under this alternative and direct/indirect effects would be Zero.

Alternative B

Alternative B has 1 wetland crossings by temporary roads for a total distance of 147 feet. This wetland is classified as forested wetland. This temp road would be closed post-harvest and allowed to revegetate.

Table 3-14 Wetland Crossings by Temporary Roads Indicator

Activity in Wetland	Alt. A	Alt. B
Number of Wetland Crossings by Temp Roads	0	1

Source: GIS data, 2016.

Summary of Indicator 2

Both alternatives are not expected to have significant impacts to wetlands or water quality. Frozen ground requirements would reduce or eliminate soil exposure, prevent compaction, and vegetation re-growth would occur the following year. Studies on the CNF have shown compaction that limits vegetation growth following winter harvests does not occur on temp roads and skid trails (See soils section). The narrow winter road may require clearing of trees and brush, however the amount of removal of the overall wetland vegetation would remain a small fraction. Such openings in the wetland forest's open canopy are common to most wetland complexes on the forest and would not negatively impact wetland function or ecosystems when properly closed and allowed to revegetate.

3.4.4. Cumulative Effects

Because of the short timeframe of potential effects and narrow spatial frameworks, Indicators 1 and 2 have no other past, concurrent or future actions foreseeable that would contribute effects, thus, no alternative has cumulative effects related to aquatic resources.

3.5. Transportation

3.5.1. Issues

To move the transportation system towards the minimum needed to provide adequate access to National Forest System (NFS) and non-NFS lands is an issue identified in the Forest Plan (D-TS-2) and Purpose and Need for this project.

The indicators are as follows:

Indicators:

- Miles of road with changes to road maintenance levels,
- Miles of system roads open and closed to motorized use
- Number of roads/miles of temporary road construction

3.5.2. Affected Environment

The affected environment includes all existing National Forest System (NFS) roads under Forest Service jurisdiction within the project area. NFS roads are categorized by maintenance level, as well as motorized use designations. Road Maintenance Levels (ML) are on a 5 tier scale, that ranges from “closed, under basic custodial care” (ML1) to “high degree of user comfort for passenger vehicles” (ML5). Motorized use is designated by type of vehicle, and time of year, as identified on a Motor Vehicle Use Map (MVUM). Those stands with proposed activity but no existing transportation system would be accessed via creating temporary roads, and those temporary roads would be removed once use is completed. These temporary roads would not be added or categorized as NFS roads.

Management Direction

In addition to Management Area direction included in Chapter 1, this section focuses on defining a minimum road system that provides safe and affordable access to NFS lands and non-NFS land. (D-TS-1, D-TS-2, O-TS-1) Further direction allows for updates to the MVUM, which identifies those roads, trails, and areas designated for motor vehicle use under 36 CFR 215.51.

3.5.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

The spatial boundary used to evaluate direct, indirect, and cumulative transportation effects is the LLVM Project area as described in Chapter 1, Section 1.2. The direct and indirect effects analysis looks at the existing road system.

Timeframe

The timeframe considered road needs to proposed activity stands to be completed in the next 10 years, as well as the long-term needs of NFS road system within the project area.

Effects by Alternative

A total of 135.1 miles of NFS roads (road segments) are located within the project boundary. Due to the irregular LLVM project boundary, some roads that started outside of the boundary or only had a short segment of the road length in the boundary were not included in the analysis.

Alternative A

Alternative A would maintain existing conditions. Motorized use designations would not be updated to align with current conditions, and roads that no longer needed would remain on the system. There would be no need for additional temporary roads as no activities would occur.

Alternative B

Alternative B would update the databases inventory and the MUVM maps to show existing condition and current management direction.

As shown in Table 3.15, the biggest change is 36.1 miles of existing high clearance vehicle use roads would go into a closed status as ML1 roads. Of these, 20.2 are currently closed to all motorized vehicles, 6.3 miles are actually gated (closed), 8.3 miles were previously listed as decommissioned but are needed to access planned activities, and 1.3 miles were not needed for access to planned activities and could be removed from the system.

Table 3-15 Miles with changes to road maintenance levels by alternative

Maintenance Level (ML)	Description of ML	Alt A	Alt B
1	closed to motorized use, or frozen conditions only	19.8	55.9
2	high clearance vehicle use	90.1	54.6
3	passenger car use	8.3	8.3
4	passenger car use, moderate comfort	16.9	16.3
	Total miles	135.1	135.1

Changes to motorized use designations, based on time of year, or vehicle type are listed in Table 3-16. Ten roads currently open would be “Closed to all motorized use” based on previous decision to decommission, and one because it is gated. These are needed for access to current proposed activities, but could be decommissioned once use is complete.

Further detail of changes by road is located in Appendix B.

Table 3-16 Summary of miles of system roads open and closed to motorized use

Motorized Use	Alt A		Alt B	
	Number of Roads	Miles	Number of Roads	Miles
Closed to All Motor Vehicles	61	56.4	69	62.4
Open to All Motor Vehicles	59	68.7	58	65.5
Open to HLV only	15	10.0	8	7.2
Totals	135	135.1	135	135.1

Table 3-17 Miles of temporary road construction to access Alt B stands

District	Location	Stand	Length (Feet)
03	226	001	750
03	261	026	500
03	181	008	450
03	263	072	600
03	261	088	100
03	272	032	500
03	284	004	300
03	263	055	550
03	261	089	150
03	288	023	1500
03	272	021	150
Total Length			5550 Feet (1.1 miles)

Construction of 11 temporary roads, total length of 1.1 miles would allow access to stands with proposed activity. Temporary roads are removed after all proposed activities are completed. For more information on the location of these temporary roads see the maps in Appendix A.

3.5.4. Cumulative Effects

Past, Present and Future Activities.

Past and present activities in the Southeast EA that required a temporary road did not overlap the temporary roads proposed in the LLVM project. Previous decision documents identified 17.9 miles of roads for decommissioning. Under this analysis, only 9.9 miles of those miles are recommended as removing from system, but 8.6 miles of those are needed for proposed activity and can only be removed from the system once activity is completed. There are no known projects planned in the foreseeable future that overlap this project area. So there are no cumulative effects.

3.5.5. Comparison of how alternatives meet Purpose & Need

Proposed changes provide a transportation system that meets current and future management objectives. Motorized use is designated in areas that can support the use, and roads would be managed to provide access as needed.

Road specific information is available in Appendix B.

3.6. Recreation

3.6.1. Issues

The impacts of harvesting and reforestation within the LL project area will be assessed along trails and identified water access sites. The indicators are as follows:

Indicators:

- Miles of trails in and/or adjacent to stands proposed for treatment (harvesting, slash)
- Number of developed water access sites in/or adjacent to stands proposed for treatment (harvesting, slash).

Access to trails and developed recreation sites affected by the proposed action relate directly to an individual's recreational experience.

3.6.2. Affected Environment

The Long Lake Vegetation Management Project proposes activity on 3,011 acres located in the southeast portion of the Deer River District, the analysis area related to recreation will look at only the proposed stands where vegetation management activity is proposed.

There is one developed boat access site, located on the on Vermillion Lake (Forest Road 2112), within 200 feet of any activity stand.

Of the approximately 71 miles passing through the Chippewa National Forest, there is 2.85 miles of the North Country National Scenic Trail that is located in activity stands. The Soo Line trail runs 21 miles through portions of the Chippewa National Forest. There is less than one mile of the Soo Line snowmobile/ATV trail, a Minnesota Grant-In-Aid trail in or near a proposed activity stand.

Management Objective

Trails are managed to provide a diverse range of opportunities, motorized and non-motorized and in a variety of forest settings. They are managed for their intended purpose and to avoid conflicts. (FP, D-RTL-1,2 ,3 ; D-RMV-1; 2-42)

3.6.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

The spatial framework for this analysis for the developed water access recreation sites is in or within 200 feet of proposed activity stands in this project and for the trails the trail itself. A 200 foot distance for water access would generally allow safe access to a body of water. This

distance defines an area that a forest visitor would not expect to have trees fall into the parking lot, or have harvesting equipment operating that could be disruptive to accessing the boat launch.

Timeframe

The direct, indirect, and cumulative analyses consider activities that have occurred in the past 5 years and are projected to occur in the next 5 years. The last 5 years were used for past effects in order to allow adequate time for planned harvests and reforestation activities to be completed. The 5 year future timeframe is the most reasonable one because, information about future projects are not readily available.

Effects by Alternative

Table 3-18 Summary of effects on Recreation

Indicators	Alternative A	Alternative B
Miles of non-motorized trails	0	2.85
Miles of motorized trails	0	0.72
Number of developed water access sites	0	1

Alternative A

Alternative A would maintain existing conditions and would have no direct or indirect effects.

Alternative B

This alternative would have direct and indirect effects on the developed water access site at Lake Vermillion. This site is located in the north end of two activity units. The proposed harvest prescription is group selection, so it is unlikely that harvest activity would actually occur within the recreation site. However, access to the units for harvesting, site preparation and planting may affect visitor's use to the boat access. This impact would be only occur during these operations and for approximately a five year period until all activities have been completed.

Harvest operations and logging truck traffic could temporarily affect the experience of some recreationists using forest roads or trails. However, given the roaded natural environment of the project area, it is reasonable for visitors to expect forest management activities.

The affect to users of The North Country National Scenic Trail would occur during operations. Users may experience thinning and single tree harvesting with accompanying slash, site preparation or planting activities while using the trail. They may see or hear equipment, see temporary trail disturbance or even slash on the trail during these operations. The operations are temporary and of relatively short time frames.

The Soo Line motorized trail is open to both Off Highway Vehicles (OHV) and snowmobiles during the respective seasons. Three activity units are located parallel to the trail; users may see equipment when proposed activities are in operation. However, users should not

experience any direct or indirect effects on the trail. Operating motorized vehicles and snowmobiles would pass through the activity area relatively quickly. Harvesting equipment would not need to be using the trail system and debris should not be on the trail.

Mitigation measures (Appendix C) would be applied to harvesting and reforestation activities to reduce conflicts with users. Examples of mitigation measures include avoiding use of trails for skidding logs, minimizing crossing of trail.

3.6.4. Cumulative Effects

There have been no harvest activity within the last five years in the proposed activity units and some harvesting taking place in the same area as the proposed action. There is no activity planned in the reasonably foreseeable future within the project proposed activity stands. Implementation of the Proposed Action, combined with other projects, would have no cumulative effect for the recreational experiences.

3.7. Visuals

3.7.1. Issues

Impacts of harvesting on the scenic quality is a secondary issue. The impacts of harvesting and reforestation activities within the LLVM project area will be assessed along trails, road corridors and lake shorelines. Even-aged regeneration harvests, (seed tree and clearcut), may effect visual quality within high and moderate scenic integrity areas. Management actions such as even-aged regeneration harvests will be analyzed because these harvests create temporary open areas. Temporary open areas (harvested areas in this project) are discussed within G-SC-1(FP, 2-45) and primarily describe regeneration harvest expectations.

Uneven aged harvests and thinning leave a quantity of trees that create big tree appearance, reduces edge differentiation, retains canopies over travel routes, and enhances views, creates vistas, and features natural openings. (FP, pg 2-45, DC-SC-2). Because these harvest methods do not create temporary openings and with applied mitigations (Appendix C), the harvesting activities do not affect the scenic resources.

Indicator:

- Acres in stands within high, and moderate scenic integrity objective (SIO) areas proposed for even-aged regeneration harvest

The above was selected as indicators because they relate directly to an individual's visual experience that enhance big-tree appearance, feature natural openings and encourages diversity.

3.7.2. Affected Environment

This analysis is focused on the views in the proposed treatment areas and access routes that occur within stand activity areas. Scenic views are limited to short distances in these forests, a couple hundred feet from where an individual is standing or driving/riding.

There are activity stands located in areas with High and Moderate Scenic Integrity Objectives with in the General Forest Management Area. The proposed activities for these stands include clear cuts, seed tree cut, single tree selection, and commercial thinning.

Management Objective

The Chippewa National Forest Plan (FP) uses the Scenery Management System (SMS) as a tool to manage landscapes for scenic integrity. The SMS classifies landscapes and sets goals and objectives for maintaining, enhancing, restoring, and monitoring scenic integrity in the Forest Plan. It characterizes all land areas into three Scenic Integrity Objectives (SIO's) categories: High, Moderate, and Low. The higher the scenic integrity objective, the more emphasis is placed on maintaining desirable scenery by making management activities less evident. The

Forest Plan contains several items that deal directly or indirectly with the visual resource. A forest-wide goal is to emphasize scenic quality in areas of high interest to people. (FP pg 2-5)

A desired condition of the Forest Plan is that the scenic environment within the Forest ranges from landscapes with high scenic quality, displaying little or no evidence of management activities to landscapes with low scenic quality , where evidence of management activities dominate. (FP, D-SC-1 pg 2-45)

Scenic resources are addressed in the Forest Plan in terms of desired conditions, objectives, standards and guidelines. The desired condition in moderate and high scenic integrity objective areas where vegetation management is visible from travel ways, recreation sites, and lakes with access is addressed within D-SC-2 as follows:

- Enhance views, creates vistas, and feature natural openings;
- Retain canopies over travel routes;
- Encourage vegetative diversity and seasonal color contrast; and
- Enhance big-tree appearance

The desired condition of the General Forest Management Area has a fairly continuous canopy and frequent openings of various sizes up to 1,000 acres. The opening sizes, shapes, and habitat conditions, not necessarily their appearance, mimic the scale, pattern, and ecological function of the most frequently visited and most scenically valued areas. (FP, D-GF-6, pg 3-6)

3.7.3. Direct and Indirect Effects

Timeframe

Direct and indirect affects are considered for a period of zero to five years – the most visually disruptive portions of the project is when harvesting or planting would occur and then the five years for new vegetation to grow and fill in the openings.

Spatial Framework

Direct, indirect and cumulative effects were analyzed within the proposed treatment stands.

Effects by Alternative

Alternative A

Under the No Action alternative, no activities would be implemented. Changes in the landscape that occur from natural events. There would be no effect on the visual resources. There would be zero acres of even-aged harvest in the high or moderate SIO areas.

Alternative B

Table 3-19 Acres of High or Moderate SIO within Alt B even-aged regeneration harvest

Harvest	SIO		
	High	**Moderate**	**Grand Total**
Clearcut	72	496	568
Seed Tree	25	60	85
Grand Total	97	556	653

The visual resource in the activity stands would be minimally and temporarily, impacted with Forest Plan standards and guidelines applied. The harvest methods would help maintain a healthy sustainable forest and would provide visual variety on the landscape in the long term. High and moderate SIO identified in the Forest Plan would be maintained using the identified proposed harvesting methods with Forest Plan standards and guidelines. Visual effects of harvest include temporary openings, ground disturbance created by log landings and skid trails, temporary road use, berms, and presence of dead vegetation (i.e., slash scattered on the ground). After five years, views of temporary openings, slash, landings, temporary roads, and other evidence of management are diminished by new vegetation growth. During timber harvesting and a few years after, the scenic integrity may be affected. In activity stands with a high and moderate scenic integrity objective, mitigation measures would maintain the standard described in the Forest Plan.

3.7.4. Cumulative Effects

Past, recent, future timber harvest projects have not changed and are not intended to change the scenic integrity objective.

Given the existing conditions from past timber harvest, in addition to the Proposed Action, the cumulative effect would be positive, as the landscape would continue to possess a forested character with management being temporarily and minimally evident. With implementation of Forest Plan standards and guidelines, the visual quality objectives would be maintained.

3.8. NNIS

3.8.1. Issues

A secondary issue regarding NNIS is the potential introduction of higher priority non-native invasive species of concern spreading to new sites from already present known locations of invasive plant species and earthworms in the project activity areas.

Indicator

- Relative effects on the known Chippewa National Forest higher priority NNIS plant infestations that occur within or near project activity areas.

3.8.2. Affected Environment

The best approach to focus the analysis for evaluating any potential effects of the project activities contributing to spreading NNIS is to look at the project activity areas and the nearby vicinity within 500 feet of these activities, and their proximity to known higher priority NNIS plant infestations. These locations are likewise appropriate for evaluating the potential spread of NNIS earthworms by project activities due to the lack of a complete inventory of earthworms in the project area. The project activity areas include the individual stands proposed for treatments, temporary road locations or other areas of ground disturbance.

The Chippewa National Forest (CNF) uses a tiered list of priority non-native invasive species based on their potential ecological risk with ratings of high, medium/high, medium, and low (Larson 2013). Correspondingly, the primary species of concern are those species' populations rated as high or medium/high, which pose the greatest threat to natural communities, and may spread because of project activities.

Of the five plants considered as a priority high ecological risk species on the Chippewa, common buckthorn (*Rhamnus cathartica*) is the only species with any known infestation recorded within the LLVM project area. Two of the four known sites occurs adjacent to stands proposed for harvest. The other two known sites are well away from any of the proposed project activities.

Two plants have a Forest priority of medium/high, but neither of these species' has a known occurrence in the project LLVM project area. Therefore, other discussion includes selected medium priority species where present, for those plants that may have some potential for project activities possibly affecting these documented infestations or for existing populations spreading to project areas. Of these medium risk species' potentially affected by project activities, wild parsnip (*Pastinaca sativa*) is the only invasive plant with known infestations in the LLVM project area. It has two known sites that occur on either side of a red pine stand proposed for thinning. The third known site in the project area does not occur anywhere close to the proposed activities.

The Non-native Invasive Species Specialist Report (Project Record) provides further discussion and analysis to those other terrestrial invasive plants determined as a low risk where present and potentially affected by project activities, as appropriate. Regarding applicable Forest low risk species', Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), field bindweed (*Convolvulus arvensis*), yellow sweetclover (*Melilotus officinalis*), reed canarygrass (*Phalaris arundinacea*), and common tansy (*Tanacetum vulgare*) are those invasive plants with any known locations near the proposed project activities.

Non-native Invasive Species – Earthworms

Since the 1980s, forest observers have noticed the presence of invasive exotic earthworms on the Chippewa National Forest. There are no native earthworms in the post-glacial landscape of northern Minnesota. Earthworms have profound effects on ecosystems, particularly on soil structure, with potential effects on virtually all parts of the ecosystem, biotic and abiotic. Effects include threats to population viability of sensitive plant species and potential effects on forest productivity (GLEW 2013).

Introduction of earthworms into northern Minnesota forests preceded knowledge of the problem by decades. Before the discovery of the problem, invasion by earthworms had occurred over much of the Chippewa.

Earthworms are widespread throughout the Chippewa, and they most likely occur within or adjacent to some stands and other activity areas in the project area. Field employees trained in spotting earthworm infestation have reported that most stands dominated by deciduous trees have some degree of earthworm infestation. Reports of the degree of earthworm infestation are highly variable within stands and between stands.

Management Direction

The action alternative is consistent with Forest Service Manual directives. Appropriate regulations include Forest Service Manual 2900 (USDA FS 2011). Any future NNIS plant control activities done in the project area would tier to and adhere to those conditions in the Non-native Invasive Plant Management Environmental Assessment (NNIP EA 2011). These probable related actions would meet the intent of other Federal acts and authorities relevant to invasive species such as Executive Order 13112 (1999) and the Forest Service National Strategy and Implementation Plan for Invasive Species Management (USDA FS 2004d).

All management activities in this project comply with relevant Chippewa National Forest Plan Objectives and Guidelines for NNIS: O-WL-38, O-WL-39, and G-WL-25 (USDA FS 2004a).

3.8.3. Direct and Indirect Effects

The proposed activities would create a mosaic condition of disturbed and altered vegetation or new openings that may facilitate the spread of NNIS plants, depending on where these areas are in proximity to current infestations.

The proposed activities that create the greatest amount of ground disturbance have a likewise greater potential for spreading NNIS plants, depending on where they occur in proximity to infestations. Movement of soil on equipment could also contribute to the spread of NNIS earthworms. This would include commercial harvesting by using techniques such as clearcutting, then seed tree or shelterwood cuts, and to a lesser degree group selection and single tree selection harvests. Temporary road construction is another activity that has greater potential for spreading NNIS as compared other lesser ground disturbing activities such as mechanical site prep and maintenance of permanent openings for wildlife.

The analysis will focus on where project-related disturbance occurs, its level of intensity, and the size or extent of the potentially affected infestation as the means for using the best science available to assess the possible spread of invasive plants for those known sites in close proximity to activities in the proposed action. As indicated, the focal species' include the higher Forest-priority NNIS plants with known infestations in the LLVM project area such as the high ecological risk species common buckthorn, and then the medium risk species of wild parsnip.

Scope of the Analysis

Spatial Framework

The principal spatial boundary used to evaluate direct and indirect effects are the activity areas consisting of the proposed commercial harvest activities, site preparation activities, new temporary road construction, and any other associated ground-disturbance included in the action alternative. In addition, analyses would consider possible indirect effects regarding the potential spread of NNIS plants to adjacent lands for a distance of up to 500 feet beyond the proposed activity areas in those locations proposed for ground disturbing activities.

Timeframe

Generally, for most NNIS plants known within the project area, their seed remains viable in the soil from one to six years. For other species such as Canada thistle, their seed may lie dormant and remain viable for 15 to 20 years. Considering these factors, a 15 to 20-year timeframe is appropriate for NNIS plants, as well. For NNIS earthworms, their effects may be longer, and addition research is required to make any long-term assessments.

Effects by Alternative

The Long Lake VMP does not include any NNIS plant control activities. All future invasive plant control treatments in the project area would tier to and completed according to the Non-native

Invasive Plant Management Environmental Assessment (NNIP EA 2011). These NNIS treatments would potentially occur in the project area, where appropriate and feasible, regardless of the decision to implement Alternative A or B.

Alternative A

Active non-native invasive plant colonization and establishment as influenced by ongoing activities other than the proposed Long Lake VMP would continue at current rates within the project area.

The primary change to the rate of spread of NNIS plants on NFS lands would depend upon existing Forest projects that overlap the project area and any other future invasive plant control done according to the Non-native Invasive Plant Management EA within or adjacent to the project (NNIP EA 2011). The rate of spread under the no action alternative would be less in the short-term because it would not increase ground disturbance. Similarly, the spread of invasive exotic earthworms would likewise continue at current levels because of fewer disturbances, and a reduced probability of movement of contaminated soil.

Due to the anticipated spread of the emerald ash borer (EAB), which kills all ash trees greater than 1-inch diameter in size, this future action would result in removing existing ash forest habitat in selected areas of the project areas. By creating conditions that are more open, it may contribute to a faster spread of some NNIS plants in some locations. In ash stands water tolerant invasive species such as reed canarygrass, if they do occur near nearby, may colonize the changing habitat.

Alternative B

The primary indicator used in the following analyses are how the proposed project activities would potentially contribute to further spread of already present higher Forest-priority NNIS plants. These plants include the high and medium ecological risk species' consisting of common buckthorn and wild parsnip, respectively.

Concerning the high ecological risk invasive species, common buckthorn, it has four known infestations within the Long Lake VMP area. Two of its known infestations are not anywhere close to the proposed activities in the project area. One known site of common buckthorn is about 175 feet away from a proposed activity area. The nearby stand consists of black ash/American elm/red maple. The proposed action is to conduct a group selection cut to improve riparian habitat. The common buckthorn infestation is extremely small, with the infested area consisting of less than 10 square feet, and represents a few small shrubs. Because the infestation is so small and the distance it occurs from the proposed activity area, the project activities has a relatively low likelihood for contributing to further spread of the infestation.

The other common buckthorn infestation is likewise extremely small consisting of a small clump of shrubs, also recorded as the same size. This site is on the boundary of a proposed red pine

thinning and an aspen seed tree cut in Alternative B. Depending on the exact location of these invasive shrubs in correlation to the proposed harvest and associated ground disturbance, these activities could contribute to their spread or indirectly provide new areas for colonization, especially if they actually occur next to area of the seed tree harvest that creates ground that is more open versus occurring in the red pine thinning.

Considering the small size of these above-mentioned two common buckthorn infestations located near project activity areas, it is likely that removal of all common buckthorn could occur prior to implementation of these proposed activities.

For the medium risk priority invasive species, wild parsnip, it has three known infestations in the Long Lake VMP area. Two very small known infestations occur on either side of a proposed activity area in Alternative B. One wild parsnip site of about 150 square feet is across county road 52 approximately 75 feet away to the east from a proposed red pine thinning in Alternative B. The second wild parsnip site is less than half the size of the other site and is approximately 160 feet way to the west from the same red pine thinning. Due to the small sizes of these infestations, thinning that creates relatively less open conditions versus other harvest methods, and because the infestations occur beyond the harvest boundaries, these activities have a low likelihood for contributing to spreading of wild parsnip by creating new areas for their colonization from these known sites. The remaining known infestations is well away from any proposed activities in Alternative B.

By properly implementing project level design criteria and appropriate best management practices (BMPs), the Forest anticipates a low to moderate risk for new introductions and possible spread of NNIS plants associated with the proposed project activities. Because NNIS plant infestations occur throughout the project areas, there is potential for disturbance from logging activities and associated temporary road construction that indirectly could spread non-native invasive plants to some degree or provide new areas for them to colonize by the proposed action alternative. Our current inventories show that NNIS plant populations exist mostly along roads either immediately adjacent to harvest areas or short distances away from the stands. These areas are the locales with the greatest likelihood for project activities indirectly contributing to the spread of invasive plants. As indicated, some very small infestations occur in proposed activity areas where project activities could likewise contribute to spreading of higher Forest-priority non-native invasive plants.

Again, a similar analysis of the proposed action and comparison to the no action alternative is appropriate in determining likely effects by exotic invasive earthworms and their possible spread due to increased movement of contaminated soil by the proposed project activities. Thus, the likelihood for earthworm expansion is greater in those areas where the proposed project activities would create more ground disturbance. As indicated, field personnel have observed earthworms across the project area, but Forest has not yet completed

a comprehensive project level inventory of invasive earthworms. Reports of earthworm infestations are highly variable across portions of the project area, including those areas within or near proposed activity areas.

3.8.4. Cumulative Effects

The cumulative effects spatial framework and timeframe is the same as described in the direct and indirect effects section.

Past, Present and Future Activities

By diligent and proper application of invasive plant control treatment using an integrated pest management process in appropriate areas where feasible and necessary, we anticipate a further reduction for the possible spread of NNIS plants through implementation of the Non-native Invasive Plant Management Environmental Assessment (NNIP EA 2011). These probable treatments would occur across the project area under both Alternatives A or B.

Alternative A

The cumulative effect of no action would be to allow these alien and invasive species to spread, largely unabated in most locations across the Long Lake VMP area. Because this alternative does not propose any new ground disturbance the spread of NNIS would occur because of existing infestations already in the project area, and their movement would continue at current rates. The rate of spread would be less than the proposed action. Risks to rates of NNIS plant expansion under this alternative would depend upon human disturbances and available funding to mitigate effects caused by those actions or activities not associated with the Long Lake VMP. Other Forest projects or actions done on other ownerships may provide some limited indirect NNIS plant control in selected locales of the project area, but the cumulative effect would result in further spread of invasive plants.

Alternative B

Non-native invasive plants and exotic invasive earthworms occur throughout the cumulative effects area on national forest system (NFS) lands, as well as adjacent county, state, private, or other ownership. For many species, establishment of these populations occurred prior to the existence of the Chippewa National Forest or NFS ownership.

Invasive plants and invasive earthworms would continue to invade and spread across the landscape. The cumulative effect of implementing the action alternative combined with ongoing human and natural disturbances is the continuing spread of these species. The actions and processes differ in various locations in the project area and across the Forest, so the rate of spread would also differ. Vehicles, equipment, wind, rain, animals, and humans have the potential to carry invasive plant seed or contaminated soil with invasive earthworm cases to new and currently uninfested areas. This spread really has no limit other than the susceptibility

of the receiving habitats. Given the inherent susceptibility of some habitats across the Forest and within the project area, spread is likely.

At the same time, Forest-wide NNIS plant management and site-specific project level control activities are increasing, which may result in reduced invasive plant populations. Private landowners are sporadically taking action against NNIS plants on their lands, with some actions possibly occurring within the project area. Site-specific design criteria prevention measures like equipment cleaning identified for the Long Lake VMP would also help in controlling the problem.

Other Decisions made under previous EAs, some of which are not yet fully implemented, may exist near the activity areas. As implementation of these other EAs progress, these actions could contribute to further spread of NNIS where they occur in close proximity to the Long Lake VMP. These activities may include timber harvest and associated activities in a number of forested stands. Other ongoing activities such as road and trail maintenance, if they occur near the project area and activity areas could contribute to NNIS spread, as well.

Refer to the prior Vegetation 3.1.4 cumulative effects section for detailed information of past, present, and future activities that could contribute to the spreading of NNIS.

3.9. Soils

3.9.1. Issues

Effects of proposed activities on soils are disclosed in this section as a secondary issue.

Ground disturbing activities included in the LLVM Project may negatively impact soils where such activities are proposed within the project area.

Indicator

The indicator for soil disturbance within the project area is expressed as the potential risk for disturbance from proposed ground disturbing activities including timber harvest and site preparation, permanent opening maintenance (mowing), prescribed fire and temporary road construction, and is based on the inherent soil characteristics where the activities would occur.

- A low, moderate, or high risk rating for soil properties will be quantified by treatment area acres
- Suitability rating will be quantified for temporary road construction locations

3.9.2. Affected Environment

The classification system used for the LLVM Project area is part of the Terrestrial Ecological Unit Inventory (TEUI). The TEUI is a national framework used to classify and map ecological units. Ecological units are associations of climate, physiography, surficial material, bedrock geology, soil, and vegetation (Winthers, et al., 2005).

Within the TEUI, Land Type Phase (LTP) units are the most site-specific and are applicable for analysis at the project level (Cleland, et al., 1997). LTPs have three integrated components; landform, soils, and vegetation. LTPs define similar ecological conditions relating to soil texture, moisture, nutrients, drainage class, slope, and other related characteristics; and can be used to provide site capability information, equipment operating periods, and more.

Information outlining brief descriptions and limitations for all of the LTPs that occur within the project area that may affect, or be affected by, the proposed activities can be found in the project record. The LTPs listed there are included because they underlie the treatment areas and temporary road locations proposed in this project. Others are included because slight differences in mapping overlay error indicate they are presently part of a proposed activity stand.

Management Objectives

The Forest Service Manual regarding Soil Management states that soils should be managed “to sustain ecological processes and function so that desired ecosystem services are provided in

perpetuity" (USDA FS 2012). In addition to following that direction, this project is intended to be consistent with Soil Resource protections included in the Forest Plan (pages 2-11 – 2-17).

3.9.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

Impacts to soils are inherently site specific. Direct, indirect, and cumulative effects to soils were analyzed for where mechanical ground disturbing activities are proposed within the project area. This includes stands proposed for harvest, including site preparation and re-entry activities, wildlife projects (mowing), prescribed fire, and areas of temporary road construction.

Timeframe

The time necessary for soils to recover from disturbance varies depending on disturbance intensity and inherent soil characteristics. Recovery in areas of erosion may occur in one or more growing seasons (Grigal & Bates 1992), while recovery from other types of disturbance may take more time (Page-Dumroese, et al. 2006). Investigations for estimated time for recovery of soil bulk density in surface horizons have ranged from approximately 1 to 18 years (National Council for Air and Stream Improvement, Inc., 2004, pp. 40 and 42), thus, effects to the soil resource may potentially last for 18 years beyond project implementation.

Effects by Alternative

Alternative A

Soils would not be at risk for disturbance because no mechanical ground disturbing activities or prescribed fire activities would occur, resulting in no direct or indirect effects. Impacts to the soil from any previous activity would remain on the landscape and continue to be naturally mitigated. Natural disturbance events and soil formation processes, including biomass accumulation and other natural inputs, would continue to naturally occur. As no further ground disturbance would occur under Alternative A however, there would be no cumulative impacts to the soil resource.

Alternative B

Vegetation management, as well as other ground disturbing activities, has the potential to negatively impact the soil resource, although the application of mitigation measures would be applied to aid in minimizing negative effects.

Risk determinations were analyzed in terms of compaction and nutrient loss potential. Generally, ratings for compaction risk evaluate the off-road transport or harvest of wood products by ground based wheeled or tracked equipment, and are based on soil properties and qualities that would be affected by such activities. Nutrient ratings are based on soil properties and site fertility for each LTP. In addition, Natural Resource Conservation Service (NRCS) risk

ratings were used to determine soil displacement risk and are based on slope delineation. In general, ratings range from low to moderate to high risk. As the risk ratings increase, the level of restrictions or mitigations that would need to be applied to protect the soil resource would also increase. For example, a soil with a high compaction risk may need to be operated under winter frozen conditions in order to adequately protect the soil resource from compaction, while a soil with a low compaction risk may have a less restrictive operating season requirement (i.e. allowing dry summer and winter operations).

Table 3-20 summarizes the potential soil disturbance risk ratings for the Alternative B proposed treatment areas in the LLVM project. The ratings noted are based on the most limiting condition of the soil, and do not factor in the guidelines put in place to protect the soil resource during the proposed harvest activities. The numbers displayed are based on the maximum anticipated acreage; actual acres of harvest may be less once mitigation measures are applied. For the purpose of this analysis, all stands with proposed ground disturbing activities, including timber harvest and site preparation, mowing for wildlife openings and prescribed fire were included. Any stands proposed for non-commercial activities would have fewer soil impacts than what are shown in this report, as they would not be susceptible to risk from compaction or displacement due to ground-based logging or other types of heavy equipment use.

Table 3-20[1]: Alternative B Acres and Percentage of Treatment Area at Risk for Soil Disturbance[2]
Summary of effects on Recreation

	Compaction Risk			Soil Displacement Risk			Nutrient Loss Risk		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Harvest Areas (Includes Site Prep.) Acres:	465	2,655	246	3,244	138	0	0	2,711	655
Harvest Areas (Includes Site Prep.) Percent of Total Treatment Area:	14%	79%	7%	96%	4%	0%	0%	81%	19%
Wildlife Mowing Acres:	1	25	8	34	0	0	0	30	3
Wildlife Mowing Percent of Total Mowing Area:	2%	74%	24%	100%	0%	0%	0%	90%	10%
Prescribed Fire Stands Acres:	0	5	1	7	0	0	0	7	0
Prescribed Fire Percent of Total RX Area:	0%	80%	20%	100%	0%	0%	0%	100%	0%

Site preparation activities are proposed for approximately 600 acres of the proposed treatment stands within this project area. In addition to these acres, some of the aspen clearcut areas may be subject to mechanical site preparation activities under the concept of adaptive management. These activities would result in intentional soil disturbance, and may increase

[1] Total acreage discrepancies between the NRCS and Chippewa National Forest data sets are due to spatial mapping overlay differences for water features.

[2] The acres and percentage of area at risk does not include the application of project mitigation measures.

compaction and displacement risks due to a short return interval, additional passes by heavy equipment, as well as bare soil exposure. Seasonal timing of site preparation activities is important, and should be arranged so as to avoid these activities when soils are wet in order to protect soil structure and decrease the displacement and subsequent nutrient loss risks in these areas.

Within the general treatment area, operational restrictions outlined in Appendix C would minimize the area and intensity of impacts to soils by heavy equipment. Studies on Great Lakes National Forests have shown that winter harvest, when soils are frozen, effectively minimizes soil disturbance and impacts on site productivity for a range of various soil types (Range & Gries, 2008; Voldseth, 2011). Displacement due to erosion is not very likely in the treatment areas as the stands are on relatively flat terrain. In all cases, implementation of mitigation measures and State Best Management Practices (BMPs) outlined in the Voluntary Site-level Forest Management Guidelines (MFRC, 2013) would help to minimize soil impacts and maintain productive soil properties within the project area.

Harvesting trees and removing the merchantable bole and bark would remove some nutrients from the treatment area. However, less than a third of the nutrients are immobilized in the merchantable stem wood and bark. The remainder returns to the soil reserve in foliage, branches, fruits, and roots (Pritchett & Fisher 1987, p. 427). Should biomass harvest occur, State BMPs addressing soil productivity during forest biomass harvesting would apply and would aid in maintaining nutrients on site. Nutrient losses by conventional harvests from even the most productive sites are relatively small on an annual basis. Such losses can likely be replaced by soil weathering and natural inputs, except for some particularly infertile soils. Most soils can replace the nutrients in the harvested timber without a long-term decrease in productivity (Pritchett & Fisher 1987, p. 427). Forest Plan Limitations have been specifically developed to minimize the removal of woody material from treatment stands on nutrient poor sites. In addition, productivity may be impacted if erosion, compaction, rutting, or displacement should occur; however, the application of project mitigations and State BMPs would be applied to minimize such effects.

Permanent opening maintenance being proposed with this project has the potential to cause soil disturbance. Mitigations regarding seasonal mowing restrictions and operational restrictions (i.e. avoiding steep slopes with ground-based equipment) are included as part of this project and would aid in minimizing impacts to the soil resource. Seventy-six percent of the proposed treatment acres are located on moderately well drained soils or better (phase groups 9, 10 & 11, Forest Plan Table G-WS-8a), which are moderately or well suited for operability. The remaining treatment acres would be restricted with mitigations previously mentioned in order to minimize soil impacts.

Pile burning is proposed for six acres. Depending on how much soil heating occurs, pile burning can have negative impacts on the soil resource by altering soil physical, chemical, and biological properties. However, not all pile burns result in extreme temperatures or soil damage; the severity of an individual burn depends on the complexity of fuel, soil, and climatic conditions at the time of ignition (Busse, et al. 2014, p. 53). Impacts to the soil can be influenced by factors such as pile condition, pile size and pile spacing. Piles containing a mix of well-cured fuel sizes, as opposed to those that contain a high percentage of large wood, will generally not produce excessive soil temperatures (Busse, et al. 2014, p. 52). Regarding pile spacing, soil heating may be less of a concern if it occurs beneath widely spaced piles that occupy a smaller percentage of the total land surface (Busse, et al. 2014, p. 59). For smaller burn piles, there is evidence that some soil properties can recover to a level similar to that of the surrounding forest within two years (Miller, 2015). Although some post-burn changes in soil properties can be expected (Busse, et al. 2014, p. 52), pile condition and spacing considerations for minimal soil effects would be incorporated into the pile burning proposed with this project.

Soil compaction, erosion and displacement are likely to be greatest in portions of treatment areas devoted to infrastructure (i.e. temporary roads, skid trails, log landings). Alternative B includes approximately one-mile of temporary road construction. Temporary road construction would result in the temporary removal of land from productive forest. Impacts to the soil resource from temporary road construction and other activity area infrastructure would be minimized through the application of project mitigation measures, BMPs, and contract specifications. Minnesota Department of Natural Resources monitoring of harvest areas on Federal ownership has shown that infrastructure has been below the recommended guidelines for forest management in Minnesota (Dahlman & Phillips 2004; Dahlman & Rossman 2010; USDA FS 2010, p. 6; USDA FS 2013, p. 8-4).

Table 3-21 summarizes the suitability information for the locations of the temporary road construction proposed as part of this project. The ratings are based on slope and other site and soil characteristics to determine the suitability for using the natural soil surface for roads (Soil Survey Staff). A rating of well suited indicates a favorable site with no limitations needed, while a poorly suited rating indicates an unfavorable site with high limitations to overcome. As before, ratings given do not factor in requirements and guidelines put in place to minimize impacts to the soil resource during the proposed project activities.

Table 3-21 Alternative B Suitability for Roads (Natural Surface) Summary[3]

Rating	Miles	Percent of Total Temporary Road Construction Miles
Well Suited	0.06	5.8%
Moderately Suited	1.05	94.2%
Poorly Suited	0.00	0%

Temporary roads would be located in areas having the least amount of impact to the soil and water resources. Though avoidance of wetland and stream crossings is the best option, if avoidance is not feasible, minimizing and mitigating impacts to those resources becomes very important. There are many options for crossing such features temporarily (Blinn 1998). In poorly suited locations, temporary construction of winter standard roads on frozen ground is one example of a way to minimize impacts in such areas (Grigal, D.F. 2000, p. 171). When no longer being used for the proposed project activities, any temporary roads created would be decommissioned using project mitigation measures and applicable timber sale contract provisions and returned to productive forest land. Natural soil processes such as swelling and shrinking due to moisture changes and movement of soil particles by freezing and thawing (including frost heave) and biological activity tend to restore soil physical properties (NCASI 2004, p. 38).

Incorporation of project mitigation measures, Minnesota Forest Management Guidelines, Forest Plan Standards and Guidelines and other practices and standards previously mentioned have been successfully employed on similar past activities across the CNF and have proven to be effective (USDA FS 2010, p. 6; USDA FS 2013, p. 8-3, 8-4). Past monitoring of harvest areas indicates that Chippewa National Forest management activities have had little impact on soil productivity (USDA FS 2013, p. 8-3, 8-4).

Given the effects of the impacts associated with the implementation of the Proposed Action (including the application of project mitigation measures), the degree, duration, distribution, and extent of the soil disturbance that would be expected from the proposed activities would result in minor, negative effects to the soil resource.

3.9.4. Cumulative Effects

Past, Present and Future Activities

Cumulative effects are considered 18 years prior to and beyond the implementation timeframe because investigations for estimated time for recovery of soil bulk density in surface horizons have ranged from approximately 1 to 18 years (NCASI 2004, pp 40 & 42). Because soil effects are inherently site-specific, spatial bounds for cumulative effects are the same as those described for direct and indirect effects.

[3] The suitability rating does not include the application of project mitigation measures.

Effects to the soil resource from historical land uses have dealt primarily with exploitative logging practices, associated activities, and uncontrolled fires which occurred during the late 1800s and early 1900s. These activities generally occurred without consideration for impacts to the land and did not include restoration plans once the activities were complete. The resulting impacts to the soil resource varied depending on the ecological characteristics associated with the different land types, thus some evidence may still be visible in the present day.

In a more recent context, some of the proposed treatment stands overlap spatially with areas that were mechanically harvested or treated (site preparation activities) between the project implementation date and 1999 (incorporating 18 years prior to implementation). Negative cumulative effects are possible in these areas as they may not have had adequate time to recover from any compaction that could have occurred during those entries.

Using the best available data, past ground disturbing activities which took place between 1999 and the present were incorporated into this cumulative effects analysis. These activities include harvest and mechanical site preparation activities. Other ground disturbing activities such as wildlife opening maintenance work (mowing) and prescribed fire activities were included but did not overlap with the treatment areas proposed in the LLVM project, thus they were dropped from further consideration. Multiple past entries (i.e. harvest followed by another entry for mechanical site preparation) are accounted for as separate entries in the numbers below.

Table 3-22 Operability Risk Ratings for Re-entry Areas within the Long Lake Vegetation Management Project Proposed Treatment Stands

Operability Risk	Acres	% of Re-Entry Area	% of Proposed Treatments at the Project-Wide Scale
Poorly Suited	46	4%	1.3%
Moderately Suited	816	77%	23.8%
Well Suited	193	18%	5.6%
Not Rated	1	0%	0%
Total:	1,055	100%	30.8%

As shown in Table 3-22, stands that may be scheduled for re-entry are located on soils that are dominantly moderately suited or well suited for operability, and thus have a lower potential for having past negative impacts. Areas that are poorly suited or not rated would likely not be included in harvest operations due to slope and operability restrictions, or they would be more heavily mitigated as a way of allowing for harvest where acceptable while still minimizing soil impacts. The soil qualities indicative of such operability risk ratings shown coupled with the operational mitigations and contract specifications, natural recovery rates, and prudent sale administration oversight should allow for sustained soil quality with minimal long term cumulative effects.

The proposed harvest areas that do not overlap spatially with known areas harvest or treated between the project implementation date and 1999 should have had adequate time to recover from any compaction that could have occurred during any previous harvest entries.

There are no activities currently occurring, and there are no reasonably foreseeable future actions within the proposed treatment areas. Access routes for activities on adjacent lands may overlap with the routes for the LLVM project. However, system roads are a dedicated use and would have no further soil effects. Temporary roads are short-term in nature. Although there may be some instances where temporary roads are located on previously decommissioned or previously used temporary roads, or where there is evidence of old, existing roadbeds or railroad grades. In such instances, soils may not have had adequate time to recover from their previous use, potentially compounding any previous soil disturbance (i.e. compaction), and prolonging the ability of the soil resource in those areas to recover.

Given the effects of the past, present and reasonably foreseeable future, the degree, duration, distribution, and extent of the soil disturbance that would be expected from the proposed activities would result in minor, negative effects to the soil resource overall.

3.10. Fuels

3.10.1. Issues

One secondary issue is the effect to fire regime condition class in the Long LLVM project area from proposed actions. An additional secondary issue for this project is how vegetation management affects fuels composition and arrangement in the project area.

Indicator:

- Acres of timber harvest.

3.10.2. Affected Environment

Fire Regime and Condition Class and Fire Regime classification are useful tools that help describe fuel conditions on the landscape. Fire Regime condition classes describe a departure from normal for the ecosystem in terms of historical fire occurrence and how this departure has altered the species composition, structural stage, stand age, and canopy closure. Condition Class I indicates the fire regimes are within or near historic range, while Condition Class III means fire regimes have been extremely altered from their historic range.

The Fire Regime of III and V is located within this landtype and within this project area. The Fire Regime of III burned on a 35-100+ year frequency and mixed severity. The Fire Regime of V burned on a 200+ year frequency and high (stand replacement) severity.

The proposed treatments are occurring primarily in the areas categorized as Condition Class's II and Fire Regimes of III and V. Condition Class II occurs when vegetation is denser because several cycles of fire have been missed. Post timber harvest slash would increase the fuel loading some. However mechanical treatment such as timber harvesting does mimic fire by thinning or reducing the number of stems per acre.

Human Values and Wildfire Risk

The Long Lake Vegetation Management project is in an area dominated by mixed hardwoods and aspen types. Hardwood and aspen forests are not considered a major hazardous fuel type.

The Long Lake Vegetation Management Project is also located in an area of low occurrence of wildfires. This findings is based from our 20 year wildfire history analysis of the Chippewa National Forest. Based on these findings there are no hazard fuels projects outside of the planned timber harvests.

3.10.3. Direct and Indirect Effects

Scope of Analysis

The proposed timber harvest on NFS lands within the project boundary.

Management Direction

The desired condition described in the 2004 Forest Plan is to restore or maintain the forest to a condition that minimizes the effects of a wildfire (FP, O-ID-3, p. 2-18).

Alternative A (No Action Alternative)

Under the No Action Alternative, no management activity would allow the build-up of fuels, increase the continuity between hazardous fuel sources, and would allow stand to continue progression toward Fire Regime Condition Class III. Also by not thinning red pine stands to increase the spacing of the canopy could also contribute to the potential of low intensity ground fuels developing into crown fires which has the potential to cause catastrophic fires.

Alternative B

While the risk of wildfire in this area is low due to historic low occurrences of fire and less receptive fuels**,** the Proposed Action Alternative B of 3011 acres of timber harvest would be beneficial to improving the fire regime condition class. Timber harvest in Alternative B reduces or maintains current fuel loading and decreases fuel continuity. The thinning of red pine to increase tree spacing would also decrease the potential for catastrophic wildfires that could be started by low intensity ground fuels developing into crown fires. Overall Alternative B would more proposed action stands toward condition class 1.

3.10.4. Cumulative Effects

The actions presented in the LLVM project are likely to have minor cumulative affects to past, present and reasonably foreseeable future activities that benefit condition class. Past effects of vegetation management activities that have been completed within 8-10 years ago would add to the proposed harvest benefits to condition class. The 66 acres of present activity planned but not accomplished are within the project boundary. There is no activity planned in the reasonably foreseeable future with in this project area. The combined cumulative effects of those past, present and foreseeable future projects in this project area would move the condition class towards a more desired level.

3.11. Economics

For this analysis, the Quick Silver Forestry Investment Analysis Program was used to evaluate commercial timber harvest and related projects. The program allows for a relative comparison of the alternatives. The program incorporates the projected revenue from stumpage as well as costs associated with sale preparation, sale administration, site preparation, reforestation and other activities. Other than stumpage, there are no requirements to monetize non-market benefits and a lack of widely accepted standards for doing so. The project record contains detailed information about this economic analysis.

3.11.1. Issues

There were no key issues as a result of scoping this project. Effects to economics resources are disclosed in this section as a secondary issue.

3.11.2. Affected Environment

The affected environment for this project is the local economy of the community around the Chippewa National Forest and Cass County where this project would occur.

Management Objective

The National Environmental Policy Act regulations 40 CFR 1508.8(b) require that all analyses consider economic factors. Forest Service Manual 1970.6 provides nonbinding guidance as to the scope of economic analysis. It states “the responsible line officer determines the scope, appropriate level, and complexity of economic and social evaluations to meet overall objectives and policy”. NEPA does not require a quantitative, monetary analysis of non-commodity resources.

According to NFMA (16 USC 1604 (g)), management prescriptions that involve vegetative manipulation of tree cover will not be chosen primarily because they will give the greatest dollar return or the greatest output of timber, although these factors shall be considered.

This document is tiered to the Forest Plan FEIS and FEIS Appendix J, Response to Public Comments, pages 426-450. An economic analysis was included in the FEIS for the Forest (USDA FS 2004b, 3.9-1 through 3.9-25).

3.11.3. Direct and Indirect Effects

Scope of the Analysis

Spatial Framework

The affected environment is the ash stands with proposed activity. This amounts to 3,011 acres harvest with reforestation and 6 acres of pile burning.

Timeframe

The analysis with Quick Silver Forestry Investment Analysis Program accounts for five years to implement all activities.

Effects by Alternative

Table 3-23 Economic results from QuickSilver

Factor	Alt. A	Alt.B
Estimated volume of timber harvested (CCF)	0	41,300
Present Value of Benefits	0	$2,400,996.53
Present Value Costs of associated sale preparation, administration, reforestation activities	0	-$1,079,053.78
Present Net Value	0	$1,321,942.75
Benefit/Cost Ratio	N/A	2.2

Alternative A

Alternative A has no dollar costs or benefits; therefore, there is no economic analysis. It is known that there are costs (and benefits) associated with not actively managing the land, e.g., fire protection, but these are not part of this economic analysis. There are no economic benefits to local workers from jobs created by treatments, e.g., logging, tree planting.

Alternative B

The Alternative B benefit/cost ratio is shown in (Table 3-23). The purpose and need of this project is not for economic reasons and is solely to prepare the forest for EAB by keeping ash stands diverse and forested. The commercial thinning of 1,146 acres of red pine in this project results in providing a higher present net benefit than the present net costs. Alternative B cuts 3,011 acres which would bring economic benefits to local workers.

It is recognized that wood products industry plays an important role in our local economies with regard to providing jobs, sources of income, and sustaining mills. This was discussed in the Forest Final Environmental Impact Statement (USDA 2004b, section 3.9) and still holds true today. Because of the regional nature of the wood products supply and demand, the time to prep and sell sales, and the length of timber sale contracts, it is difficult to analyze the effects of a specific project on the local economy in terms of jobs and the effects on local mills.

3.12. Other

3.12.1. Tribal Gathering and Traditional Uses

One of the Forest-wide goals (USDA FS 2004a, P. 2-5) is to contribute to the efforts to sustain the American Indian way of life. This includes gathering of natural resources for tribal use. While this project is entirely outside the LLBO reservation boundary there may be use of the area for tribal and traditional gathering by communities. With one purpose and need in this project for fostering native vegetation community development during harvest, site preparation, reforestation and stand improvement activities (Purpose and Need , Section 1.3) the gathers should continue to find native species in the future.

For American Indian traditional users of natural resources - especially for the Leech Lake Band of Ojibwe (LLBO) - practically all natural resources of the Chippewa National Forest, are resources that have been and would continue to be utilized for food, clothing, shelter, utensils, transportation, medicinal, and ceremonial purposes.

The Long Lake Vegetation Management Project area is outside but in close proximity to the Leech Lake Indian Reservation. There is a portion of the project area within the Areas of High Interest (USDA FS 2004a, Figure TR-1, page 2-37). Native American communities in the vicinity are Deer River, and Ball Club. Tribal members may use the project area for hunting, recreation and gathering activities. The Forest Plan delineates Areas of High Interest to the Leech Lake Band of Ojibwe (Forest Plan, Figure TR-1, page 2-37).

The Long Lake Vegetation Management Project scoping letter was mailed to the LLBO Division of Resource Management (DRM). Prior to the mailing the District Ranger called the LLBO DRM contact asking if they wanted a meeting with the IDT on this project. The LLBO DRM contact requested no meeting at this time and asked that we just send the scoping package. The scoping package was also sent to the Ball Club Local Indian Council, no comments were received.

3.12.2. Heritage Resources

The general area contains numerous heritage resource sites resulting from human settlement and other activities over the last 10,000 years. These include camping sites, villages, special activity areas such as wild rice processing sites, cemeteries, and sites of spiritual and traditional use. There is also evidence of a wide range of later historic activities ranging from the fur trade up to and including Forest Service administrative sites, which are still in use today. Common late historic sites include those associated with mineral exploration, settlement, logging, fur trapping, resorts, and recreational dwellings such as cabins.

The Long Lake Vegetation Management Project study area is outside of the boundaries of the Leech Lake Reservation. Lands and resources both within and outside the Leech Lake

Reservation boundary are very important to Native Americans for subsistence gathering, for the collection of plants for medicines, for spiritual and ceremonial purposes, and, in general, for living and being. Maintaining the health, availability, and access to these resources is of vital concern to those involved in traditional practices. Any Agency proposals that manipulate, change, or alter forest resources may prevent or alter the ability to gather and utilize valuable and potentially scarce resources (e.g. quality birch bark, blueberries, and medicinal plants). Some Tribal issues may be resolved or mitigated when people are informed of management activities prior to implementation. Forest Service managers are aware of the sensitivity of the issue to Native Americans, and work collaboratively with local Indian communities and Reservation officers prior to making any decisions that may be perceived by the public as denying access to the land.

The Long Lake Vegetation Management Project area has been occupied for at least the last 10,000 years by various densities of people. Their main impacts on the landscape were fire-related, with periodic "prescribed" burning. The larger populations of the last several centuries prior to the arrival of Europeans created greater impact within the ecosystems than previous occupations. Through treaty and federal legislation most of the ancestral lands of the Ojibwe people were ceded and opened to logging, farming and permanent settlement by Euroamericans in the late 19th century. This era of increased use, settlement, and fire suppression forever changed the character of the area in a number of ways (less white pine, decline in fire dependent pine forests, increase in hardwoods, balsam fir, and shrubs). The practice of temporarily damming waterways to provide flow for floating logs during the early pine logging also altered both terrestrial and aquatic habitats within the watersheds.

Investigations of heritage resources for this project follow the implementing regulations of Section 106 (36 CFR 800) of the National Historic Preservation Act (PL 89-665; 16USC470) as amended 1992, to fulfill National Environmental Policy Act requirements. Information concerning the location and nature of heritage resource sites is protected from public disclosure by the National Historic Preservation Act, the Archeological Resources Protection Act (PL 96-95), and is exempt from information requests under the Freedom of Information Act.

Although much of the land within the Long Lake Vegetation Management Project area has been surveyed to some extent for evidence of heritage sites (by use of historic records and field examination), the inventory is far from complete as it has been focused on planned project land areas only. Only a small portion of the known heritage sites have been subject to more extensive evaluation of their eligibility for the National Register of Historic Places. Most often, known heritage resources, (usually archeological sites), are simply excluded from the project area. Sites include earliest periods of human occupation down to the industrial logging period, homesteading, and more recent Ojibwe occupation.

Tribal gathering and traditional use areas have been identified, but the National Register eligibility of these sites as traditional heritage properties has not been evaluated. Instead, the continued management of these areas and effect of this proposal on the commodities gathered is being considered.

There are known archeological sites in the Long Lake Vegetation Management Project area. They would be protected from any affects to them. All stands proposed for treatment have received surveys to identify heritage resource sites. Sites discovered within the stands proposed for treatment have been marked, protected with a buffer, and excluded from treatment. There are no effects to known sites from treatments. Sites identified during treatments, the work would stop and the site would marked, buffered and excluded from treatment.

3.12.3. Air Quality

Particle emissions from prescribed burning and wildfires can impact human health and reduce visibility. The Clean Air Act is the primary instrument for air resource management. The Minnesota Pollution Control Agency (MPCA) administers the Act in Minnesota. The burning agencies in the State of Minnesota came together with the MPCA and developed a smoke management plan for Minnesota (SMP 2016) revision is in the signature process) which addressed the application of the federal air quality regulation in Minnesota. The SMP is followed for all the burns. The SMP contains the dispersion index which must be “fair” or better before any prescribed fire may occur on the Chippewa National Forest.

Pile burning, smoke in the near vicinity may be heavy during the initial ignition of these piles but is expected to dissipate and lift shortly thereafter. Remnant of hanging smoke could be expected for 1 or 2 days following the burn depending upon characteristics of the burn unit and weather conditions, however; this effect should be fairly localized.

Provisions for the Minnesota Smoke Management Plan would be designed into the prescriptions for all of the burning. This would minimize effects to air quality.

3.12.4. Environmental Justice

Under Executive Order Number 12898–*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations,* when low-income or minority populations of the affected area or the county are greater than twice the state percentage for low-income or minority populations, an assessment must be conducted. In MN, twice the state percentage is 21.2 percent for low-income and 27.4 percent for minority populations (2010 US census numbers). The project area is part of Cass County and does not include any of the LLBO Reservation. Cass county has a minority population of 14.1 percent and 13.1 percent of the population is below the poverty level (2010 US census numbers). Since Cass County numbers below the state numbers, an Environmental Justice assessment is not required.

The minority population in the adjacent to the project area is predominately Ojibwe Indian. Tribal members and local residents may use the project area for hunting, recreation and gathering activities. Native American communities contacted during scoping include the Local Indian Counsels and the Division of Resource Management Leech Lake Band Ojibwe (Section 1.5).

The low-income or minority populations of Cass County are not greater than twice the state percentage for low-income or minority populations, there was no Environmental Justice assessment.

4. Finding of No Significant Impact (FONSI)

4.1. A. Context

This decision is consistent with the activities implemented by the Chippewa National Forest, which lead toward achieving the goals, objectives and requirements in the Forest Plan identified for the management areas within the project area (Forest Plan, Chapter 2 and 3), while meeting the purpose and need of the EA. This project is tiered to the Forest Plan, and all of the expected impacts from this project are consistent with the expected impacts disclosed in the Final Environmental Impact Statement for the Forest Plan.

4.2. B. Intensity

I have determined the following with regard to the intensity of the project. Bold items are directly from 40 CFR 1508.27):

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes the effect will be beneficial.

The beneficial effects of the action do not bias my finding of no significant environmental effects. Impacts associated with my decision are discussed in Chapter 3 of the EA. The environmental assessment provides sufficient information to determine that this project will not have a significant impact (beneficial or adverse) on the land and its natural resources, air quality, or water quality (EA pages 25-92).

2. The degree to which the proposed action affects public health or safety.

The chosen alternative would not degrade public water supplies. Considering the effects disclosed in Chapter 3 of the EA, and the information contained in the project file, I conclude that implementing the chosen alternative with mitigation would not significantly affect public health or safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

There are no parklands, prime farmlands, or wild and scenic rivers affected by this project. In addition, the supporting documentation located in Chapter 3 of the EA and the project file provides sufficient information to determine that this project will not affect any known unique characteristics of the geographic area such as cultural resources (EA pages 89-91) or wetlands (EA pages 52-59).

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The degree of controversy with regard to effects on the quality of the human environment are limited and considered not significant based on comments received during the scoping and the comment periods (EA, section 1.7 & 1.8, and Appendices D). Differing opinions do not indicate controversy.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

Timber harvest, planting, temporary road construction activities have occurred previously on the Chippewa and other national forests. No impacts to the human environment that are highly uncertain or involve unique or unknown risks have been identified in this analysis.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Timber harvest and planting are well-established practices on the Chippewa National Forest and do not establish a precedent for future actions. The Chippewa National Forest Land and Resource Management Plan allocates areas scheduled for activity in management areas that allow for such activities (EA, section 1.2).

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

There would be no significant cumulative effects as a result of this project beyond those discussed in the Chippewa National Forest Land and Resource Management Plan. I have reviewed the impacts of those past, present, and reasonably foreseeable actions described in the Environmental Effects Section of the EA (EA pages 25-91) and find that this action will not have a significant cumulative impact on the environment.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

A cultural resource inventory has been completed for this project. The Cultural Resources Report and EA disclosure (EA pages 89-91); project file, Tribal Historic Preservation Office and Minnesota Historic Preservation Office consultation indicate that no Historic Properties would be effected. The potential for impacting yet undiscovered sites is adequately mitigated in Forest Plan Standards and the timber sale contract. Based on this information, I conclude that this

action will not cause loss or destruction of significant scientific, cultural, or historical resources (EA pages 89-91).

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

Based on the information disclosed in the EA and Biological Assessment (EA section 3.2, BA section 4.1), the Biological Evaluations, no adverse effects are anticipated for the Canada Lynx and the gray wolf and likely to adversely affect the northern long-eared bat in the Proposed Action (Alternative B). The US Fish and Wildlife Service also concurred with the Biological Evaluation determinations that the project may affect, but will not likely adversely affect, the federally threatened Canada lynx and gray wolf and the may affect, likely to adversely affect the northern long-eared bat (EA, page 40-41). A letter of concurrence from the US Fish and Wildlife Service was received and dated July 12, 2016.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Laws imposed for the protection of the environment provided the framework for the 2004 Chippewa National Forest Land and Resource Management Plan. From the documentation provided in the EA, the project file, and Other Findings Required by Law, I find that the proposed activities do not threaten a violation of Federal, State, or local law imposed for the protection of the environment.

5. List of Preparers, Agencies and Persons Consulted

5.1. Forest Service Interdisciplinary Team

Barbara Knight	IDT Leader, District Planning Team Leader
Kelly Barrett	Wildlife Biologist
Ben Roy	Assistant Zone Fire Management Officer
Audrey Gustafson	Forester - Silviculturist
Amy Amman	Soil Scientist
Kirk Larson	Forest Botanist
Eric Raitanen	Fish Biologist
Drew Wilson	GIS Resource Information Specialist
Ken Hansen	North Zone Public Services Team Lead
Millie Baird	Civil Engineer
Sean Dunham	Archaeologist
Greg Van Orsow	Supervisory Forester-Timber/Reforestation

5.2. Other Forest Service Contributors

Sharon Klinkhammer	Forest Planner/NEPA coordinator
John Rickers	Forest Resource Information/Program Manager

5.3. Tribal Consultations

Leech Lake Band of the Ojibwe

Tribal Historic Preservation Office

Division of Resource Management

Local Indian Council (Ball Club)

6. Glossary

Animal damage control: is needed to protect seedlings/saplings from deer browsing. This could include spraying repellant(s), bud capping, tubing, or other forms of control that become available.

Clearcut with reserves: is an even-aged harvest used to regenerate stands that are currently mature. Approximately 6-12 reserve trees per acre would be retained to provide wildlife benefits (e.g. future snags, large woody debris, wildlife seed sources). Harvest, site preparation, and release treatments would retain overstory trees, as well as existing understory and midstory trees, to provide species and structural diversity to meet multiple resource objectives (e.g. wildlife values, visual concerns, climate change predictions, etc.). See project record for more details.

Commercial thinning: is an intermediate silvicultural treatment where individual trees would be removed throughout stands to provide improved growing conditions for the remaining trees, as well as provide forested communities with diversity of species, diameter, vertical structure, and spacing.

Commercial thinning would be applied to red pine and mixed jack pine-red pine stands. Approximately 1/3 – ½ of the basal area (BA) would be removed; stands would be thinned to no less than 90 square feet of BA due to concerns that heavy thinning would increase hazel densities.

Existing variations in density would be maintained and/or enhanced. Existing within-stand species diversity would be maintained by retaining species such as white pine, jack pine and hardwoods, as practicable.

Supercanopy white pine and red pine would be retained.

Unthinned areas would be retained to provide natural tree mortality for wildlife objectives.

In stands 40 years and older, and greater than 10 acres in size,

Thin throughout 95% of each stand to a target BA based on stand conditions.

Leave 5% of each stand un-thinned; no harvest activities would occur in these areas.

Remove red pine in favor of other species for diversity.

In stands less than 40 years old (which are first time commercial thins in stands of relatively high basal areas) or stands less than 10 acres in size, the thinning treatment would be more regimented to row thinning or thinning to a specific target basal area across the stands to provide access and minimize damage to the remaining trees.

Group selection: harvesting is an uneven-aged method used to establish and maintain a multi-aged structure but involves the removal of small groups of trees; groups would be approximately ¼ - 1 acre in size.

Large, mature upland patches: are large (300 to 1000s of acres) blocks of upland forest that are managed to maintain the characteristics of mature and older native upland forest vegetation communities, and promote the maintenance or development of interior forest habitat valuable for a variety of plant and wildlife species (O-VG-16; O-VG-22; D-VG-7b).

In general, old/mature forests are dominated by long-lived tree species. These forests are interspersed with old, usually large trees and tree fall gaps invaded by a variety of tree, shrub, and herbaceous species forming multiple canopy layers and increasing structural diversity. The tree, shrub and herbaceous communities should reflect the composition of native vegetation communities (O-VG-7, O-VG-8). These communities contain a high frequency of standing dead and dying trees, and down logs of various sizes and in various stages of decay. In general, the older the forest, the larger the canopy-layer trees, the greater the amount of dead and dying, standing and downed trees, and the more structurally complex the forest (FEIS pp. 3.2-15, 3.3.1-4). For specific descriptions of mature and older growth stages specific to each Landscape Ecosystem see FEIS Appendix G.

Vegetation management treatments within large, mature upland patches must maintain a minimum of 50% canopy closure and large diameter trees (S-VG-3). Harvests also need to be designed so that stand structure and species composition reflect the later stages of stand development, and the characteristics described above. The desired conditions include uneven-aged and multi-aged forests with a variety of tree ages and different vegetation layers (heights) within the same community (D-VG-6), and should allow for the continuance of ecological processes of native vegetation communities, including disturbances from fire, wind, flooding, insects and diseases (D-VG-8).

Natural regeneration with harvest: would occur via suckering (aspen), sprouting (paper birch), seeding from cones in scattered slash (jack pine), and seeding from mature seed-producing trees (jack pine, white pine, paper birch, balsam fir, northern hardwoods).

Planting: in even-aged regeneration harvest would be accomplished with about 1000 trees per acre of mixed species that are suitable for those specific sites. On these planting sites, the featured species would make up about 50-60% of the seedlings, with other species each making up about 20-25% of the mix. Fill-in planting may be necessary if stocking levels do not meet minimum standards within 3 years of harvest in stands treated with clearcut, or seed tree treatments.

Release: of desired seedlings/saplings from competing vegetation would involve the cutting of competing, non-coniferous stems. Aspen and hazel are the predominant species of competing vegetation.

There would be a minimum of 5 feet from the branches of the released desired species to the branches of competing species. If not directly competing with a desired seedling/sapling, oaks, maples, and fruiting shrubs (e.g. pin cherry, chokecherry, high bush cranberry, juneberry, plum, blueberries, etc.) would be retained.

Pockets of aspen or hazel would also be retained if they are not competing with desired species.

In stands with paper birch stump sprouts, cut all but one stump sprout to provide all nutrients, water, growing space, etc. to one stem.

Seeding: the distribution of seed by hand or machine in regeneration. All seeding rates depend upon the objective (e.g. diversity or regeneration) and the species being sown. Species to be seeded include white pine, red pine, white spruce, black spruce.

Seed tree with reserves: harvest method would regenerate stands using existing scattered seed trees (i.e. 10 square feet of overstory basal area of paper birch). Harvest, site preparation, and release treatments would retain overstory trees, as well as existing understory and midstory trees, to provide species and structural diversity to meet multiple resource objectives (e.g. wildlife values, visual concerns, climate change predictions, etc.). See project record for more details.

Scenic Integrity Objectives: guide the amount, degree, intensity, and distribution of management activities needed to achieve desired scenic conditions.

High: Landscapes where the valued landscape character appears intact. Deviations may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character, so completely and at such a scale that they are not noticeable.

Moderate: Landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Single tree selection: is an uneven-aged method used to establish or maintain a multi-aged structure. It involves the removal of individual trees in all size classes to promote growth of remaining trees, provide space for regeneration (especially northern hardwoods), and inhibit aspen suckering.

Site preparation: prior to seedling establishment would be achieved via harvest operations and/or post-harvest mechanical treatments. The intent of site preparation would be to expose and scarify mineral soil in irregular patterns over approximately 80% of any given stand. Equipment would go around residual trees, stumps, and small inclusions (varying in size and shape) within stands. Post-harvest residual trees would not be removed unless considered to be safety hazards. Mechanical site preparation could include brush raking, disking, biomass harvest, or other means. In this project, biomass harvest would be allowed in certain stands with clearcut, shelterwood, or seed tree harvests where mechanical site prep for natural

regeneration, seeding, or planting was identified. In these stands, biomass harvest would achieve objectives of slash removal, soil exposure, and soil scarification while retaining residual trees and inclusions as described above (e.g. results would be similar to other mechanical site preparation treatments).

Road Decommissioning or Closure Road: road decommissioning or closure is effective blocking of the road in such a manner as to prevent motorized traffic. Decommissioning of roads in activity stands would take place after harvest and regeneration activities are complete

7. Abbreviations

BA biological assessment

BE biological evaluation

CFR Code of Federal Regulations

CNF Chippewa National Forest

DNR Minnesota Department of Natural Resources

EIS environmental impact statement

FP Forest Plan

FS Forest Service

FSH Forest Service Handbook

FSM Forest Service Manual

GIS Geographical Information Systems

LE landscape ecosystem

LIC Local Indian Council

LLBO Leech Lake Band of Ojibwe

LLVM Long Lake Vegetation Management Project

MFRC Minnesota Forest Resource Council

MIH Management Indicator Habitat

MIS Management Indicator Species

NEPA National Environmental Policy Act

NF National Forest

NFMA National Forest Management Act

NFS National Forest System

OML objective maintenance level (roads)

R9 Region 9 (Forest Service Eastern Region)

RFSS Regional Forester Sensitive Species

RMV recreation motor vehicle

ROS recreation opportunity spectrum

SIO scenic integrity objective

TES threatened, endangered, and sensitive (species)

USDA United States Department of Agriculture

USFWS United States Fish and Wildlife Service