

# North Central Landscape Plan



## A Regional Plan to Guide Sustainable Forest Management

**MFRC North Central Regional Landscape Committee**  
**September 20, 2017**



Minnesota Forest Resources Council (MFRC)

Document #TBD

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Content: MFRC North Central Landscape Planning Committee (for a list of the Planning Committee Members see Appendix A)

Primary MFRC Staff support and document development: Lindberg Ekola, Landscape Program Manager; Kathryn Fernholz, Dovetail Partners Executive Director; David Henkel-Johnson, Laurentian Resource Conservation and Development contract support; Jeff Reinhart, GIS Coordinator

Cover photo: Beauty Lake at Pillsbury State Forest in Cass County. Taken by Larry Leonard

Please cite this document as:

Minnesota Forest Resource Council. 2017. North Central Landscape Forest Resources Plan. Document #TBD. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <http://mn.gov/frc>.



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## **Part 1. Purpose and Context:**

Where have we been and where are we today?

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## Section 1

### Introduction

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The Minnesota Forest Resources Council (MFRC) is a 17-member organization working to promote long-term sustainable management of Minnesota's forests as directed by the Minnesota legislature in the Sustainable Forest Resources Act of 1995. Through its Landscape Program and the six regional committees, the MFRC develops and supports the implementation of regional forest resource plans (aka landscape plans) for Minnesota's six major forested regions. This section summarizes the statutory foundations for landscape management in Minnesota.

#### A. Sustainable Forest Resources Act

The Minnesota State Legislature enacted the Sustainable Forest Resources Act (Minn. Statutes, Chapter 89A) in 1995, which established the Minnesota Forest Resources Council (MFRC) and formalized the state's policy to:

- pursue the sustainable management, use, and protection of the state's forest resources to achieve the state's economic, environmental, and social goals;
- encourage cooperation and collaboration between public and private sectors in the management of the state's forest resources;
- recognize and consider forest resource issues, concerns, and impacts at the site and landscape levels;
- recognize the broad array of perspectives regarding the management, use, and protection of the state's forest resources and establish processes and mechanisms that seek and incorporate these perspectives in the planning and management of the state's forest resources.



The purpose of the MFRC is to develop recommendations to the Governor and to federal, state, county and local governments with respect to policies that result in sustainable management of forests in the state. The policies must:

- acknowledge the interactions of complex sustainable forest resources, multiple ownership patterns, and local to international economic forces;
- give equal consideration to the long-term economic, ecological, and social needs and limits of the state's resources;
- foster productivity of the state's forests to provide a diversity of sustainable benefits from the site to landscape levels;
- enhance the ability of the state's forest resources to provide future benefits and services;
- foster no net loss of forest land;

- encourage appropriate mixes of forest cover types and age classes within landscapes to promote biological diversity and viable forest-dependent fish and wildlife habitats;
- encourage collaboration and coordination with multiple constituencies in planning and managing the state's forest resources;
- address the environmental impacts and implement mitigations as recommended in the *Generic Environmental Impact Statement on Timber Harvesting and Forest Management*. This includes MFRC Voluntary Site Level Forest Management Guidelines which help sustain forest resources.

## B. MFRC Landscape Program

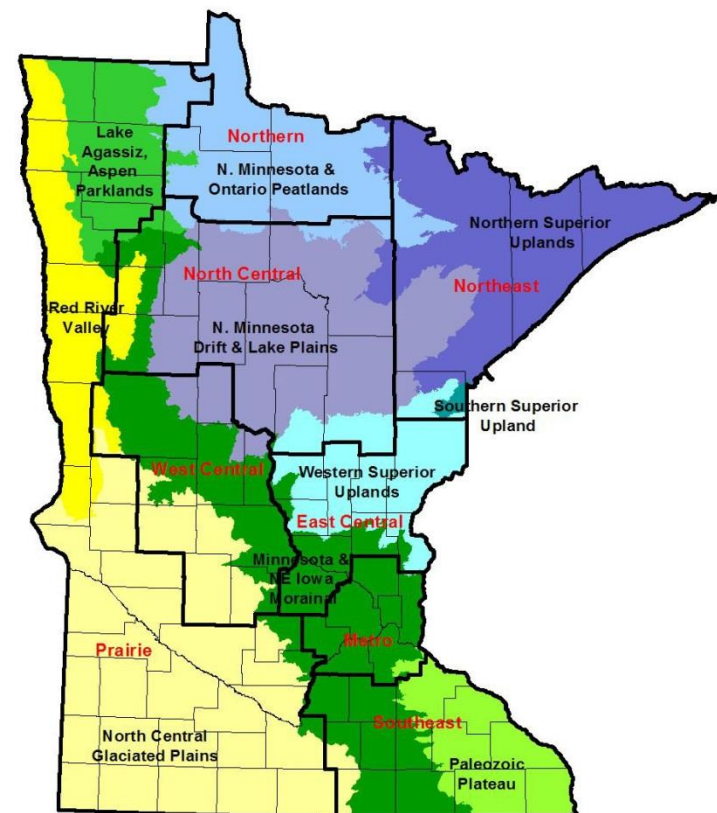
The Sustainable Forest Resources Act (SFRA) provided authorization for the establishment of regional landscape committees to foster landscape-based forest resource planning and coordination. This legislation defined landscape-level planning as “long-term or broad based efforts that may require extensive analysis or planning over large areas that may involve or require extensive coordination across all ownerships.” It charges regional committees to:

- include representative interests,
- serve as a forum to discuss issues,
- identify and implement an open and public process whereby landscape-level strategic planning can occur,
- identify sustainable forest resource goals for the landscape and strategies to achieve those goals, and
- provide a regional perspective on forest sustainability to the Council.

The MFRC established the Landscape Program in June 1997 to organize and support the regional Landscape Committees. Following direction from the SFRA, the Council divided the state into eight Landscapes as shown in the figure to the right. They established six regional committees to solicit the input of diverse forest resource interests within particular forested “Landscapes”. These Landscapes are based on broadly defined ecological units, yet recognize existing political and administrative boundaries for delineation. These regional committees provide an opportunity to involve private citizens, natural resources professionals, and members of various interest groups in developing and implementing landscape-level plans that promote forest sustainability.

The MFRC Landscape Program provides an ongoing means of addressing regional issues through local partnerships that help to develop and accomplish citizen-identified short-term and long-term sustainable forest management goals and projects for the broader landscape region by

**Figure 1.1. MFRC Landscapes and ECS Boundaries.**



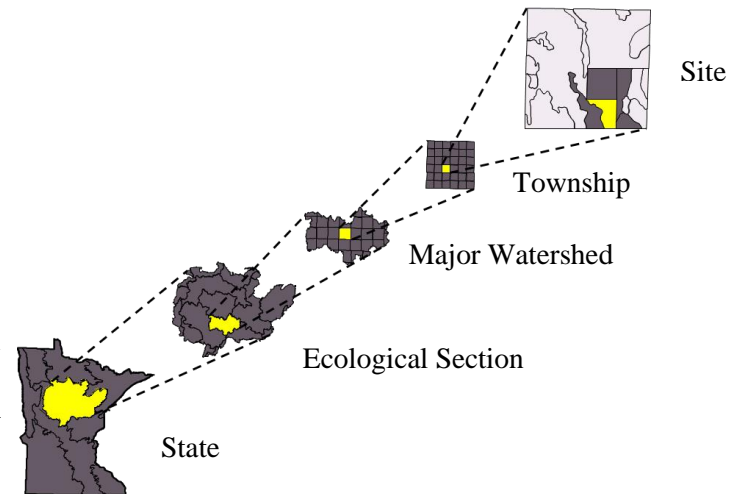
bridging land ownership and forest types. Find more about Minnesota's forested Landscapes, the process of Landscape-level forest management, and the regional volunteer committees here: <http://mn.gov/frc/landscape-level-management-program.html>

## C. Landscape Planning Scales and Contexts

Forest resource planning takes place on many scales based on administrative (e.g., township) or ecological boundaries (e.g., watershed) (Figure 1.2). MFRC landscape plans are designed to be strategic in purpose and cover all ownerships in a region. As planning scales decrease to the sub-landscape and eventually to the site-level, forest resource plans typically become more tactical in nature and cover fewer ownerships. Yet all scales are connected, and landscape-level plans can broadly help to guide plans which occur at a smaller scale, whose collective accomplishments help to achieve landscape-level goals and objectives.

The North Central Landscape Region includes Itasca, Aitkin, Cass, Becker, Clearwater, Crow Wing, Hubbard, Mahanomen, east half of Polk and south half of Beltrami counties (approximately 9.1 million acres). Its borders also roughly correspond to the Northern Minnesota Drift and Lake Plains Section (Figure 1.1).

**Figure 1.2. Landscape to Site Level Planning.**



## D. Regional Forest Resources Committees

As described above, the SFRA provided authorization for the establishment of regional landscape committees to foster landscape-based forest resources planning and coordination, and the MFRC Landscape Program has established regional committees to implement this state policy at the landscape-level throughout the State. The SFRA requires the regional committees fulfill and/or address many functions and activities in landscape planning and coordination. The following summarizes these functions:

- include representative interests in a particular region that are committed to and involved in landscape planning and coordination activities;
- serve as a forum for landowners, managers, and representative interests to discuss landscape forest resources issues;
- identify and implement an open and public process whereby landscape-based strategic planning of forest resources can occur;
- integrate its report with existing public and private landscape planning efforts in the region;
- identify and facilitate opportunities for public participation in existing landscape planning efforts in the region;
- identify sustainable forest resources goals for the landscape and strategies to achieve those goals;
- provide a regional perspective to the council with respect to council activities;
- facilitate landscape coordination between existing regional landscape planning efforts of land managers, both public and private.

These volunteer, citizen-based regional landscape committees are central to carrying out landscape management processes. Regional landscape committees provide an open public forum for diverse interests to cooperatively promote forest sustainability. By bringing together

representative interests from landscape regions, the committees serve as springboards for effective forest management activities that address specific needs and challenges in each region. Regional committees meet on a regular basis to guide implementation of landscape plans and coordination of land management activities.

The North Central Landscape Regional Committee (the Committee) was initially organized in June, 2000. Since then, the Committee has been working to build agreement on how best to achieve long-term forest sustainability through landscape planning and coordination. According to Committee members and participants, the landscape management process has:

- developed useful scientific approaches, information, and valuable tools for landscape assessment;
- fostered working relationships with a diverse set of people;
- produced landscape direction for agencies and other landowners on a voluntary basis;
- developed strategies for implementing this landscape direction;
- facilitated better communication among diverse groups.

Also, landscape management planning has helped land managers and other partners recognize that individual forest and related natural resources management choices must be viewed in the context of those of their neighbors and that the multiple management objectives of the various land managers can provide for a diverse and balanced landscape condition in terms of ecological, economic, and social conditions.







## Section 2

# Landscape Planning Process



Landscape planning is a voluntary, consensus-based process that brings together people who have an interest in the long-term health and vitality of a particular region. It is a process that helps landowners and resource managers better understand how the lands that they manage, from an individual site to a portfolio of agency lands they are responsible for, fit into the larger region or ‘landscape.’ This section describes the overall context for forest resource planning in the state and an overview of the process used to develop this Plan.

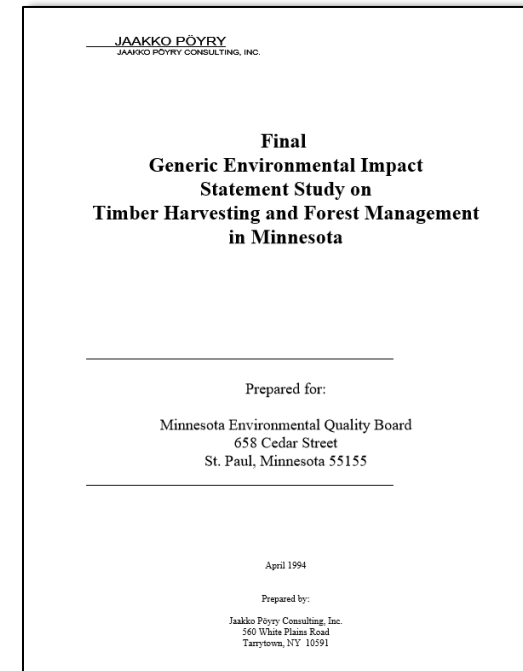
### A. Forest Resources Planning in Minnesota

Landscape planning in Minnesota was conceived by the Generic Environmental Impact Statement (GEIS) on Timber Harvest and Forest Management (1988-1994), enacted into statute by the Sustainable Forest Resources Act (SFRA) in 1995, and made operational by the MFRC starting in 1996.

By Minnesota statute, MFRC landscape plans were designed to provide broad, strategic guidance to all land managers across all ownerships in a given landscape region. The MFRC landscape plans provide guidance to a range of more specific and actionable planning efforts including: 1) forest management plans for specific land managing entities, 2) agency programmatic plans, and 3) funding development plans. The MFRC landscape plans provide guidance to the following:

#### Forest Management Plans

- USDA Forest Service land and resource management plans – ten to fifteen year plans developed for the Chippewa and Superior National Forests. They cover approximately 2.6 million acres of federal lands in northern Minnesota.
- Tribal land and resource management plans – there are eleven tribes in the state. Tribal forestry organizations have developed plans to cover over 600,000 thousand acres of tribal forest land in northern Minnesota.
- MN DNR Forestry Section Forest Resource Management Plans – plans that guide the management of vegetation including timber harvest on state owned lands within ecological units, for 3.8 million acres of state forest land managed by DNR Forestry and Wildlife Divisions.
- County tax forfeit land management plans – Fifteen northern and central Minnesota counties manage approximately 2.6 million acres of forest land. These plans guide land management including timber harvest on most of these acres.



- Industry forest management plans – forest industry and timber investment companies have plans for about 1.0 million acres of forest land.
- Woodland stewardship plans – some of Minnesota’s 150,000 family forest owners have woodland plans covering 10 to 15 percent of the 6.0 million acres of family-owned private forest land.
- Other private land plans – there are a number of other private plans related to forest management in Minnesota and related conservation activities undertaken by various environmental organizations, land trusts, and others.

### **Program Plans**

- Forest for the Future Plan – the plan used to create and manage the MN DNR’s forest conservation easement and acquisition program.
- Private Forest Management System Framework – the plan developed to guide the delivery of planning and implementation services to Minnesota's family forest landowners through the MN DNR Forestry Private Forest Management (PFM) Program.
- Urban and Community Forestry program plan – the plan developed to direct efforts by DNR Forestry to promote urban forestry projects and practices in communities throughout the state.
- Landscape stewardship plans – plans developed through the DNR PFM Program to increase collaborative efforts by all service providers to promote the implementation of landscape stewardship approaches at sub-landscape scales (Camp Ripley Landscape Stewardship Plan, Pine River Watershed Landscape Stewardship Plan).
- Community wildfire protection plans – locally based program plans to promote collaborative efforts to help landowners be properly prepared for wildfire protection.
- Watershed Restoration and Protection Strategies (WRAPs) reports – reports developed by the Minnesota Pollution Control Agency (MPCA) and partner organizations which provides detail on water quality issues in major watersheds (8-digit HUC) and identifies ways to prioritize projects to protect or restore water quality in those watersheds.

### **Funding Development Plans**

- State Forest Action Plan (FAP) – federally required plans that all states must prepare to received federal funding for forestry projects through the US FS State & Private Forestry.
- Forest Legacy Assessment of Need (AON) – a federally mandated plan that provides direction for investing of federal funds for fee title acquisitions and conservation easements through the Forest Legacy Program.
- 25-Year Lessard-Sams Outdoor Heritage Council (LSOHC) Forest Habitat Implementation Vision – a framework for the LSOHC to use in advising the legislature about funding for forest projects that improve fish and wildlife habitat for game and nongame species.

## **B. First and Second Generation Landscape Plans**

### **2003 North Central Landscape Plan**

The North Central Landscape Committee was organized in June of 2000 with over 70 people expressing interest in participating and 20-25 people remaining active throughout the development of the original North Central Landscape Plan. The North Central was the second of the six regional committees to develop a landscape plan.

The North Central Committee was able to apply the technical knowledge gained about landscape analysis in the Northeast Landscape Region to the North Central Landscape Region, expediting the development of the plan. Early in the process the North Central Committee chose to concentrate on the first two bullets of the desired future forest condition statement and to follow an ecological approach based on native plant communities. These two desired future forest conditions statements from the 2003 North Central Landscape Plan were:

- There will be an increased component of red, white and jack pine, cedar, tamarack, spruce and fir.
- The forest will have a range of species, patch sizes, and age classes that more closely resemble natural patterns and functions within this landscape.

The Committee also decided to complete the ecological analysis first and then determine the economic impact of any proposed changes. The Committee did not develop explicit social and economic goals.

The Committee did not complete the goals and strategies for the third bullet of their desired future forest condition statement in time for the March 25, 2003 timeline for Council approval. The third bullet stated that “The amount of forest land and timberland will not decrease using FIA definitions for timberland and forest land. Large blocks of contiguous forest land that have minimal inclusions of conflicting land uses will be created and/or retained for natural resource and ecological benefits and to minimize land use conflicts”. Rather than delay the review and approval of the goals and strategies for the first two bullets, the North Central Committee decided to amend the plan once the third bullet goals and strategies were completed.

The Minnesota Forest Resources Council approved the first generation North Central Landscape Plan on March 25, 2003, and the amended plan on January 27, 2004. Partners in the region have been actively implementing the plan ever since.

### **Decision to Revise the 2003 North Central Landscape Plan**

While the SFRA did not establish a process for maintaining or updating the landscape plans, over time the six regional committees began to recognize that the first generation of plans did not address some issues they were facing in their coordination and implementation efforts. The Coordination Committee (the group organized to oversee the coordination, implementation, and monitoring of the plan after it was approved) identified a range of issues and concerns that were not addressed in the 2003 Plan. Some of the topics included: climate change, connection of forest and water quality, change in forest composition, change in the industrial landscape, decreased harvest levels, invasive species, changes in forest sector capacity, watersheds and water resources and related methodologies, land use change, changes in policy and funding structures,



tribal interests and treaty rights. Further, it was recognized that more consideration for economic and social issues was needed as the 2003 Plan did not develop explicit economic and social goals.

Parallel with the work by the Coordination Committee, there were some key research and coordination initiatives underway that could support the development of the revised plan. These initiatives included the US Forest Service Northern Minnesota Climate Change Response Framework Project, Natural Resource Research Institute's Potential Native Plant Community Modeling Project, Minnesota Department of Natural Resources Fish Habitat Conservation Framework and Watershed Health Assessment Framework. Products and information from these parallel efforts have been integrated into this second generation planning process.

In October of 2015, the Coordination Committee unanimously supported the updating of the 2003 North Central Landscape Plan. At their March 16, 2016 meeting, the Council agreed with the recommendation from the Coordination Committee and directed that the second generation plan be created.

### **C. Formation of the Second Generation North Central Landscape Planning Committee**

Following the Council's decision to revise the 2003 Plan, an invitation letter was sent to a broad range of organizations and interests throughout the region asking for their participation on the second generation planning committee. Over 30 people expressed interest in participating by attending planning process meetings. The members of the Planning Committee and the organizations and interests they represent are provided in Appendix A.





## **D. Planning Process Overview**

### **General Steps in the Planning Process**

The general process that was used by the Planning Committee to develop this Plan included the following major steps:

- Develop an inventory and assessment of the resources in the landscape.
- Gather and inventory existing policies relating to forest management from plans adopted by local, regional, and state organizations.
- Brainstorm and prioritize forest resources management assets and issues in the region.
- Identify and synthesize resource trends and key findings.
- Develop guiding principles and define the long-term desired future conditions.
- Establish a comprehensive policy framework of goals, objectives, and action items to address the issues and sustain the assets that were identified.
- Begin clarifying the appropriate roles and responsibilities of stakeholders in coordinating and implementing this Plan.

## **E. Committee Input**

A total of 13 Planning Committee meetings were convened to prepare this Plan and Planning Committee members provided direction and input throughout the planning process. A series of methods and approaches were used in gathering committee input including small and large group discussions, draft document reviews, and ad-hoc workgroups.

### **Small Group – Full Group Discussions**

Meetings 2, 3, and 4 were used to develop the ecological, economic, and social goals and objectives sections after a common framework of understanding was developed. These goals and objectives sections were developed through a small group – large group brainstorming process where the Planning Committee was randomly split into 5-7 person work groups during a meeting to discuss and refine draft goals, objectives, and action items. This allowed everyone an opportunity to include their ideas into the draft document. Following these discussions, group leaders presented their group’s ideas to the entire Planning Committee. These small group ideas were then compiled between the meetings and the revised draft was discussed with the entire Planning Committee through a review process. This allowed the Planning Committee to discuss issues as a whole and in many cases arrive on consensus or general agreement about language as an entire group.

### **Planning Committee Review**

Based upon information provided by members of the Planning Committee and presentations by invited experts, MFRC staff drafted sections of the plan to reflect the discussion, decisions, and ideas of the Planning Committee. These draft sections of the plan were then shared with the Planning Committee for review. During this time period the Planning Committee was able to provide comments on specific sections and send them to MFRC staff for compilation. MFRC staff integrated these suggestions into the draft document and presented it to the Planning Committee on (date) where the Planning Committee approved the draft plan and recommended opening the public comment period.

## **F. Public Review and Comment Process**

The Sustainable Forest Resources Act (SFRA) provides the following guidance on the public review requirements for landscape planning: “(3) identify and implement an open and public process whereby landscape-based strategic planning of forest resources can occur”.

The following public review process was used for approving the Plan:

- An email notice announcing the public review process was sent to interested persons and entities in the region.
- A notice was posted in the EQB Monitor.
- Press releases were sent to newspapers in the region announcing the public review period.
- The public review draft Plan and supporting materials were posted on the MFRC website.
- The public review and comment period lasted for 30-days.
- Comments were reviewed by the Planning Committee.
- Review / recommendation by the MFRC Landscape Committee (LAC).
- Review / approval of the Plan by the Council.

## **G. Council Approval**

The Minnesota Forest Resources Council reviewed and unanimously approved this Plan on September 20, 2017.

## Section 3

### Context of the North Central Landscape



This section of the plan provides context for the North Central Landscape, including a geopolitical overview of the counties within the region; a summary of the Ecological Classification System (ECS) sections within the landscape; the local hydrology; and the region's land ownership and management.

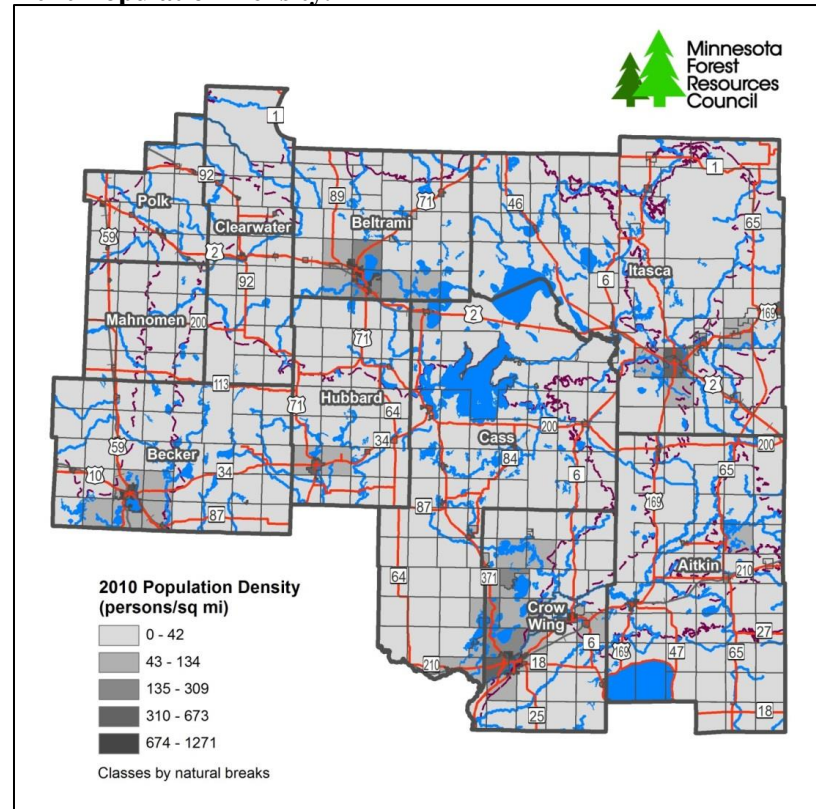
#### A. Geopolitical

The Minnesota Forest Resources Council defines the North Central Landscape as the following ten county area: Aitkin, Becker, Cass, Clearwater, Crow Wing, Hubbard, Itasca, and Mahnomen counties, in addition to the southern half of Beltrami County and eastern half of Polk County. Most of this 9.1 million acre region is rural with the exception of the cities of Bemidji, Brainerd, Detroit Lakes, Grand Rapids, and Park Rapids.

**Table 3.1. Area of North Central Landscape Counties.**

County	Area
--------	------

**Figure 3.1. North Central Landscape Political Boundaries and 2010 Population Density.**



Source: US Census and MN Geospatial Commons.

	Acres	% of Region
Aitkin	1,275,804	14.1
Becker	925,073	10.2
Beltrami (south)	693,691	7.6
Cass	1,544,170	17.0
Clearwater	659,017	7.3
Crow Wing	739,801	8.2
Hubbard	639,536	7.1
Itasca	1,872,385	20.6
Mahnomen	373,535	4.1
Polk (east)	346,703	3.8
<b>Total North Central Region</b>	<b>9,069,715</b>	<b>100</b>

Source: US Census and MN Geospatial Commons.

## B. Ecological Classification System

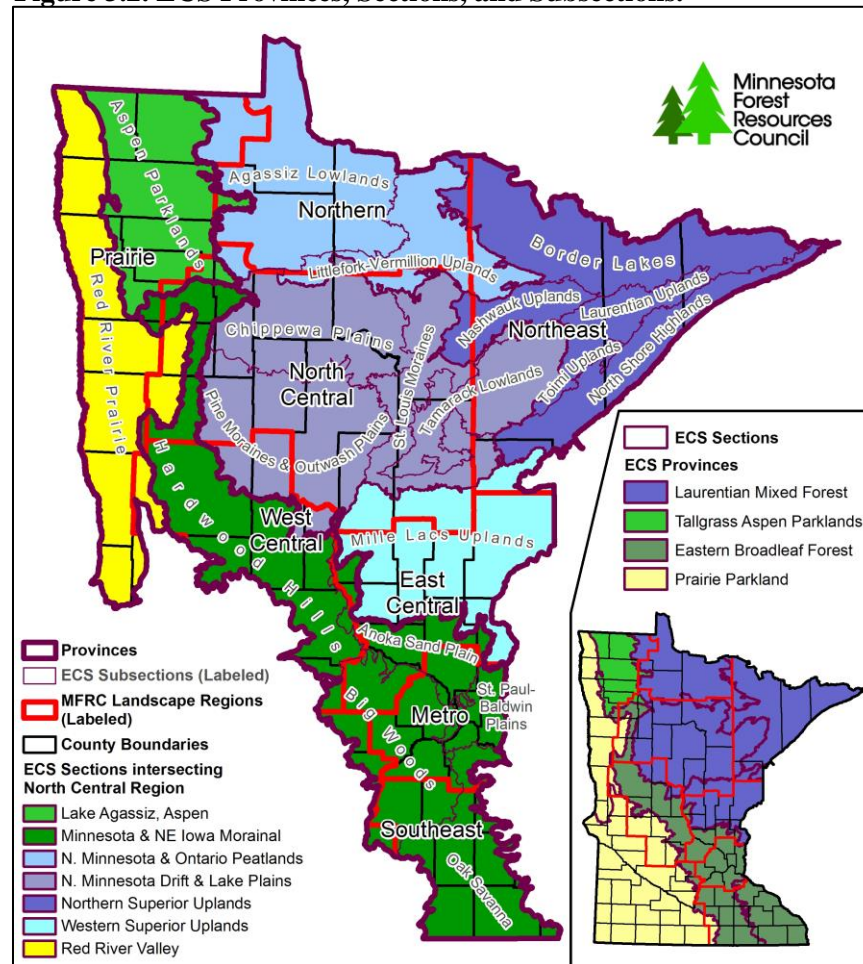
The North Central Landscape can be described using the Ecological Classification System (ECS), which defines areas that have similar ecological characteristics such as geology, vegetation, soils, etc. The North Central Landscape is located primarily within the Laurentian Mixed Forest Province, but contains portions of the Tallgrass Aspen Parklands, Eastern Broadleaf Forest, and Prairie Parkland ECS Provinces (Figure 3.2). The North Central Landscape is the only MFRC region to intersect with all of Minnesota's biomes and consequently possesses a high level of biodiversity.

Of the smaller ECS units in the region there are seven ECS Sections and a total of 12 ECS Subsections. Within the 12 subsections, there are 90 Land Type Associations (LTAs) and the average area of a LTA is approximately 101,000 acres. Find more information about ECS and Minnesota's ECS units here: <http://www.dnr.state.mn.us/ecs/index.html>

**Table 3.2. ECS sections in the North Central Landscape.**

ECS Sections	Code	Acres in Region	% of Region
Lake Agassiz, Aspen Parklands	LAP	147,531	1.6
Minnesota & NE Iowa Morainal	MIM	745,722	8.2

**Figure 3.2. ECS Provinces, Sections, and Subsections.**



N. Minnesota & Ontario Peatlands	MOP	408,607	4.5
N. Minnesota Drift & Lake Plains	MDL	6,483,253	71.5
Northern Superior Uplands	NSU	211,922	2.3
Red River Valley	RRV	415,270	4.6
Western Superior Uplands	WSU	657,410	7.2
<b>Total North Central Region</b>		<b>9,069,715</b>	<b>100.0</b>

Source: MFRC and MN Geospatial Commons.

Source: MN Geospatial Commons.

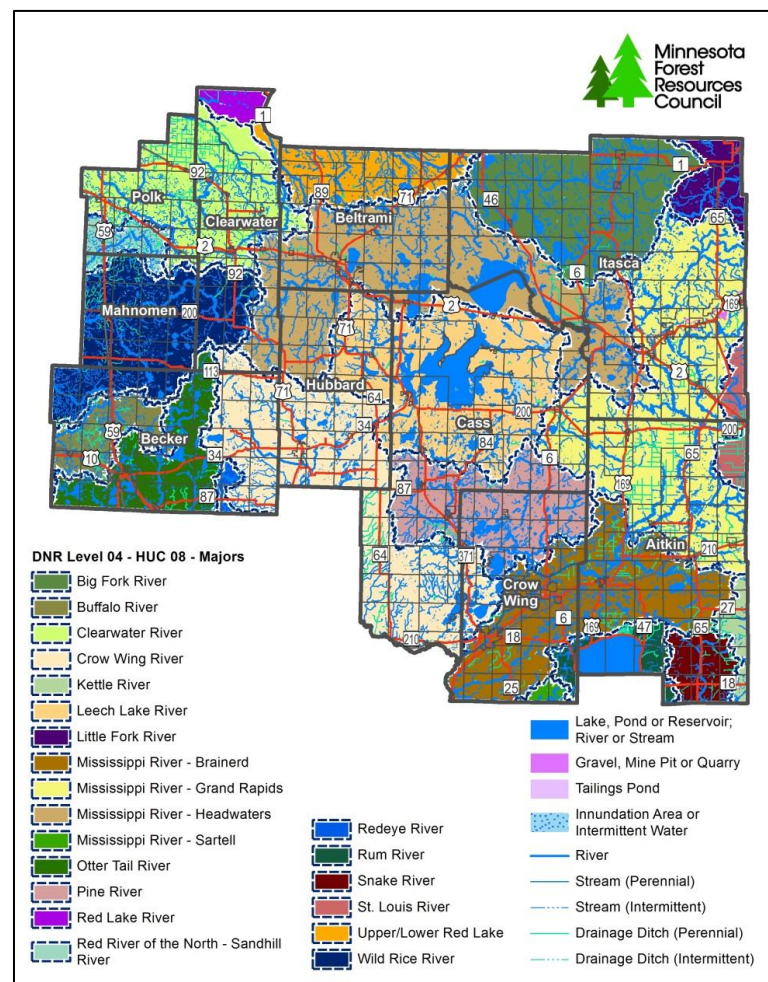


## C. Hydrology

The North Central Landscape is an area rich with water resources, including lakes, rivers, streams and wetlands of regional, statewide, and national importance. A particularly unique attribute of the region is that it is at the headwaters of several rivers and therefore is the source water for large areas but receives input only from precipitation. Most of this region is drained through the Upper Mississippi River Basin, the Red River of the North Basin, or the Rainy River Basin. The region also contains small portions of the Lake Superior Basin and St Croix River Basin. Water in this landscape forms the headwaters to the Mississippi River and land use practices and forest areas within the region can directly affect water quality in streams and lakes.

**Table 3.3. Watershed Health Assessment Framework (WHAF) Scores and Area, 2015.** WHAF Scores Range from 0 (unhealthy) to 100 (best condition).

**Figure 3.3. North Central Landscape Major Watersheds.**



Major Watershed	WHAF	Acres	% of
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	Score		Region
Big Fork River	78	642,164	7.1
Buffalo River	51	183,445	2.0
Clearwater River	60	618,573	6.8
Crow Wing River	61	989,280	10.9
Kettle River	64	68,160	0.8
Leech Lake River	69	857,971	9.5
Little Fork River	69	148,211	1.6
Mississippi River – Brainerd	63	750,329	8.3
Mississippi River - Grand Rapids	65	1,225,074	13.5
Mississippi River – Headwaters	68	1,228,889	13.5
Mississippi River – Sartell	58	23,785	0.3
Otter Tail River	58	356,141	3.9
Pine River	67	500,887	5.5
Red Lake River	54	57,348	0.6
Red River of the North - Sandhill River	48	97,857	1.1
Redeye River	64	28,454	0.3
Rum River	61	165,166	1.8
Snake River	62	130,118	1.4
St. Louis River	59	93,025	1.0
Upper/Lower Red Lake	73	292,268	3.2
Wild Rice River	57	612,570	6.8
<b>Total North Central Region</b>	<b>--</b>	<b>9,069,715</b>	<b>100.0</b>

Source: MNDNR WHAF and MN Geospatial Commons.

Source: MN Geospatial Commons.

## D. Land Ownership and Management

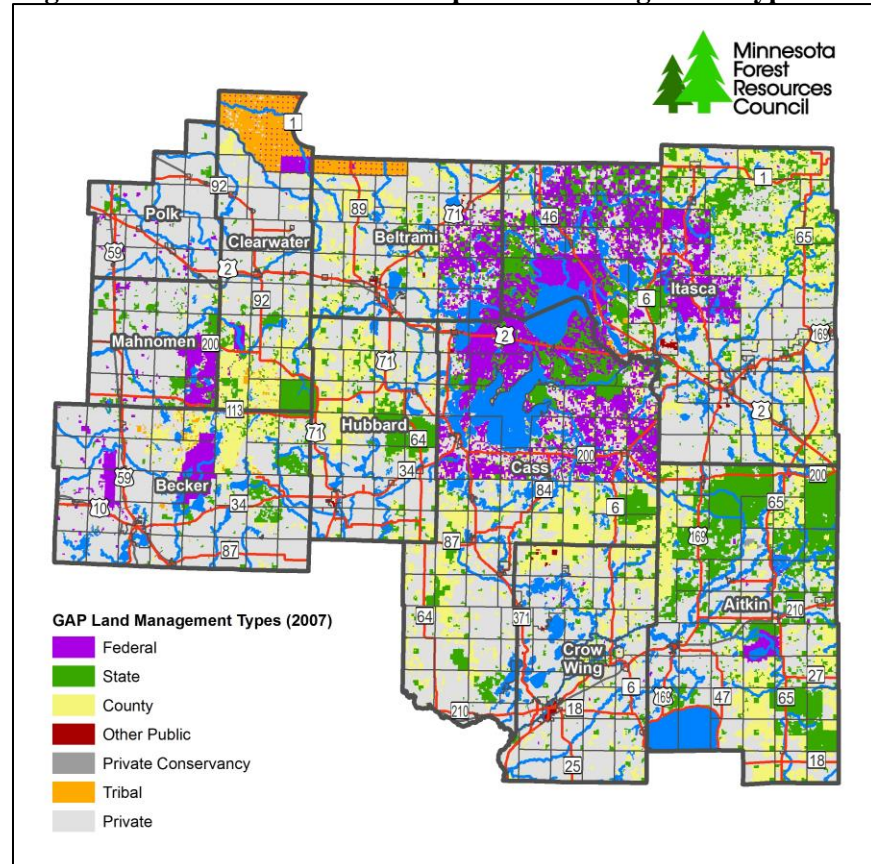
Ownership and management of forests in the North Central Landscape is shared between many different private and public entities (Table 3.4 and Figure 3.4) and its spatial pattern is highly complex. Private land ownership represents the majority of the landscape with 60% of the total land area; this includes both industrial land and non-industrial land. Public lands cover nearly 40% of the landscape and is split relatively evenly between federal, state, and county agencies. Tribal lands account for nearly 2%.

In many cases land ownership and management are interchangeable terms; however, there are situations where this distinction can make a dramatic difference in understanding trends on the landscape. For instance state-owned county administered forfeited (tax-forfeited) land is owned by the State of Minnesota; however, the surface estate is managed by the counties. With this in mind, the relative importance of county management in the North Central Landscape is 0.2 % when based on ownership but rises to 14.8 % of the total land area when based on management responsibilities.

**Table 3.4. Land Ownership and Management in the North Central Landscape.**

Type	Ownership		Management	
	Acres	% of Total	Acres	% of Total
Federal	879,521	9.7	870,405	9.6

**Figure 3.4. North Central Landscape Land Management Types.**



State	2,581,744	28.5	1,259,003	13.9
County	20,135	0.2	1,343,021	14.8
Other Public	15,480	0.2	15,480	0.2
Private Conservancy	2,351	< 0.1	2,351	< 0.1
Tribal	155,688	1.7	164,658	1.8
Private	5,414,797	59.7	5,414,797	59.7
<b>Total North Central Region</b>	<b>9,069,715</b>	<b>100.0</b>	<b>9,069,715</b>	<b>100.0</b>

Source: GAP Land Ownership and MN Geospatial Commons.

Source: GAP Land Ownership and MN Geospatial Commons.

## E. Native American Reservations and Treaties

There are five Bands of Chippewa (Ojibwe) in the region: Leech Lake, Red Lake, White Earth, Mille Lacs, and Bois Forte Bands. These bands have a long tradition of cultural uses of the forests and forest-dependent fish and wildlife species in this region.

The Leech Lake Reservation is located in in the counties of Beltrami, Cass, Hubbard, and Itasca and its boundaries largely overlap with the Chippewa National Forest. The Red Lake Reservation is located within Beltrami County with a small portion in Clearwater County near the northwestern portion of the region. The White Earth Reservation encompasses all of Mahanomen County and portions of Becker, and Clearwater Counties near the region’s western border. The Mille Lacs Reservation is located primarily near the south end of Mille Lacs Lake, but the Mille Lacs Band has also land holdings with the Sandy Lake Reservation near the shores of Big Sandy Lake in Aitkin County. The Bois Forte Reservation is divided into three sectors: Nett Lake, Vermilion, and Deer Creek. The Vermilion section is located near the town of Tower, the Nett Lake section is located on the St. Louis-Koochiching County line, and the Deer River sector is in Itasca County although no Band members live there.

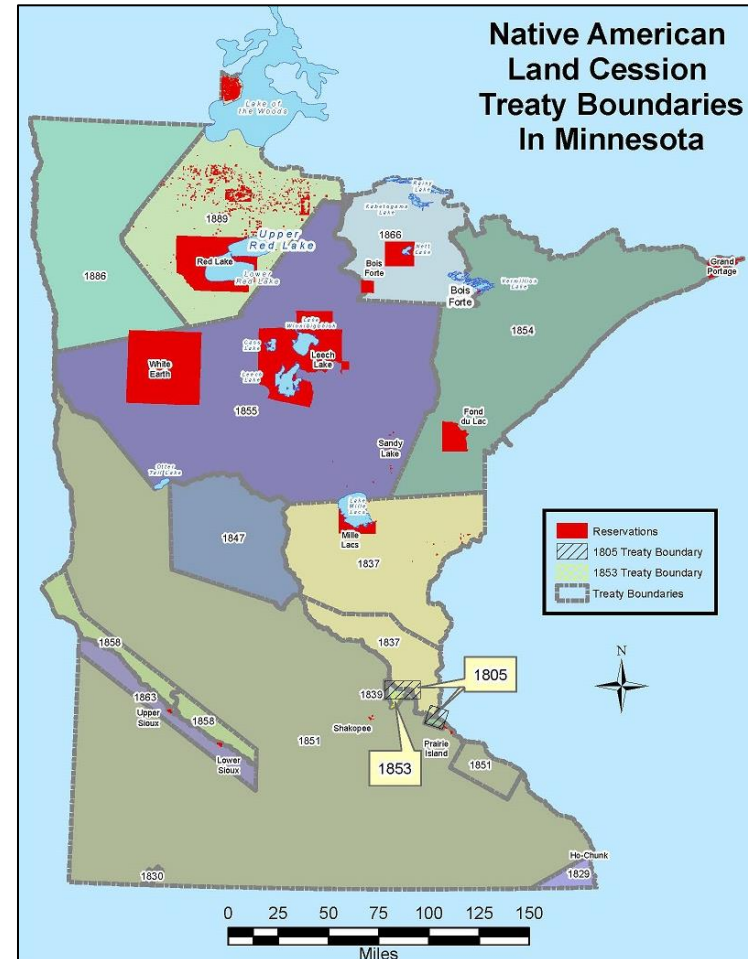
The Bands maintain off-reservation hunting, fishing, and gathering rights in the 1837 and 1854 Ceded Territories. The 1855 Treaty did not explicitly grant those rights to tribe members, and disputes about land use rights in the 1855 territory continue. Tribal resources in these territories are maintained by the Bands and regional treaty organizations.

**Table 3.5. Native American Reservations in the North Central Landscape.**

Reservation	Acres	% of Landscape
Leech Lake	864,983	9.5
Mille Lacs	345	0.0
Red Lake	158,598	1.7
Sandy Lake	171	0.0
White Earth	745,082	8.2
<b>Total Reservation Areas</b>	<b>1,769,179</b>	<b>19.5</b>
<b>Total North Central Region</b>	<b>9,069,715</b>	

Source: US Forest Service and MN Geospatial Commons.

**Figure 3.5. Native American Reservation and Treaty Locations in Minnesota.**



Source: Leech Lake Band of Ojibwe, Division of Resource Management.

Note: The NC Committee recognizes there is a dispute on the boundary of the White Earth Reservation in Clearwater County (Nora, Minerva, Rice and South Clearwater Unorganized townships). This map is not intended to resolve the boundary dispute in any way.

## **F. State Land and Mineral Ownership and Management**

The State of Minnesota is one of the largest landowning entities in the United States. Within the state there are about 51.2 million acres of land and 2.6 million acres of water. About 25 percent of the land is owned by governmental units. The federal government owns about 7 percent of the land area, or 3.4 million acres, while the state government owns about 17 percent of the land area, or 8.4 million acres. Over 95 percent of the state-owned land was granted or donated to the state by the federal government.

The history of the transfer of land to the state is long and complicated. The federal and state laws that created the various types of state lands established specific directions and mandates on the development and use of the state lands, and directly impacts how those lands are to be managed including forest management. The DNR Division of Lands and Minerals generally groups state lands into the following:

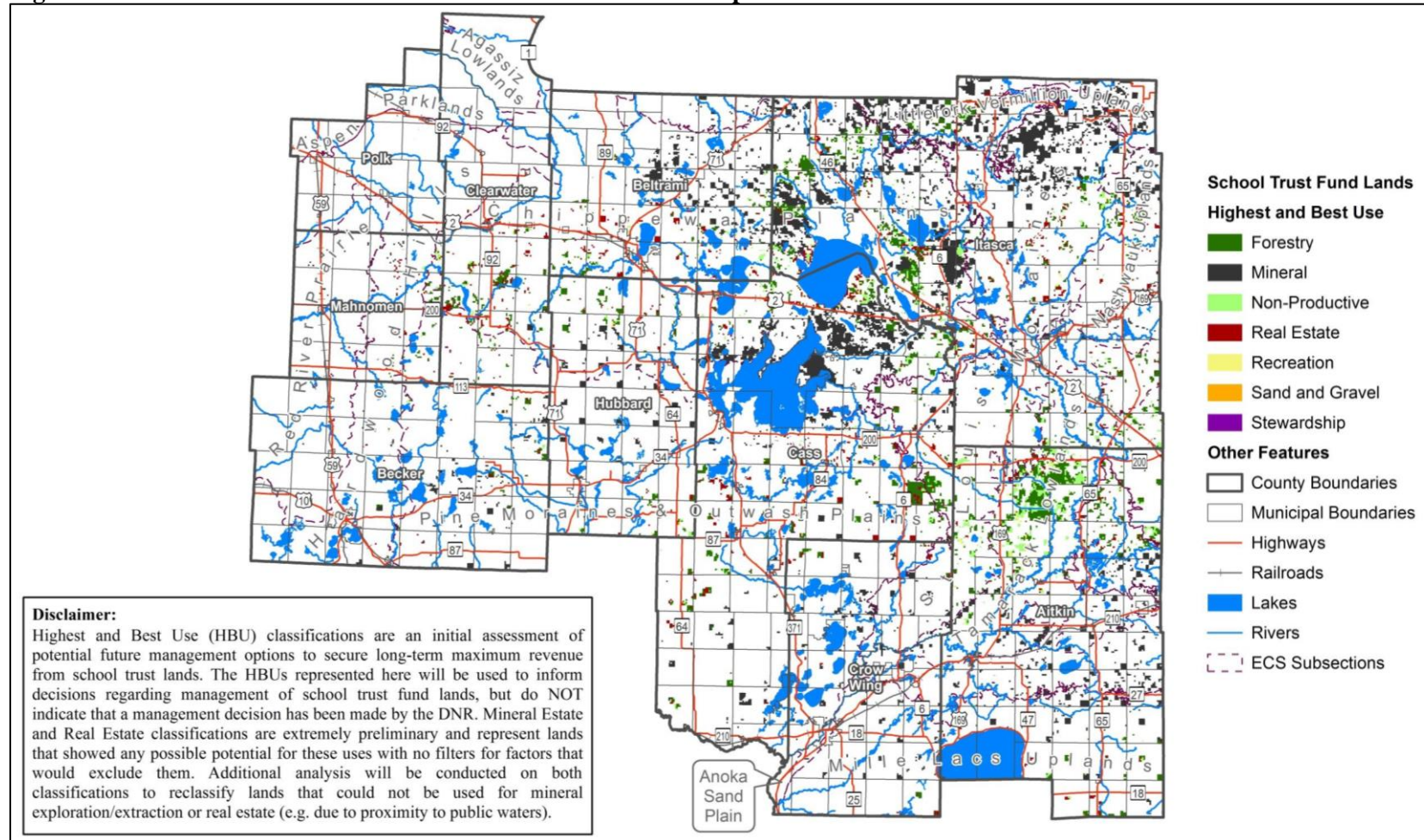
- Lands granted by the federal government.
- Federal and state land acquisitions.
- Lands acquired through forfeiture.

The following narrative provides general information regarding school trust lands and mineral rights, both of which directly affect forest management on large portions of in the landscape. For more detailed information on the history of state land ownership and their management, please refer to the following website: [http://www.dnr.state.mn.us/lands\\_minerals/index.html](http://www.dnr.state.mn.us/lands_minerals/index.html)

### **School Trust Lands**

When Minnesota became a state in 1858, Congress granted to Minnesota sections 16 and 36 of every township to support public schools. Alternative sections, referred to as Indemnity School Lands, were granted in lieu of sections 16 and 36 when those sections had already been claimed or were reserved for a federal reservation, or were under water. The original school trust land grant ultimately resulted in 2.9 million acres being granted to the state for the use of the public schools. Also included in school trust lands today are remaining lands from two other federal land grants, which were redesignated by the state legislature to support schools: the 1860 Swamp Act granted approximately 4.7 million acres, and the 1866 Internal Improvement Acts grant of 500,000 acres. By 1900, much of this land had been sold to raise an endowment for public schools. The trust relationship established between the federal government and the state requires the state to act with undivided loyalty as it manages the school lands to support public schools. Today, the DNR manages 2.5 million acres of school trust lands and an additional 1 million acres of mineral rights for long-term revenue generation. School trust lands cover 733,842 acres of the Landscape or 8.1 % of the 9,069,715 acre region and are scattered widely (Figure 3.6).



**Figure 3.6. School Trust Fund Lands in the North Central Landscape.**

Source: MNDNR and MN Geospatial Commons.

## **Mineral Rights**

Mineral ownership in Minnesota also has a long and complex history, and there are many different variations on mineral ownership. Sometimes the mineral rights associated with a tract of land are wholly owned by the same owner. In other cases, the mineral rights have been separated from the surface ownership and retained by a former owner, creating split estates. Generally, land ownership transfer documents, such as deeds, indicate ownership. These records are contained in each county's land records office.

The State of Minnesota is the largest single owner of mineral rights, controlling around 24% of all rights and managing these for the benefit of the permanent school and university trust funds and local taxing districts. The vast majority of mineral rights in the state, however, are owned by private parties.

In 1901, the state legislature passed a law requiring that the state retain the mineral rights upon the sale of any land that had been acquired by the state, except for the lands granted to aid in the construction of railroads. The policy of reserving mineral rights has now been extended to most of the other lands owned by the state, such as tax forfeited lands and consolidated conservation area lands.

The state's policy of reserving mineral rights when it sells the land means that the state owns more mineral rights than surface rights. It is estimated that the state owns approximately 12 million acres of mineral rights. The exact amount of mineral rights owned by the state is not known due to the lack of clarity in some tax forfeiture records and the lack of a comprehensive state inventory of all lands that have ever been forfeited for taxes. State mineral ownership administration exceeds 50% of the North Central Landscape if you take into consideration the administration of mineral rights associated with meandered water bodies.

For managers of mineral estates one of the highest priority items for landscape planning is access to land so that surveys and samples can be collected to evaluate the mineral estate, and to reduce the uncertainty of where mineral resources might be located in the landscape. However, since state mineral ownership is anchored in place by law, consolidation of surface lands does not result in consolidation of mineral estate. Instead it results in the creation of split estate ownership which can increase difficulty of access for mineral evaluation. So there is some challenge in balancing a desire for surface consolidation, and a desire to retain surface and mineral estate in a united title. Mineral managers would prefer to retain united estate in areas of higher mineral resource potential, and minimize restrictive designation that limits access, discovery, and development.



## Section 4

### Resource Assessment and Trends

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This section summarizes an assessment of the forest resources in the North Central landscape. It highlights resource trends and key findings made by the North Central Landscape Committee relating to forest resources in the region. It has been organized into three areas or resource initiatives including: 1) Ecological, 2) Economic, and 3) Social. This section is intended to serve as a foundation for the development of the strategic policy framework including desired future conditions, goals, and objectives provided in Section 6.

The Committee recognized that while topics in this section are categorized by ecological, economic, and social resource initiatives, the interconnected nature of these issues means that many topics can potentially be addressed under more than one heading. The following narrative starts with the list of assets and issues identified by the Committee. A summary of resource assessments and trends for each of the three resource initiatives follows the list of assets and issues.

#### A. Ecological Resource Review: Assets, Issues, and Resource Trends

##### Assets

- **Intact Forest Land.** The terrestrial area of the North Central landscape is nearly 62% forested as of 2016 and has extensive areas of large blocks of forest lands in comparison with other regions of Minnesota. The large contiguous forests provide habitat for numerous native plant, fish, game, and non-game wildlife species and provide a wide range of ecosystem services such as source water protection, rainfall filtration, cool water temperatures, carbon sequestration, and nutrient cycling.
- **Water Resources.** The region has an extensive network of some of the nation's highest quality lakes, rivers, streams, and wetlands with over 900,000 acres of open water, and over 10,000 miles of streams and rivers. Of particular note is the Mississippi River headwaters which start in the northern part of the region and is the source of drinking water for one quarter of Minnesota's residents and more than 18 million U.S. citizens. Most of the region's streams and rivers follow their natural course and a high number of the lakes have undeveloped forested shorelines. Many of the region's 5,000 lakes support cisco and globally unique high quality wild rice resources.
- **Rare and Unique Species.** The North Central Landscape hosts 84 endangered, threatened, and special concern species, such as the Blanding's turtle and goblin fern.
- **Public Land Base.** Nearly 3.5 million acres (39%) of the North Central Landscape is publicly owned and managed to provide recreation opportunities, wildlife habitat, water quality protections, and forest products. These ownerships have a much lower likelihood of being converted to non-forest uses and development as compared to privately owned lands in the region.

## Issues

- **Climate Change.** Climate change is expected to have widespread effects on forest ecosystems in Minnesota. Many of the important factors that influence forest composition and distribution are expected to change, including seasonal temperatures, the timing and type of precipitation, soil moisture patterns, the severity and frequency of natural disturbances, and the abundance of pests and diseases.
- **Direct Anthropogenic Influence.** Direct influence of ecosystem drivers by humans have and are leading to changes in forest structure and composition. These changes present risks to some native plant and animal communities and makes them vulnerable to a range of stressors including climate change, insects and diseases, invasive species, increased rates of herbivory, and wildfire.
- **Forest Land Conversion.** Approximately 730,000 acres, or 16.3%, of upland forests and over 137,000 acres (5.8%) of lowland vegetation (including lowland forests) in the region have been converted to non-forested land uses since European settlement. As of 2011, agriculture and developed land covered over 1 million acres of the North Central Landscape, down from a peak of over 1.5 million acres in 1992. In recent years forested lands, particularly those in the western portion of the region, are being converted to agricultural uses.
- **Forest Parcelization and Fragmentation.** Parcelization and fragmentation of forest land is occurring across the region, particularly on private lands. The consequences of forest fragmentation include constrained movement of species, reduced forest interior habitat, and increased likelihood of invasive species, insects, and disease.

## Key Ecological Resource Trends

### North Central Region Land Cover

The table below provides an inventory of land cover for five time periods in the North Central Landscape: 1895 (pre-European settlement), 1992, 2001, 2006, and 2011. The 1895 data source is Marschner's Presettlement Vegetation of Minnesota, 1992 from the GAP Analysis Project, and 2001-2011 from the National Land Cover Database (NLCD). At the time of the writing of this plan the NLCD 2016 data was not yet available.

An analysis of the land cover changes in the North Central Landscape indicates a 16.3% decrease in upland forests since pre-European settlement, and a 2.0% decrease since 2006. Conversely, lowland vegetation – which includes lowland forests – has decreased by 5.8% since presettlement and 1.1% since 2006. Agriculture decreased by 55.0% since 1992, but remains dominant in the far western portion of the region. The average annual conversion of rural lands to developed lands from 1992 to 2011 was approximately 0.2% of the landscape (15,430 acres) per year. Since 2011 the conversion rate may have increased as a result of recent conversions of additional upland forests to agriculture, namely pine forests being converted to potato fields and other commodity crops.

**Table 4.1. Land Cover Change in the North Central Landscape, Presettlement (1895) to 2011.**

Land Cover Category	1895		1992		2001		2006		2011	
	Area (Acres)	% of Total	Area (Acres)	% of Total	Area (Acres)	% of Total	Area (Acres)	% of Total	Area (Acres)	% of Total
Upland Forest	4,463,406	49.2	3,781,916	41.7	3,850,912	42.5	3,809,896	42.0	3,735,130	41.2
Upland Shrub	168,778	1.9	295,996	3.3	286,327	3.2	295,566	3.3	324,015	3.6
Upland Grass	1,371,596	15.1	560,550	6.2	841,384	9.3	850,947	9.4	869,579	9.6
Lowland Vegetation	2,365,973	26.1	2,015,059	22.2	2,237,143	24.7	2,253,660	24.8	2,228,779	24.6
Agriculture	0	0.0	1,480,323	16.3	667,392	7.4	667,437	7.4	666,773	7.4
Open Water	699,619	7.7	877,344	9.7	904,191	10.0	902,924	10.0	901,124	9.9
Barren	0	0.0	17,608	0.2	4,618	0.1	9,151	0.1	10,250	0.1
Developed	0	0.0	40,918	0.5	277,748	3.1	280,133	3.1	334,065	3.7
Unclassified	342	0.0	0	0.0	0	0.0	0	0.0	0	0.0
<b>North Central Landscape</b>	<b>9,069,715</b>	<b>100.0</b>	<b>9,069,715</b>	<b>100.0</b>	<b>9,069,715</b>	<b>100.0</b>	<b>9,069,715</b>	<b>100.0</b>	<b>9,069,715</b>	<b>100.0</b>

Source: MN Geospatial Commons, Multi-Resolution Land Characteristics Consortium.

The table at the right displays Forest Inventory and Analysis (FIA) estimates of forest land acres for each county in the North Central Landscape over the past 40 years. According to the FIA estimates, forested acreage in the North Central Landscape has decreased 0.6% since 1977, despite a recent increase of nearly 125,000 acres between the 2003 and 2016 inventories. Seven of the ten counties experienced a net loss of forest land between 1977 and 2016. Aitkin County gained the most forest land (56,301 acres) and Hubbard County lost the most (44,742 acres).

### Forest Composition and Age

FIA estimates indicate that the aspen-birch forest type group has decreased /by over 690,000 acres between 1977 and

Source: Forest Inventory and Analysis.

**Table 4.2. Estimated Extent of Forest Land Acres in the North Central Landscape, 1977-2016.**

County	Forest Land Area (Acres)			
	1977	1990	2003	2016
Aitkin	753,644	754,177	774,658	809,945
Becker	328,886	335,312	348,312	309,149
Beltrami	402,072	400,877	402,944	422,249
Cass	879,357	868,715	826,216	845,450
Clearwater	332,092	317,933	317,698	305,718
Crow Wing	380,486	388,135	355,199	371,045
Hubbard	434,071	401,514	367,769	389,329
Itasca	1,346,925	1,361,403	1,310,732	1,380,254
Mahnomen	106,691	121,326	110,409	102,201
Polk	40,821	31,500	36,396	39,738
<b>North Central Landscape</b>	<b>5,005,046</b>	<b>4,980,891</b>	<b>4,850,333</b>	<b>4,975,078</b>

2016, although it remains by far the largest forest type in the region at approximately 39% of the landscape. During the same period, the oak/hickory forest type group increased by over 446,000 acres. A large majority of the aspen-birch decrease occurred in the 41-60 age class, and much of the oak/hickory increase was in the 61-80 and 81-100 age classes.

Comparison between 2003 and 2016 FIA surveys show a decrease of the aspen-birch forest type group by over 161,000 acres, and a simultaneous increase of the oak/hickory, elm/ash/cottonwood, and maple/beech/birch forest type groups by over 70,000 acres. Most of the aspen-birch decrease happened in the 41-60 and 61-80 age classes, but is partially offset by a large increase in the 21-40 age class. Conversely, the hardwood groups increased most in the 81-100 age class.

FIA estimated age class structure showed an abundance of forest land in the 41-60 age class in 1977. This was significantly reduced by 2016, and was exceeded by the 61-80 age class (now the most abundant age class at 1,148,525 acres). During the same period relatively large gains were also observed in the 81-100 and 101-150 age classes. Table 4.3 - Table 4.6 provides FIA estimates of the age-class structure of the forest broken out by ownership (national forest, state, county and municipal, or private) forest type group, and year – 1977, 1990, 2003, and 2016.

**Table 4.3. Estimated Age Class Structure of Forest Land in the North Central Landscape (acres) by Forest Type Group and Ownership. 1977.**

National Forest									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	6,199	3,111	14,536	22,316	7,699	3,709	--	--	57,570
Spruce / fir	29,730	5,119	10,932	22,353	23,089	--	--	--	98,223
Oak / hickory	--	--	9,432	--	4,120	--	--	--	13,552
Elm / ash / cottonwood	20,267	--	3,800	7,199	3,800	--	--	--	35,065
Maple / beech / birch	2,304	10,399	16,703	20,398	8,399	8,639	--	--	66,841
Aspen / birch	62,440	33,750	118,793	55,552	24,531	--	--	--	295,066
<b>Total</b>	<b>133,279</b>	<b>52,379</b>	<b>174,196</b>	<b>127,818</b>	<b>71,637</b>	<b>12,348</b>	<b>--</b>	<b>--</b>	<b>578,656</b>
State									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	27,698	7,799	19,198	10,499	--	--	--	--	65,194
Spruce / fir	110,721	51,696	62,694	41,697	31,897	21,709	--	1,700	322,115
Oak / hickory	1,400	--	11,099	2,700	1,400	--	--	--	16,598
Elm / ash / cottonwood	25,598	10,099	18,099	18,699	6,000	2,500	--	--	80,995
Maple / beech / birch	9,208	2,700	27,197	11,499	5,399	1,200	--	--	57,204
Aspen / birch	81,798	94,292	154,086	34,897	4,400	--	--	--	369,472
<b>Total</b>	<b>257,522</b>	<b>166,586</b>	<b>292,374</b>	<b>119,989</b>	<b>49,096</b>	<b>25,409</b>	<b>--</b>	<b>1,700</b>	<b>912,677</b>
County and Municipal									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	8,199	27,508	25,198	16,798	--	--	--	--	77,703
Spruce / fir	53,695	31,601	58,197	29,198	7,699	9,399	--	1,400	191,189
Oak / hickory	1,400	7,699	13,899	8,399	1,500	--	--	--	32,897
Elm / ash / cottonwood	10,799	8,100	21,099	16,399	12,499	1,300	--	--	70,195
Maple / beech / birch	1,400	17,399	46,295	14,299	6,699	1,400	--	--	87,492
Aspen / birch	106,492	161,086	321,486	69,593	5,600	--	--	--	664,258
<b>Total</b>	<b>181,985</b>	<b>253,393</b>	<b>486,173</b>	<b>154,686</b>	<b>33,997</b>	<b>12,099</b>	<b>--</b>	<b>1,400</b>	<b>1,123,734</b>
Private									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	38,296	59,395	74,803	21,002	6,599	1,300	--	--	201,396
Spruce / fir	50,999	62,095	61,795	35,098	11,800	13,899	--	--	235,685
Oak / hickory	19,698	19,803	76,798	44,101	12,599	5,499	--	--	178,498
Elm / ash / cottonwood	22,598	29,299	50,399	45,096	20,899	8,000	--	--	176,291
Maple / beech / birch	10,599	33,597	105,904	69,300	22,409	9,199	--	--	251,008
Aspen / birch	230,090	366,971	583,155	100,491	16,598	5,199	--	--	1,302,505
<b>Total</b>	<b>382,780</b>	<b>571,161</b>	<b>952,853</b>	<b>315,087</b>	<b>90,904</b>	<b>43,096</b>	<b>--</b>	<b>--</b>	<b>2,355,882</b>

Source: Forest Inventory and Analysis.

**Table 4.4. Estimated Age Class Structure of Forest Land in the North Central Landscape (acres) by Forest Type Group and Ownership. 1990.**

National Forest									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	17,899	9,900	19,503	9,900	2,900	8,000	--	--	68,101
Spruce / fir	10,600	17,498	25,766	17,299	24,299	14,799	2,000	--	120,861
Exotic softwoods	--	--	--	--	--	--	--	--	--
Oak / hickory	1,200	--	5,999	--	--	--	--	--	7,199
Elm / ash / cottonwood	8,303	7,299	5,500	5,104	3,001	4,600	--	--	35,207
Maple / beech / birch	5,900	1,400	15,504	15,866	13,300	4,700	--	--	56,669
Aspen / birch	90,633	34,399	76,709	63,302	19,500	4,900	--	--	291,043
<b>Total</b>	<b>134,535</b>	<b>70,496</b>	<b>148,981</b>	<b>111,472</b>	<b>62,999</b>	<b>36,999</b>	<b>2,000</b>	<b>--</b>	<b>581,680</b>
State									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	18,299	12,999	11,100	11,900	4,600	700	--	--	59,597
Spruce / fir	29,999	70,397	53,999	47,898	41,603	35,701	2,600	1,701	321,401
Exotic softwoods	--	--	--	--	--	--	--	--	--
Oak / hickory	1,500	3,200	6,100	3,400	500	--	--	--	15,699
Elm / ash / cottonwood	6,500	9,799	10,499	18,099	12,207	3,500	--	--	66,803
Maple / beech / birch	1,800	5,703	8,099	20,599	13,499	3,000	--	--	52,700
Aspen / birch	78,697	51,198	94,994	69,396	14,499	3,500	--	--	337,925
<b>Total</b>	<b>143,994</b>	<b>153,296</b>	<b>184,791</b>	<b>171,291</b>	<b>86,907</b>	<b>46,400</b>	<b>2,600</b>	<b>1,701</b>	<b>872,725</b>
County and Municipal									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	26,900	13,300	31,397	19,299	5,000	--	--	--	95,895
Spruce / fir	28,799	42,998	50,797	51,496	15,399	14,602	1,200	1,500	238,188
Exotic softwoods	--	--	--	--	--	--	--	--	--
Oak / hickory	3,600	2,400	16,499	18,698	1,500	2,300	--	--	44,996
Elm / ash / cottonwood	12,699	14,903	19,502	25,400	9,900	6,801	1,100	--	92,904
Maple / beech / birch	500	6,299	42,000	42,298	9,700	7,799	--	--	108,597
Aspen / birch	159,799	80,801	231,088	145,592	13,700	--	--	--	636,680
<b>Total</b>	<b>236,496</b>	<b>160,700</b>	<b>391,284</b>	<b>302,783</b>	<b>55,199</b>	<b>31,502</b>	<b>2,300</b>	<b>1,500</b>	<b>1,229,260</b>
Private									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	35,311	44,006	72,397	34,699	9,099	4,300	--	--	199,812
Spruce / fir	22,402	70,110	64,002	42,207	20,199	14,999	--	--	243,418
Exotic softwoods	500	--	--	--	--	--	--	--	1,800
Oak / hickory	11,399	14,499	73,601	54,201	31,904	8,200	--	--	193,803
Elm / ash / cottonwood	36,304	19,499	52,400	69,500	26,099	20,902	--	--	227,304
Maple / beech / birch	20,198	18,507	85,107	79,707	39,098	8,499	--	--	251,116
Aspen / birch	253,789	205,889	401,789	208,093	29,498	8,499	--	--	1,113,163
<b>Total</b>	<b>387,103</b>	<b>373,609</b>	<b>749,296</b>	<b>489,607</b>	<b>155,898</b>	<b>65,399</b>	<b>--</b>	<b>--</b>	<b>2,244,518</b>

Source: Forest Inventory and Analysis.

**Table 4.5. Estimated Age Class Structure of Forest Land in the North Central Landscape (acres) by Forest Type Group and Ownership. 2003.**

National Forest									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	4,433	23,569	17,684	20,104	--	5,041	--	3,360	74,191
Spruce / fir	5,844	8,650	8,980	24,164	33,141	13,173	2,476	--	96,428
Oak / pine	--	11,086	2,520	3,360	--	--	--	--	16,967
Oak / hickory	4,656	2,716	3,566	3,303	3,360	3,360	--	--	20,962
Elm / ash / cottonwood	2,520	840	--	13,828	2,520	6,721	--	--	26,430
Maple / beech / birch	1,539	--	3,104	23,889	9,095	--	--	--	37,627
Aspen / birch	98,164	54,300	42,809	55,063	11,369	--	--	--	261,705
<b>Total</b>	<b>121,479</b>	<b>101,162</b>	<b>78,663</b>	<b>143,710</b>	<b>59,487</b>	<b>28,295</b>	<b>2,476</b>	<b>3,360</b>	<b>538,633</b>
State									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	5,255	12,366	20,444	5,841	--	--	--	--	43,906
Spruce / fir	11,774	32,425	88,720	79,249	56,304	29,772	7,982	3,055	309,282
Oak / pine	2,991	--	--	3,525	3,179	--	--	--	9,695
Oak / hickory	4,009	--	17,896	17,042	2,644	--	--	--	41,591
Elm / ash / cottonwood	807	2,810	9,610	19,539	9,530	16,935	--	--	59,231
Maple / beech / birch	--	1,560	2,384	52,658	12,984	--	--	--	69,586
Aspen / birch	138,313	77,368	82,868	61,021	10,398	3,361	--	--	373,329
<b>Total</b>	<b>187,725</b>	<b>132,410</b>	<b>221,922</b>	<b>240,709</b>	<b>95,040</b>	<b>51,066</b>	<b>7,982</b>	<b>3,055</b>	<b>939,909</b>
County and Municipal									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	16,790	24,697	17,978	10,792	10,845	--	--	--	81,103
Spruce / fir	15,848	20,622	40,837	41,259	18,454	22,646	--	--	159,666
Oak / pine	3,439	1,527	2,644	17,028	--	--	--	--	24,638
Oak / hickory	15,700	7,613	36,473	39,240	5,288	--	--	--	104,313
Elm / ash / cottonwood	5,362	8,302	21,762	21,471	16,890	12,034	--	--	85,822
Maple / beech / birch	881	7,092	34,065	38,540	6,644	3,525	--	--	90,748
Aspen / birch	184,374	115,292	116,179	139,619	19,013	--	--	3,055	577,532
<b>Total</b>	<b>266,380</b>	<b>185,146</b>	<b>269,938</b>	<b>307,950</b>	<b>77,133</b>	<b>38,205</b>	<b>--</b>	<b>3,055</b>	<b>1,147,807</b>
Private									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	28,644	49,119	40,973	29,162	882	--	--	--	148,780
Spruce / fir	15,934	41,402	61,225	39,004	18,736	3,283	2,462	--	182,046
Oak / pine	4,131	33,031	32,840	9,351	8,950	--	--	--	88,303
Oak / hickory	48,492	28,519	109,891	172,441	69,402	--	--	--	428,746
Elm / ash / cottonwood	12,161	21,580	37,719	63,667	43,564	13,088	3,082	--	194,861
Maple / beech / birch	20,900	4,924	64,262	70,814	41,735	--	--	--	202,635
Aspen / birch	231,710	169,696	268,665	192,945	29,187	--	--	--	892,202
<b>Total</b>	<b>391,244</b>	<b>348,271</b>	<b>619,657</b>	<b>580,750</b>	<b>216,372</b>	<b>16,371</b>	<b>5,545</b>	<b>--</b>	<b>2,178,209</b>

Source: Forest Inventory and Analysis.

**Table 4.6. Estimated Age Class Structure of Forest Land in the North Central Landscape (acres) by Forest Type Group and Ownership. 2016.**

National Forest									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	169	11,374	19,586	17,750	15,754	7,297	--	--	71,930
Spruce / fir	6,421	8,056	16,124	28,129	23,439	19,249	3,138	--	104,557
Oak / pine	--	5,348	8,166	5,047	6,376	3,035	--	--	27,973
Oak / hickory	7,960	4,913	2,489	7,381	--	6,507	--	--	29,250
Elm / ash / cottonwood	2,391	3,485	1,176	5,531	12,939	9,564	--	--	35,085
Maple / beech / birch	741	1,419	3,188	31,775	4,868	2,489	--	--	44,479
Aspen / birch	50,845	100,966	43,221	48,101	18,303	5,689	--	--	267,125
<b>Total</b>	<b>78,371</b>	<b>135,561</b>	<b>94,780</b>	<b>143,713</b>	<b>81,679</b>	<b>53,829</b>	<b>3,138</b>	<b>--</b>	<b>591,071</b>
State									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	5,577	10,745	9,344	5,341	6,875	--	--	--	37,882
Spruce / fir	21,724	20,810	66,215	81,949	52,868	63,086	7,740	--	314,392
Oak / pine	3,138	--	--	9,074	--	2,988	--	--	15,200
Oak / hickory	10,959	5,738	11,797	8,607	17,770	2,542	--	--	57,414
Elm / ash / cottonwood	7,322	4,206	7,441	22,588	20,442	27,547	--	--	89,545
Maple / beech / birch	9,366	7,500	6,878	20,848	32,796	--	--	--	77,388
Aspen / birch	113,149	100,233	55,502	42,275	11,005	6,926	--	--	329,090
<b>Total</b>	<b>202,043</b>	<b>149,233</b>	<b>162,362</b>	<b>193,036</b>	<b>141,756</b>	<b>103,089</b>	<b>7,740</b>	<b>--</b>	<b>959,258</b>
County and Municipal									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	10,047	21,528	10,174	7,720	7,976	3,885	--	--	61,330
Spruce / fir	11,675	12,363	39,149	42,637	39,301	29,077	436	--	174,638
Oak / pine	9,359	3,417	--	8,979	3,923	--	--	--	25,677
Oak / hickory	25,419	11,099	16,730	35,063	29,360	3,810	--	--	121,482
Elm / ash / cottonwood	6,820	785	16,754	21,633	31,922	17,564	--	--	95,477
Maple / beech / birch	21,470	4,584	17,225	32,002	35,700	2,484	--	--	113,465
Aspen / birch	198,960	180,731	62,580	61,907	16,681	2,241	--	--	523,099
<b>Total</b>	<b>311,978</b>	<b>239,524</b>	<b>165,751</b>	<b>209,941</b>	<b>166,807</b>	<b>59,844</b>	<b>436</b>	<b>--</b>	<b>1,154,280</b>
Private									
Forest Type Group	Age Class								Total
	0-20	21-40	41-60	61-80	81-100	101-150	151-200	201+	
White / red / jack pine	31,984	55,535	41,766	14,483	7,072	785	--	--	151,624
Spruce / fir	20,012	30,756	31,913	67,247	14,349	9,760	2,542	--	176,578
Oak / pine	15,098	1,519	22,021	27,568	5,926	--	--	--	72,133
Oak / hickory	38,008	23,329	91,759	187,358	107,284	16,736	--	--	464,474
Elm / ash / cottonwood	23,070	14,429	26,052	86,393	60,421	28,806	--	--	239,170
Maple / beech / birch	14,483	6,485	28,524	64,551	99,871	22,270	--	--	236,182
Aspen / birch	225,485	245,368	182,381	140,373	38,150	1,559	--	--	833,315
<b>Total</b>	<b>402,584</b>	<b>384,596</b>	<b>426,011</b>	<b>588,820</b>	<b>338,764</b>	<b>84,949</b>	<b>2,542</b>	<b>--</b>	<b>2,228,266</b>

Source: Forest Inventory and Analysis.



### Climate Change

Future forest management discussions need to consider climate change, which is already impacting Minnesota’s forest in the form of warmer average annual temperatures, longer growing seasons, more frequent freeze/thaw cycles, and more frequent and extreme storm events. Forest managers and researchers from across the State of Minnesota and Great Lakes Region developed a climate change vulnerability assessment for the forest ecosystems of the Laurentian Mixed Forest Province in northern Minnesota, titled the Forest Ecosystem Vulnerability Assessment and Synthesis (FEVAS) by Handler et al. 2014. The FEVAS summarizes major drivers and stressors related to climate change and vulnerability determinations for all six forested Native Plant Community Systems, in addition to two key managed forest systems as seen in the table below. Overall vulnerability determinations ranged from low-moderate (Floodplain Forests) to high (Wet Forests, Forested Rich Peatlands, and Acid Peatlands).

**Table 4.7. FEVAS Vulnerability Determination Summaries.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Fire-Dependent Forest	Negative	Moderate-High	Moderate	Medium	Medium
Mesic Hardwood Forest	Moderate	Moderate-High	Moderate	Medium	Medium
Floodplain Forest	Moderate-Positive	Moderate	Low-Moderate	Limited-Medium	Medium
Wet Forest	Negative	Low	High	Limited-Medium	Medium
Forested Rich Peatland	Negative	Low	High	Medium	Medium-High
Acid Peatland	Negative	Low	High	Medium	Medium-High
Managed Aspen	Moderate-Negative	Moderate	Moderate-High	Medium	High
Managed Red Pine	Moderate-Negative	Moderate-Low	Moderate-High	Medium	Medium

Source: Handler et al. 2014; Forest Ecosystem Vulnerability Assessment and Synthesis (FEVAS).

To assist in formulating vulnerability determinations, researchers affiliated with the FEVAS used two climate impact models (Tree Atlas and LANDIS) to describe potential change to tree species by the end of the century in the Northern Minnesota Drift and Lake Plains Ecological Section (212N), which has a similar boundary to the North Central Landscape. Results for the Tree Atlas model are summarized directly from this assessment in the following table and cover the entire Laurentian Mixed Forest Province in Minnesota. Tree Atlas results are divided into “low” (PCM B1) and “high” (GFDL A1F1) climate scenarios so the range of potential outcomes can be compared side-by-side. The LANDIS model results are summarized from a new set of projections from Portland State University and the USFS Northern Research Station. They are draft results as of December 2015, and consider only the Ecological Section 212N landscape. Consistent “winner” species across all three models include American elm, eastern hophornbeam, eastern white pine, northern pin oak, red maple, and white oak. The “loser” species are aspen/poplar and spruce species, which currently cover much of the region. In general, many of the “winners” are from the mesic hardwood, savannah, and grassland ecosystems, whereas the “losers” are associated with the boreal forest.

**Table 4.8. Climate Change Projections for Individual Tree Species Landscape: Northern Minnesota Drift & Lake Plains (Ecological Section 212 N).**

Common Name	PCM B1	GFDL A1FI	LANDIS
American basswood	No Change	Increase	
American beech	New Habitat	New Habitat	
American elm	Increase	Lg. Increase	Increase
American hornbeam	Increase	Lg. Increase	
Balsam fir (-)	Decrease	Lg. Decrease	
Balsam poplar	Lg. Decrease	Lg. Decrease	Decrease
Bigtooth aspen	No Change	Decrease	Decrease
Bitternut hickory (+)	Lg. Increase	Lg. Increase	
Black ash (-)	No Change	Decrease	Increase
Black cherry (-)	Lg. Increase	Lg. Increase	Mixed
Black hickory	NA	New Habitat	
Black locust	New Habitat	New Habitat	
Black oak	Lg. Increase	Lg. Increase	
Black spruce	Lg. Decrease	Lg. Decrease	Decrease
Black walnut	Lg. Increase	Lg. Increase	
Black willow (-)	Lg. Increase	Lg. Increase	
Blackgum (+)	NA	New Habitat	
Blackjack oak (+)	NA	New Habitat	
Boxelder (+)	Increase	Lg. Increase	
Bur oak (+)	No Change	Increase	Increase
Butternut (-)	No Change	Lg. Decrease	
Chestnut oak (+)	NA	New Habitat	
Chinkapin oak	New Habitat	New Habitat	
Chokecherry	No Change	No Change	
Eastern cottonwood	Increase	Lg. Increase	
Eastern hemlock (-)	New Habitat	New Habitat	
Eastern hophornbeam (+)	Increase	Increase	Increase
Eastern red cedar	Increase	Lg. Increase	
Eastern redbud	NA	New Habitat	
Eastern white pine	Increase	Increase	Increase
Flowering dogwood	NA	New Habitat	
Green ash	No Change	Lg. Increase	
Hackberry (+)	Lg. Increase	Lg. Increase	
Honeylocust (+)	New Habitat	New Habitat	
Jack pine	No Change	Decrease	Decrease
Mockernut hickory (+)	NA	New Habitat	
Mountain maple (+)	Lg. Decrease	Lg. decrease	

Common Name	PCM B1	GFDL A1FI	LANDIS
Northern catalpa	NA	New Habitat	
Northern pin oak (+)	Lg. Increase	Lg. Increase	Increase
Northern red oak (+)	Increase	No Change	Mixed
Northern white-cedar	Decrease	Lg. Decrease	Increase
Ohio buckeye	NA	New Habitat	
Osage-orange (+)	New Habitat	New Habitat	
Paper birch	No Change	Lg. Decrease	Decrease
Peachleaf willow	Lg. Decrease	Lg. Increase	
Pignut hickory	New Habitat	New Habitat	
Pin cherry	Decrease	No Change	
Pin oak (-)	New Habitat	New Habitat	
Post oak (+)	NA	New Habitat	
Quaking aspen	Decrease	Lg. Decrease	Decrease
Red maple (+)	Increase	Increase	Increase
Red mulberry	New Habitat	New Habitat	
Red pine	No Change	Increase	Increase
River birch	Increase	Increase	
Rock elm (-)	No Change	Increase	
Sassafras	New Habitat	New Habitat	
Scarlet oak	New Habitat	New Habitat	
Shagbark hickory	New Habitat	New Habitat	
Shingle oak	NA	New Habitat	
Silver maple (+)	Lg. Increase	Lg. Increase	
Slippery elm	Lg. Increase	Lg. Increase	
Striped maple	No Change	No Change	
Sugar maple (+)	Lg. Increase	Increase	Mixed
Sugarberry	NA	New Habitat	
Swamp white oak	Increase	Lg. Increase	
Sweet birch (-)	NA	New Habitat	
Sweetgum	NA	New Habitat	
Tamarack (-)	Decrease	Decrease	Mixed
White ash (-)	Lg. Increase	Lg. Increase	Mixed
White oak (+)	Lg. Increase	Lg. Increase	Increase
White spruce	Decrease	Decrease	Decrease
Wild plum	Increase	Increase	
Yellow birch	Lg. Increase	Decrease	Increase
Yellow-poplar (+)	NA	New Habitat	

Sources: Handler et al. 2014; Forest Ecosystem Vulnerability Assessment and Synthesis (FEVAS).

Draft LANDIS results from Melissa Lucash, Portland State University, 12/4/15

Note: (-) and (+) = this species has particularly low or high modification factors according to the Tree Atlas model, which are natural history traits that might make them less or more adaptable to future change.

### Terrestrial Populations and Diversity

The North Central Landscape provides habitat for many of the state’s terrestrial flora and fauna. According to the MNTaxa dataset total vascular plant species richness in Minnesota is 2,250 with 1,378 documented in the North Central Landscape. Over 87% of these vascular plant species are native to the region and seven of the species are found only in the North Central Landscape.

**Table 4.9. Richness of Amphibians, Reptiles, Birds, and Mammals in North Central Minnesota, 2003.**

compiled in 2003 by the MN DNR Wildlife Resource Assessment Program and reveals that 19 of the state’s 21 amphibian, 14 of 29 reptile, 274 of 315 bird, and 70 of 78 mammal species occur in ECS subsections completely or partial within the North Central Landscape.

Researchers from the Natural Resources Research Institute at the University of Minnesota Duluth conducted research on populations of forest-breeding birds in the Chippewa and Superior National Forests. In general, they found that population trends for some species appear stable or increasing on these lands over the 1995-2015 period. The authors hypothesize that the positive trends relate to important changes in age structure of the forest. An aging forest combined with changing silvicultural practices over the past two decades (e.g. leaving standing timber and snags in clear cuts) may better represent the historical fire disturbance regime to which many bird species are adapted.

### Aquatic Populations and Diversity

Prime fish habitat and healthy populations of fish occur throughout the North Central Landscape. According to statements from Peter Jacobson, Habitat Group Supervisor from MN DNR Fisheries Research, a large and stable population of walleyes occur in the sandy, gravel lakes of the region. In the 634 walleye lakes comprising 587,000 acres of water within the landscape, anglers harvest almost one million pounds (973,000 lbs) of walleyes every year. The North Central Landscape is also the heart of Minnesota’s native muskellunge habitat, which occur in 56 lakes representing 256,000 acres of water and includes the most important native muskie lake within the state, namely Leech Lake. Additionally, the many deep, clear lakes in the region provide excellent habitat for important coldwater fish such as cisco (tullibee). Of the 176 cisco refuge lakes identified in the state, 84 are found in this landscape (these are cold, clear, and deep lakes that will provide refuge for cisco from expected impacts of climate change). 19 of the 84 cisco refuge lakes are Tier 1 lakes (Table 4.10), indicating lakes that have the most suitable coldwater

The table on the right displays species richness by ECS subsection. The data was

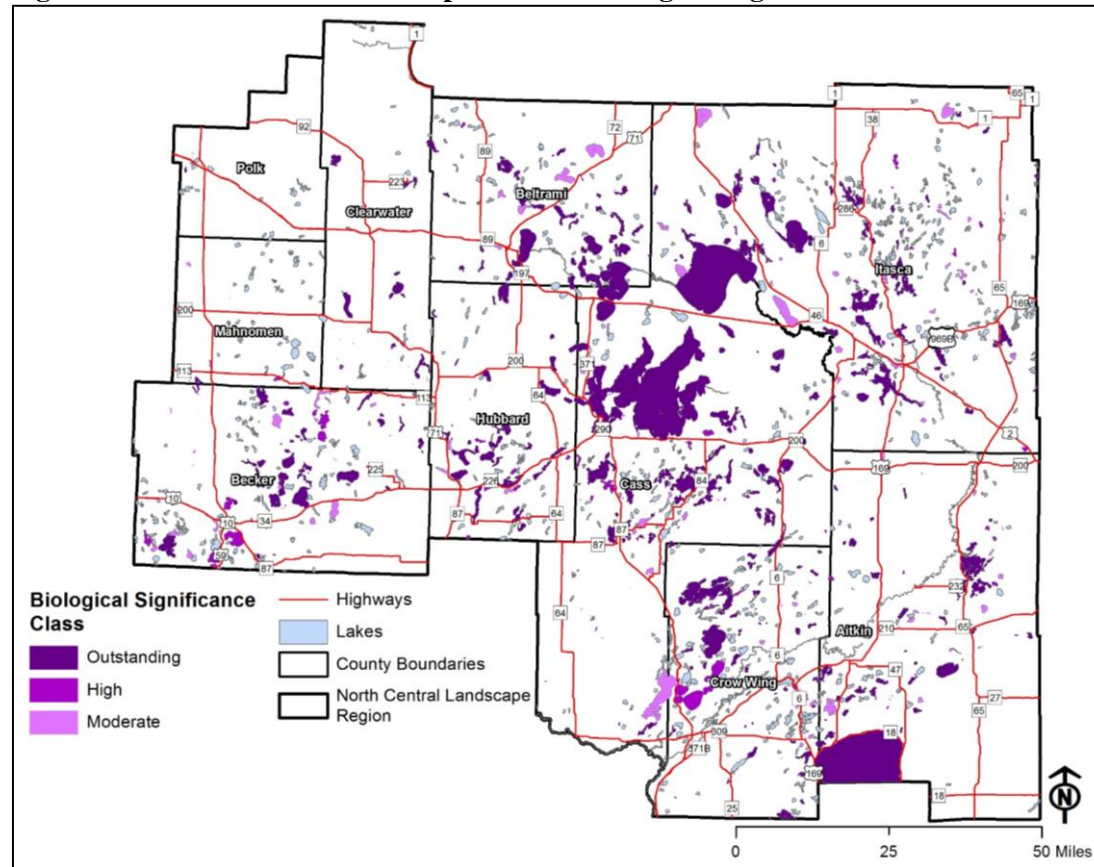
<b>ECS Subsection</b>	<b>Amphibian</b>	<b>Reptile</b>	<b>Bird</b>	<b>Mammal</b>
Red River Prairie	9	8	173	45
Hardwood Hills	12	8	185	53
Aspen Parkland	8	7	184	46
Mille Lacs Uplands	15	14	196	53
Pine Moraine & Outwash Plains	13	10	195	55
St. Louis Moraine	12	4	200	50
Chippewa Plain	11	6	210	52
Tamarack Lowlands	12	5	201	49
Agassiz Lowlands	8	4	212	43
Nashwauk Uplands	12	4	176	40
Littlefork-Vermillion Uplands	12	4	180	39
<b>Total North Central Subsections</b>	<b>19</b>	<b>14</b>	<b>274</b>	<b>70</b>
Minnesota	21	29	315	78

Source: 2003 National GAP Analysis Program – from MN DNR Wildlife Resource Assessment Program.

fish habitat and are expected to be the most resilient to a warming climate. The remaining 65 lakes are Tier 2 lakes, which are less deep and clear than Tier 1 lakes, but are still refuge lakes.

Of the thousands of lakes in the North Central Landscape, hundreds are considered to be ‘Lakes of Biological Significance’ which are lakes identified and classified by DNR subject matter experts on objective criteria for four community types (aquatic plants, fish, amphibians, birds). The region contains 334 lakes classified as outstanding, 88 as high, and 137 as moderate (Figure 4.1). These lakes often include other important features as well, such as cisco and wild rice.

**Figure 4.1. North Central Landscape Lakes of Biological Significance.**



Source: MN Geospatial commons.

**Table 4.10. Tier 1 Cisco Lakes in the North Central Landscape.**

County	Lake Name	Acres
Aitkin	Round	733
Becker	Bad Medicine	746
Becker	Boot	378
Cass	Deep Portage	129
Cass	Portage	277
Cass	Ten Mile	5,047
Crow Wing	Big Trout	1,363
Crow Wing	Kimball	183
Crow Wing	Star	127
Hubbard	Big Sand	1,635
Hubbard	Blue	336
Hubbard	East Crooked	379
Hubbard	LaSalle	238
Itasca	Bluewater	364
Itasca	Clubhouse	265
Itasca	Hatch	216
Itasca	Ruby	235
Itasca	Siseebakwet	1,210
Itasca	Trout	1,743

Source: MN DNR Fisheries.

## B. Economic Resource Review: Assets, Issues, and Resource Trends

### Assets

- **Abundant Public Lands and Diverse Ownership.** Approximately 39% of the total area and over 53% of the region’s forest land is public land managed by federal, state, and county agencies. The remaining land base is privately controlled under tribal, industrial, non-industrial, and non-profit categories of ownership. This diversity of ownership buffers the forest products industry and other regional economic interests through changes in any one owner’s policies or practices.
- **High Quantity and Quality Timber Resources.** The North Central Landscape is over 60% forested and contains a mix of forest types which are important to the economy and businesses in the region. Much of the forest is third-party certified, which promotes sustainable forest management and helps to increase market access for forest products in the region
- **Forest Products Industry and Infrastructure.** The region is home to one paper mill, one engineered wood plant, and 86 sawmills (of which five are among the top 10 largest sawmills in Minnesota). The forest products industry provided over \$808 million in economic outputs and approximately 2,958 jobs in 2015. The North Central Landscape’s 19,000 mile roadway network is vital to the forest products industry for accessing and transporting the region’s timber resources as well as for other businesses and economic activity in the region.
- **Indirect Forest Products, Water Resources, and Outdoor Economic Activity.** The region possesses several unique assets which fuel the recreation and tourism industry. These include numerous game and non-game wildlife species, over 900,000 acres of open water available for aquatic recreation, opportunities for gathering non-timber forest products, thousands of miles of trails, unique and beautiful scenery, and numerous publicly owned outdoor recreation areas.

### Issues

- **Forest Conversion and Parcelization.** High land values, infrastructure development (e.g. energy transmission, urban development, etc.), property taxes, and demand for arable land may trigger landowners to subdivide and sell their property, eventually leading to the conversion of natural cover types (forest lands, grasslands, etc.) to development and croplands. Forest land conversion fragments habitat, threatens water quality, reduces the amount of land available for timber production, and may negatively affect the tourism and recreation industry. Changes in climate may exacerbate this trend.
- **Private Forest Management.** Lack of markets and low stumpage prices for many species (e.g. ash, basswood, tamarack) makes management of these cover types difficult for private landowners.
- **Climate Change, Invasive Species, Pests, and Pathogens.** Climate change and its positive influence on invasive species, pests, and pathogens may have significant impacts to some native plant communities and their associated timber species, which could have major economic impacts on the region. Furthermore, many forest roads and trails may only be used during the frozen season, and some roads have seasonal weight restrictions. This limits access for multiple resources including timber, minerals, and recreation.
- **Forest Industry Uncertainty.**
  - Mill Closures/Partial Shutdowns. Mills in Bemidji, Brainerd, Cook, Deerwood, Duluth, Grand Rapids, and Sartell closed or partially shut down between 2006 and 2013.
  - Recession and Globalization. The economic downturn beginning in 2008 impacted nearly all sectors. The rapidly changing global economy is increasingly challenging to forest based industries competing with overseas costs of production.

- Declining Demand. Due to the decreasing demand for paper products, changes in international markets, and the 2008 collapse of the housing market, Minnesota continues to experience decreasing demand for traditional forest products.
- Declining Timber Harvests. The volume of pulpwood harvested in the region has declined significantly since 2005 and this impacts timberland health and productivity as well as the regional economy.
- Uncertainty in the Reliability and Predictability of Timber Supply. Uncertainties in timber supply coupled with changes in forest product demand make it difficult to confidently project future trends and therefore forest product companies' economic investment timeframes are shortened.
- Logging Sector Changes. In Minnesota there has been a trend toward larger logging businesses harvesting an increasing percentage of the total annual volume harvested, while smaller businesses are predicted to continue to decline. Furthermore, logging equipment and the loggers themselves are aging while fewer young people are entering into the business.
- Transportation Distance. Distances of timber harvest sites to mills in Minnesota are greater than in other wood producing regions. Higher transportation costs negatively affect the forest products industry.
- Sustainable Employment. It is difficult for the forest products industry and the network of supporting employers to create and sustain jobs for workers across the region.

## **Key Economic Resource Trends**

### Forest Land Management

According to 2016 FIA estimates, over 55% of the 4.9 million acres of forest land in the North Central Landscape is publicly owned, and split relatively evenly between Federal (13%), State (19%), and County/Municipal (23%) management. The federal land is primarily located in Cass and Itasca Counties with over 250,000 acres of federal land (primarily the Chippewa National Forest) in each county. State land is a little more evenly distributed with the highest estimated totals in Aitkin and Itasca counties (~285,000 acres each). The amount of county-owned land in each county is positively associated with the size of the county, although Beltrami and Hubbard County have the highest percentage of total forest land in local-government ownership, 34% and 31% respectively.

The remaining 45% of the region's forest land is split between Tribal, Industrial Private, and Non-Industrial Private land ownership. Due to data disclosure issues these three categories are lumped together under the general heading of 'Private'. The highest total private forest land estimates in the region are in Itasca (556,000 acres) and Aitkin (314,300 acres).

### Forest Products Industry

Data in this section about the forest products industry comes from the following source: "North Central Minnesota Forestry Economic Impact Analysis 10-Year Projections"; by M. Haynes et al. 2017; Bureau of Business and Economic Research at the Labovitz School of Business and Economics – University of Minnesota Duluth.

The table below displays the results of IMPLAN (IMPact analysis for PLANning) modeling by Haynes et al. 2017 on the employment, labor income, and output of forest product sectors in the North Central Landscape. The data indicate that forest products manufacturing and related sectors is a significant driver in region, accounting for 3.5% of the economic output. Paper mills produces the highest output (\$274.6 million)

of all forest products sectors in the region. The paper mills also have the highest labor income (\$33.1 million) in the forest products sector. Commercial logging has the highest employment in the region with 729 jobs followed by paper mills employing 329 workers.

**Table 4.11. Forest Products Sectors in the North Central Landscape Based on Employment, Labor Income, and Output According to IMPLAN Modeling, 2015.**

Description	Employment	Labor Income (in Millions)	Output (in Millions)
Paper mills	329	\$33.1	\$274.6
Reconstituted wood product manufacturing	291	\$24.7	\$143.2
Sawmills	250	\$9.9	\$66.8
Commercial logging	729	\$32.1	\$55.4
Wood container and pallet manufacturing	268	\$8.9	\$35.5
Wood preservation	69	\$4.5	\$35.1
Engineered wood member and truss manufacturing	155	\$5.9	\$31.6
Paper bag and coated and treated paper manufacturing	48	\$4.3	\$24.9
Wood kitchen cabinet and countertop manufacturing	201	\$5.3	\$22.3
Wood windows and doors and millwork manufacturing	83	\$5.7	\$19.9
All other miscellaneous wood product manufacturing	128	\$4.1	\$19.8
Prefabricated wood building manufacturing	73	\$4.5	\$15.1
Cut stock, resawing lumber, and planning	60	\$2.8	\$14.7
Other millwork, including flooring	52	\$2.1	\$10.6
Electric power transmission and distribution*	8	\$0.9	\$10.0
Truck transportation**	51	\$2.9	\$8.4
All other converted paper product manufacturing	20	\$1.0	\$6.6
Support activities for agriculture and forestry***	88	\$3.3	\$5.2
Nonupholstered wood household furniture manufacturing	42	\$1.1	\$4.5
Paperboard container manufacturing	2	\$2.6	\$3.1
Showcase, partition, shelving, and locker manufacturing	4	\$0.1	\$0.8
Forestry, forest products, and timber tract production	6	\$0.2	\$0.4
<b>Total (Forestry Sector)</b>	<b>2,958</b>	<b>\$159.8</b>	<b>\$808.5</b>
<b>Total (All Sectors)</b>	<b>166,501</b>	<b>\$6,614.3</b>	<b>\$22,803.1</b>
<b>% Forestry</b>	<b>1.3%</b>	<b>2.4%</b>	<b>3.5%</b>

Source: ‘North Central Minnesota Forestry Economic Impact Analysis 10-Year Projections’, (2017) prepared by the Bureau of Business and Economic Research at the Labovitz School of Business and Economics – University of Minnesota Duluth.

Notes: \* 2% of electric power transmission and distribution from woody biomass, EIA 2017; \*\* 2.8% of truck transportation applies to log and lumber hauling, EMSI 2017 and Reference USA 2017; \*\*\* 20% applies to forestry, EMSI 2017.

### Recreation and Tourism

Outdoor recreation and tourism is a significant portion of the North Central Landscape's economic base. Travelers come to experience the woods and waters of North Central Minnesota which provide multi-season opportunities for a variety of outdoor activities amid beautiful scenery. Some of the region's most popular regional attractions are its parks, lakes, and recreation areas. In total, the region contains eight Minnesota State Parks and two State Recreation Areas which saw an annual visitation in excess of 1.1 million and brought in over \$2.57 million in total sales in 2013. Additionally, the Chippewa National Forest generated over \$385,000 from campground fees in 2015 and estimated roughly 768,000 site visits in 2011.

In 2012, Explore Minnesota Tourism estimated the economic impact of travel/tourism in the North Central Landscape to be nearly \$640 million in gross sales and account for over 13,000 full- and part-time private sector jobs. These numbers encompass accommodations, food and drink places, and arts, entertainment, and recreation. Explore Minnesota Tourism also estimated the total economic impact of expenditures by travelers in the North Central Landscape in 2007-2008 to support nearly 30,000 full-time equivalent jobs. This estimate includes the direct impacts in addition to the estimated indirect impacts. The same report found that about 50% of the total traveler expenditures are between June and August.



## C. Social Resource Review: Assets, Issues, and Resource Trends

### Assets

- **Water Resources.** The region has an extensive network of some of the nation’s highest quality lakes, rivers, streams, and wetlands with over 900,000 acres of open water, and over 10,000 miles of streams and rivers. Of particular note is the Mississippi River headwaters which start in the northern part of the region and is the source of drinking water for one quarter of Minnesota’s residents and more than 18 million U.S. citizens. Most of the region’s streams and rivers follow their natural course and a high number of the lakes have undeveloped forested shorelines. Many of the region’s 5,000 lakes support cisco and globally unique high quality wild rice resources.
- **Outdoor Recreation.** Visitors and residents alike seek outdoor experiences among the woods and waters of the region, which provide readily accessible opportunities for fishing, hunting, hiking, biking, canoeing, kayaking, boating, camping, bird and wildlife watching, alpine and Nordic skiing, snowboarding, snowshoeing, snowmobiling, off-road vehicle riding, berry and other non-timber product harvesting, and many more activities amid unique and beautiful scenery.
- **Native American Traditions and Treaty Rights.** The Leech Lake, Mille Lacs, Red Lake, Sandy Lake, and White Earth Bands of Chippewa (Ojibwe) have a long tradition of cultural uses for the forests and forest-dependent fish and wildlife species in this region. These bands maintain off-reservation hunting, fishing, and gathering rights in the 1837, 1854, and 1855 Ceded Territories which plays a significant role in regional natural resources management. Awareness of tribal treaty rights by resource agencies helps to preserve cultural resources, supports traditional uses, and promotes consideration of other interests when planning land management activities.
- **Citizen Stakeholder Groups.** The North Central Landscape is home to numerous non-profits and conservation groups working to engage citizens in issues affecting forest resources. Among these organizations are local lake associations, land trusts, Minnesota Deer Hunters Association, and the Mississippi Headwaters Board.

### Issues

- **Aging Population.** The 65+ age group is anticipated to increase by over 25% and the 25-64 age group decrease by nearly 4% from 2015 to 2045. This and the baby boomer retirement is expected to have big costs and benefits for society as many people make their seasonal homes full-time retirement residences. This change may impact demands for forest resources, infrastructure, and public services.
- **Water Sources for State-Wide Communities.** The region provides source water for many communities, businesses, and households downstream in Minnesota and beyond. The land use in the North Central region impacts people far beyond its borders.

## Key Social Resource Trends

### Water Resources

The North Central Landscape is an area of rich water resources. Most of this region is drained through the Upper Mississippi River Basin, Red River of the North Basin, or Rainy River Basin. The region also contains small portions of the Lake Superior Basin and St Croix River Basin. Water in this region forms the headwaters to the Mississippi River and land uses in the region, including forestry practices directly affect stream and lake health. Uniquely, water flows are directed exclusively out of this region, not into the region.

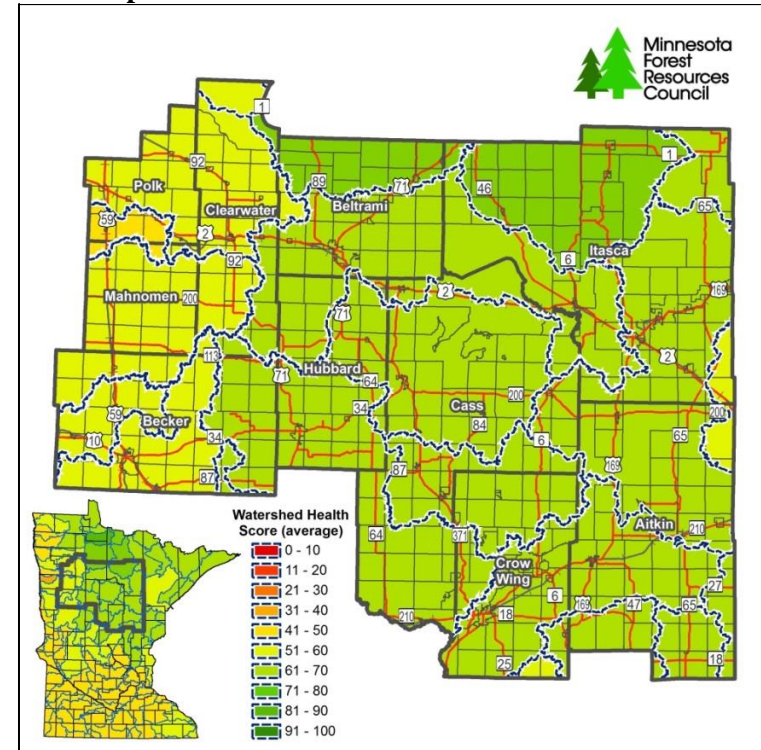
According to watershed health scores as determined by the Watershed Health Assessment Framework (2015), watershed health in the North Central Landscape is on average higher than the rest of Minnesota, but the western watersheds of the Red River Basin had lower watershed health scores than other watersheds in the region, as seen on the map at the right. Additionally, the Minnesota Pollution Control Agency has found that 812 miles of stream and nearly 523,000 acres of lakes in the North Central Region are impaired, with the most common impairment being mercury in fish tissue (affecting 460 miles of streams and 512,000 acres of lakes). Other relatively common impairments result from low levels of dissolved oxygen in streams (276 miles) and high levels of nutrients in lakes (40,000 acres). These water resource conditions in the region impact social conditions for residents, property owners, and visitors.

### Recreation

#### *Resident preferences*

Data on recreational activity preferences of North Central Landscape residents is not specifically available for the 10-county region, however the University of Minnesota Center for Changing Landscapes has developed reports for the 9-county DNR Northeast Region (contains: Aitkin, Crow Wing, and Itasca) and the 24-county DNR Northwest Region (contains: Becker, Beltrami, Cass, Clearwater, Hubbard, Mahnomon, and Polk) as defined in the 2004 Outdoor Recreation Participation Survey of Minnesotans. According to this 2004 study, the recreation activities Northeast and Northwest Region residents most frequently participate in are walking or hiking, boating, swimming and driving for pleasure, which parallel state-wide participation figures. Northeast Region residents participate in gathering mushrooms, berries or other wild foods, ATV driving, and snowmobiling to a greater extent than state residents overall and are less likely to participate in biking, golfing,

**Figure 4.2. Watershed Health Scores in the North Central Landscape.**



Source: MNDNR Watershed Health Assessment Framework.

walking/hiking, or running and jogging. Northwest Region residents participate in hunting, ATV driving, and snowmobiling to a greater extent than state residents overall and are less likely to participate in biking, running or jogging, or ice skating/hockey outdoors.

### *Access*

Public access to the region's forests, lakes and waterways are typically via trails and public water access points. The two main trail management agencies are the US Forest Service and the Minnesota DNR. The combined miles of trail types managed by these two organizations within the North Central region are snowmobile (4,636), All-Terrain Vehicle (890), hiking (794), bicycling (including mountain bike) (549), Off-Highway Motorcycle (513), cross-country ski (173), horse (124), and Off-Road Vehicle trails (50). Residents and tourists can also access the water resources of the North Central Landscape by using any of the estimated 939 public water access points in the region, over half of which are located in Itasca, Cass, and Crow Wing counties. Access types include ramps (concrete, gravel, and earth), carry-in access, as well as fishing piers.

### Demographic Trends and Projections

#### *Population*

The population of the North Central Landscape (295,419 people according to the last census in 2010) has experienced a variety of changes over the last 55 years. Rates of change have varied from near stable (1960-70 = 0.4%; 1980-90 = -0.2%) to outpacing the state-wide growth (1970-80 = 16.5%; 1990-2000 = 13.3%). The US Census Bureau estimates that seven counties in the region experienced growth between 2010 and 2016 (Becker, Beltrami, Clearwater, Cass, Crow Wing, Hubbard, and Itasca), two remained relatively stable (Mahnomen and Polk), and one experienced population decline (Aitkin).

The Minnesota State Demographic Center is able to provide population projection estimates, and they forecast that the region's population will increase by 7.9% between 2015 and 2045. Despite the overall increase, variability in the rate of change exists within the region. Becker, Beltrami, and Mahnomen are projected to increase at a higher rate than the state-wide average (13.4%) while Aitkin is expected to decline by 13.7% between 2015 and 2045. All other counties are projected to increase between 5 and 10%, with the exception of Itasca County which has a population growth projection of 0.8%. When broken down by age groups, the 0-24 year-old age group is expected to rise by 13.2% in the North Central Landscape while the 25-64 age group is expected to decline by 3.7%. During this same time period the >65 age group is expected to increase in population by 25.6%.

#### *Household*

According to the U.S. Census Bureau, 5.8% (123,132 households) of Minnesota's roughly 2.16 million households and 7.9% of the state's 2.35 million housing units are located in counties in the North Central Landscape. Crow Wing County contains the most households and housing units in the region (21.4% and 21.8%, respectively), while Mahnomen County contains the fewest (1.6% and 1.5%, respectively). All ten counties in the region have median household incomes below the state median (\$63,217). Median annual household income is highest in Becker County (\$54,115 followed closely by Polk County at \$53,059) and lowest in Mahnomen County (\$41,597). All counties except Crow

Wing are above the state median of persons below poverty level (10.8%) with the highest rates in Mahnomen (22.3%) and Beltrami (19.1%) counties.

The Minnesota State Demographic Center predicts household numbers state-wide will rise by 5.6% between 2015 and 2020, and 24.6% between 2015 and 2040. Household projections for the North Central Landscape are lower, 4.7% and 16.4% respectively. Beltrami County is projected to have a greater increase in households by 2040 (30.8%) than the state as a whole while Clearwater County is projected to decline by 5.8% by 2040.

### *Employment*

Data from the Bureau of Labor Statistics shows that from 2006-2015 Minnesota's mean annual employment numbers increased by 4.0%. In the North Central Landscape five of the ten counties have experienced overall negative employment growth since 2006 (Aitkin, Crow Wing, Hubbard, Mahnomen, and Polk) and three counties experienced growth rates higher than Minnesota as a whole (Becker, Beltrami, and Clearwater). According to the Minnesota Department of Employment and Economic Development, the largest employment sectors are Health Care and Social Assistance, Retail Trade, Accommodation and Food Services, and Manufacturing, which collectively account for about 57.7% of all reported jobs in the region.

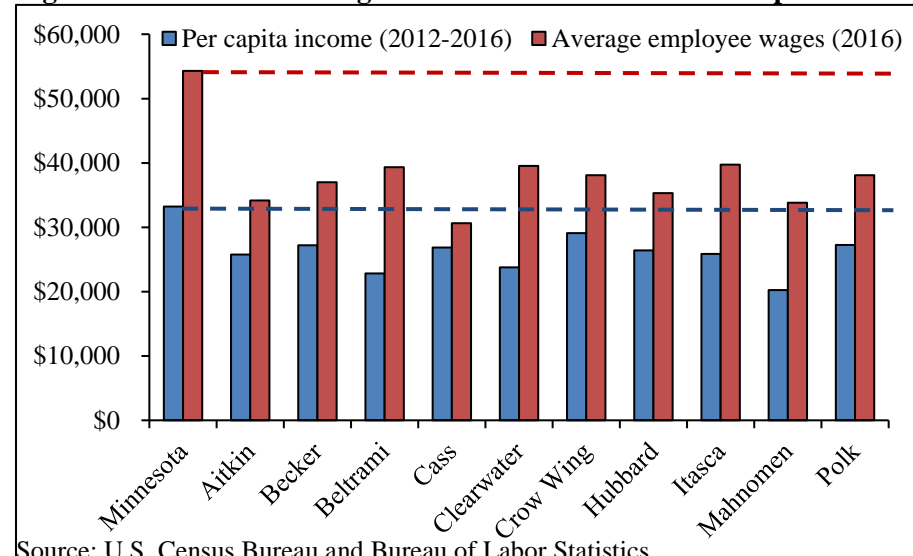
Over the past 15 years the regional unemployment rate has generally been higher than the state and national average, but since the 2008 recession it has either been lower or very near to the national average. Most counties have similar unemployment rates with the exception of Clearwater County, whose unemployment rate has been consistently higher than the other counties in the region.

### *Earning and Income*

According to data from the U.S. Census Bureau and Bureau of Labor Statistics, the state-wide per capita income and average annual employee wages exceeds every county in the North Central Landscape by at least 12.4% and 26.9%, respectively. The highest-income county in the region is Crow Wing County (\$29,106) and the lowest-income county is Mahnomen (\$20,233). In terms of wages, Itasca and Clearwater County workers received the highest per worker wage (~\$40,000) and Cass County workers received the lowest (\$30,633).

The figure at the right details the per capita income and average employee wages for North Central Landscape counties.

**Figure 4.3. Income and Wages in the North Central Landscape.**



Source: U.S. Census Bureau and Bureau of Labor Statistics.

## D. Committee Findings on Overall Resources in the North Central Landscape

- **Complex Landscape.** This region is a highly complex landscape with an abundance of interconnected ecological, economic, and social resources and values.
- **Ecosystem Stress.** Native plant communities are stressed by altered natural disturbance regimes, invasive species, climate change, and increased rates of herbivory.
- **Land Ownership.** The North Central Landscape’s ecological, economic, and social resources are all influenced by patterns of land ownerships. The region has some of the most complicated rural land ownership patterns in the nation. Private landownership is particularly important, but there is a significant decline in private landowner engagement and forest land management.
- **Tribal Interests.** Native Americans are a larger proportion of the population and land ownership base in the North Central Landscape than other parts of the state. Treaty rights cover significant portions of the landscape.
- **Water Resources of National Significance.** This region encompasses water resources - including lakes, stream, and wetlands - that are nationally significant and provides drinking water for millions of people downstream. Landscape decisions will therefore have long-term significant impacts on water quality and availability on both a regional and national level.
- **Water Quality/Forest Connection.** Water quality is directly linked to healthy forests.
- **Tourism and Timber.** The local economy is strongly driven by the forest industry, recreation, and tourism. Effective management of natural resources is therefore needed to maintain and enhance the region’s economic and social well-being.
- **Economic Influences.** The landscape is heavily affected by macroeconomic trends.
- **Healthy Forest Products Industry.** Health of the forest products industry and infrastructure is essential for forest management.
- **Forest Fragmentation.** A significant portion of the landbase in the region is at risk to parcelization, fragmentation, and land use change. In general, urban and shoreland pressures are moving across the landscape from the south and agricultural land conversion pressures are moving into the region from the west.
- **Conservation Priorities.** Conservation priority areas are at the intersection of risk and quality.
- **Keeping Forests as Forests.** Maintaining intact forest land benefits all other ecological resources.
- **Balance.** Working together, we can find ways to balance the three legs of the sustainable forest resources stool.

## E. Conclusion

Through the resource assessment process described in this section, the Committee has made a direct and intentional effort to give equal consideration to long-term **ecological, economic, and social** needs and limits facing the forest resources in the North Central Landscape. It has also added consideration to administrative, coordinative and financial aspects.

This work has helped to increase understandings and build a shared perspective on forest resource issues and challenges in the region for the Committee. It should be reviewed by users of the Plan to help them participate more effectively in the implementation of the Plan.

The findings provide a summary of the topics studied by the Committee in this planning process provide a substantial starting point or foundation for developing the policy framework in this Plan. This summary, along with the background studies and research, are intended to provide a logical and rational basis for the policy framework described next, in Sections 6–9.

## **Part 2. Strategic Policy Framework:**

Where do we want to go?

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## Section 5

### Working Principles and Definitions

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This first section of Part 2 of the Plan addresses the strategic question, ‘where do we want to go?’ and outlines the working principles the Committee developed at the outset of their visioning for the future forests of the North Central Landscape. Part 2 of the Plan represents the heart of the Committee’s vision for the future of forest resources in the landscape. Users of the Plan are encouraged to read through these principles to gain that shared perspective with the Committee.

#### A. Working Principles

In May 2016, the North Central Landscape Committee formulated a series of working principles to summarize how they viewed the context of the forests in the North Central landscape over time and how they would recommend interested stakeholders pursue sustainable forest management in the future.

The working principles were developed to help provide users of this Plan more perspective as they work with the desired future conditions and the policy framework of goals, objectives and action items. The following summarizes the Committee’s working principles:



- 1. Voluntary Nature of Landscape Planning and Coordination.** The Committee recognizes the voluntary nature of landscape planning and coordination as envisioned by the Minnesota Sustainable Forest Resources Act and acknowledges the rights and responsibilities of the landowners and managers concerning land use and management. The Committee further recognizes that land use is largely a matter of local and private control and that each unit of government, in conjunction with landowners, works to guide and manage the use of lands, forests, and natural resources within their jurisdictions.
- 2. Promote a Shared Understanding of the Forest Resources in the Region.** Understanding or attempting to reconstruct past forest disturbances to explain how or why a forest stand is as it is, is important when managing land to support a shared understanding of the forest resources in the region and their history. But choosing to manage back to any one condition may not be optimal or attainable. Acquired knowledge should be used deliberately to steer a stand/forest/landscape toward a future desirable and attainable condition.
- 3. Use Best Available Science, Indigenous Knowledge, and Professional Judgment to Inform Decision Making.** The Committee recognizes that forest ecosystems are complex and dynamic and that science is an ongoing endeavor. Decision makers need to continuously stay current in relevant topics in order to arrive at the best possible answers. We also acknowledge that the past is an important but not the only guide to anticipating future conditions, and that we will need to commit to continuous improvement and adaptive management in

order to successfully plan for a range of plausible futures. In our evolving management endeavors, we commit to using the best available science, indigenous knowledge and professional judgment to inform decisions.

4. **Work Collaboratively to Sustainably Manage Forest Resources Across All Lands in the Landscape.** The Committee recognizes the diverse economic and social patterns that have evolved across the region over the past several thousand years – from the American Indian traditions to the present day land ownership patterns. While the extent and condition of forest resources has changed, the Committee recognizes that forest land cover is still largely intact across much of the landscape and provides an array of public and private benefits.

The Committee recommends an ecologically based approach to land management and development in the region, such as the Ecological Classification System (ECS), as a means to plan and guide forest management activities. When making recommendations to private landowners or management decisions on public lands, the Committee recommends that all land managers consider presettlement vegetation, current conditions, climate change, as well as potential native plant community options that promote an ecologically diverse forest, resilient to stressors. The Committee further recognizes the continuum of forestry practices and that forest management involves a number of conditions and approaches. There are different types of forests for different needs and landowner objectives. By working collaboratively, the region's landowners and managers contribute to sustainably managed forest resources across the landscape.

5. **Commitment to Landscape Management.** The Committee encourages all stakeholders to commit to the landscape coordination processes and use the landscape plan as a reference document when developing their own plans to increase and sustain cooperation and coordination among and between landowners, agencies and organizations responsible for forested landscapes. The Committee commits to supporting open and continuous communication and dialogue among all parties interested in sustaining regional forested landscapes to achieve the region's ecological, economic, and social goals. The Committee also commits to supporting existing monitoring and evaluation systems and implementing a regional monitoring and evaluation program that supports increased coordination for sustainable forest management.

## B. Overview: Planning Terms

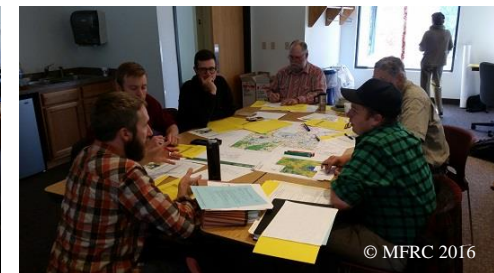
The Committee adopted a series of nested terms to organize the ideas and concepts suggested by the people involved in the planning process. The terms were standardized to aid in the development as well as in the coordination and implementation of the Plan and are defined as follows:

**Desired Future Condition.** Desired Future Conditions (DFC) are broad overarching statements that describe preferred or desired conditions that a given geographic area or region will be like at the end of a given timeframe. DFC statements are very general and long range in nature. They are intended to provide an initial starting point for agreement on what forests in the landscape should be like in the future. This plan used a one hundred (100) year horizon when describing the desired future conditions of forests.

**Goal.** Goal statements outline the general aims of an organization that it intends to attain at some point in the future. Goals are intended to provide general direction for a given ecological economic or social resource initiative (forest land base, vegetation and wildlife, water resources, etc.). Words such as *encourage*, *protect*, *promote*, *preserve*, and *restore* are commonly found in goal statements. The goals in this landscape plan represent what the Committee thought needed to be pursued over the next ten to twenty (10 – 20) years to promote sustainable forest resources across the region.

**Objective.** Statements that provide more specific direction on the efforts or strategies that are needed to implement each goal. Goals usually have more than one objective. Words like *construct*, *plant*, *remove*, and *monitor* are used to describe more specific direction in implementing the goals. Often, objectives will include quantifiable targets as means to provide more specific and measurable parameters for monitoring progress. The initial direction and description of programs and projects are usually found in objective statements.

**Action Items.** These statements outline in more detail what the partners anticipate will be the major tasks in completing the objectives. Objectives should contain several action item statements to help further clarify efforts needed to complete the objectives.



In general, goals, objectives, and action items are intended to provide a detailed outline of what an organization proposes to implement over the planning horizon, typically ten to twenty years. Collectively, the objectives and action statements define the methods needed to achieve the goals.

A simple illustration can help clarify these fundamental planning policy definitions. The diagram in the side bar illustrates how the different types or levels of policy statements (goals, objectives and action items) relate to each other. This simple structure was used to help record, sort, and organize the ideas and recommendations made in the planning process.

As illustrated, several action item statements are nested into a corresponding objective or the next level up in the outline. Next, objectives nest into or describe how a given goal is to be implemented. And finally, the goals nest into the one desired future condition addressing the major emphasis areas of the resource initiatives of this project (ecological, economic, and social). This structure or hierarchy helps to provide a stronger sense of purpose and a more detailed or specific course of action. This organizational format is also intended to help readers more quickly locate the specific topics that they are interested in.

Users of this Plan are encouraged to briefly read through the headings of various levels of policy statements to quickly gain a general sense of direction that the partners in the North Central Landscape have chosen. Generally, the goals, objectives, and action items listed in this Plan have been placed in a sequential or chronological order. In some instances, the statements may have been organized in order of diminishing influence that the North Central Landscape Committee and its partners have in implementation.

The strategic policy framework lays out a blueprint or road map for the sustainable management of forest resources in the region. It is meant to guide not only the efforts of the members of the North Central Landscape Committee, but also landowners, resource managers, local officials, natural resources professionals and service providers working in the region. Only through the combined and coordinated efforts of these people will sustainable forest management be successful in the North Central Landscape.

### **Nesting of Policy Statements**

**Desired Future Condition...** in one hundred years, the landscape region will have...

**Goal 1:** .

**Objective 1:**

Action Item 1.

Action Item 2.

**Objective 2:**

Action Item 1.

Action Item 2.

**Goal 2:** .

**Objective 1:**

Action Item 1.

Action Item 2.

**Objective 2:**

Action Item 1.

Action Item 2.

and so on...

## Section 6

### Desired Future Conditions, Goals, Objectives, and Action Items



This section of the Plan further describes the vision for the future forest conditions across the North Central Landscape by providing the Desired Future Conditions and the approaches (Goals and Objectives) to promote the management of healthy forests in the region. The SFRA requires the MFRC and its regional committees give equal consideration to the long-term ecological, economical, and social needs and limits of the state's forest resources. The Committee addressed this legislative directive by organizing this section of the plan into ecological, economic, and social resource initiatives.

Throughout this plan and in the development of the initiatives described below, it is a shared understanding that partners will implement the MFRC management guidelines when managing forest resources in the region. These measures are described in Sustaining Minnesota's Forest Resources: Voluntary Site-Level Management Guidelines.

#### A. Ecological Resource Initiatives

From an ecological perspective, in 100 years the North Central Landscape Committee envisions a landscape with the following Desired Future Conditions:

- **DFC 1: Forest Diversity and Health.** North Central region forests have a range of cover types, patch sizes, growth stages, and age classes that closely resemble the composition, structure, and function of native plant communities adapted to the landscape and climate of the North Central region. The diversity of fish, wildlife, and plant species is maintained or restored on the landscape using management activities and best management practices which are appropriate to the native plant community and prevent unintended adverse consequences. The resilience and natural adaptive capacity of ecosystems is maintained or enhanced to address climate change and other stressors while maintaining quality ecosystem services.
- **DFC 2: Native Ecosystems.** The amount of forest land and timberland in the landscape is the same or greater than it was in 2016. Extensive areas of large block contiguous forest land with minimal inclusions of conflicting land uses are distributed across the region. Other key native ecosystems such as wetlands and prairie are protected and restored in appropriate locations.



The following ecological goals, objectives, and action items outline the steps the committee believes are necessary to achieve these desired conditions.

**Goal 1: Enhance the ability of the forest ecosystems in the region to adapt and respond to current and future threats by fostering ecosystem resilience, resistance, and adaptability.**

**Rationale:**

- Ecosystems are dynamic and should be managed to promote forest health and their ability to adapt to changing conditions.
- The ability of a forest ecosystem to respond to disturbances, to be resilient, resisting of change and adaptable when change comes can be affected for better or for worse by human disturbances, forest management and other land management actions. It is the goal of the NC Landscape Committee that land managers use the best available science in our management so that we collectively enhance the ability of our forests to thrive into the future.

**Potential Monitoring Indicators:**

- Acres affected by natural disturbance events – fire, insects, windthrow, etc.
- Within stand and landscape level diversity.
- Number of rare species and acres of rare communities in the landscape.
- Changes of species locations relative to topography, aspect, latitude.
- Age structure diversity across the forest.
- Wildlife species changes relative to habitat.
- Acres of tree species anticipated to increase or decrease with climate change according to the USDA (2014) Forest Ecosystem Vulnerability and Assessment and Synthesis report.

**Objective 1: Ecosystem Diversity.** Manage for a mix of current and future adapted species, promote genotypic diversity, and maintain a range of age classes, growth stages, and structural diversity features characteristic of the native plant community. Educate forest partners about natural variation in ecological communities - especially at the landscape level.

**Action Item 1: Forest Land Prioritization.** Prioritize at risk, ecologically valuable, or vulnerable forest lands to conserve forest resource values.

**Action item 2: Disturbance Events:** Respond appropriately to natural disturbance events to minimize additional impacts.

**Objective 2: Forest Health and Natural Disturbances Events.** Remain flexible and adaptive with regards to forest management in order to respond to disturbances and other health issues appropriately, while acknowledging their role in ecosystem processes.

**Action Item 1: Invasive Species.** Inventory, education, and control the spread of terrestrial invasive species.

**Objective 3: Protect unique, rare, or sensitive features.** Management activities should protect unique, rare, or sensitive species and ecological communities on the landscape from development or degradation. The Natural Heritage Information System is one of many useful sources for identifying natural features in need of protection.

**Action Item 1: Refugia.** Maintain sites of biodiversity refugia from stressors, including climate change, by prioritizing and protecting sites which are unique, or contain sensitive or at-risk species/communities. Establish reserves for at-risk and displaced species.

**Objective 4: Wildlife Management.** Manage for a full spectrum of wildlife species based on their respective ecosystem carrying capacity and natural range of variation.

**Goal 2: Maintain or increase the area of forest land in the North Central Landscape.**

**Rationale:**

- The forest lands of the North Central Landscape provide more than the wood based fiber we all use daily in our lives. These forests support our local economies; not only the forest product industries, but also our tourism industries, resorts, camping, clean water, quality fisheries, etc. The forested watersheds of the region also support the headwaters of the Mississippi River which provides drinking water to communities living downstream. These benefits all stem from the forested conditions across a large percentage of the North Central landscape. The Committee believes that maintaining or increasing the forest land base is integral to maintaining these benefits and ecosystem services.

**Potential Monitoring Indicators:**

- FIA (Forest Inventory and Analysis) landcover classification/remote sensing.
- Forest acreage vs non-forest acreage overall.
- Forest and timber land acreage overall.

**Objective 1: Landowner Education.** Provide information to landowners on the value of forests to society, the economy, and the environment, and the importance of maintaining current acreage and parcel sizes to avoid the threats associated with fragmentation.

**Action Item 1: Education.** Participate in the efforts of private forestry programs, including work led by local and state agencies.

**Objective 2: Land Protection Tools.** Utilize voluntary conservation easements, fee title acquisition, incentive payments, and tax programs to protect private forest land from conversion to non-forest uses.

**Action Item 1: Forestry Associations.** Encourage partnerships between small private forest land owners to utilize land protection tools for which they may not qualify individually.

**Action Item 2: Forest Land Prioritization.** Prioritize at risk, ecologically valuable, or vulnerable forest lands for application of land protection tools, to prevent conversion to non-forest uses, and to conserve forest resource values.

**Objective 3: Establish Forests.** Encourage reforestation of abandoned farm lands with tree and shrub species appropriate to the native plant community, to the extent possible.

**Goal 3: Retain contiguous blocks of forest land.**

**Rationale:**

- Large forests help retain water quality and aesthetic, habitat, and other natural resource values.
- Contiguous blocks of forest land, whether on a single ownership or spanning across multiple ownerships, can provide a variety of benefits which smaller isolated blocks do not. A large forested area, even as an ever shifting mosaic of age classes and species changes, provides connected habitat which is necessary for some wide ranging wildlife species and advantageous for species with small home ranges by maintaining a pool of genetic variability for their populations.
- Contiguous blocks also allow for increased forest management efficiencies, reduced road network per acre of forest, and other benefits. Large blocks allow for more efficient timber management and sustainable management of a diverse array of cover types.

**Potential Monitoring Indicators:**

- The number of acres protected from conflicting non-forest conversions by conservation easements, etc.
- The number of forested blocks exceeding some threshold sizes (e.g. DNR Section Forest Resource Management Plan patch size definitions).
- Changes in forest patch sizes and connectivity.
- Changes in median and mean forest parcel size within the region.

**Objective 1: Natural Resource Emphasis Areas (NREAs).** Create and/or retain large blocks of contiguous forest land with minimal inclusions of conflicting land uses for natural resource and ecological benefits (hereafter referred to as "natural resource emphasis areas") which encompass national forests, state forests, county forests, and other large, contiguous blocks of forest land through mutual agreement.

**Action Item 1: Identification.** Identify regional NREAs where ecological quality and risk of parcelization/fragmentation overlaps.

**Objective 2: Fragmentation and Parcelization.** Minimize fragmentation of forests by encouraging innovations, including strategic development planning and design, that promote forest uses and discourages parcelization.

**Action Item 1: Forest Stewardship.** Utilize the private forest implementation toolbox (see Section 10), especially for larger blocks of land.

**Objective 3: Planning Coordination.** Coordinate the North Central Landscape Plan and watershed management plans to promote the protection of large blocks of contiguous forest land to protect water quality and maintain fish communities and species richness.

**Action Item 1: Plan Integration.** Promote integration of the North Central Landscape Plan with regional resource management plans.



**Goal 4: Protect and prevent the loss of sensitive and undeveloped lake and river shorelines. Restore natural characteristics to developed shorelines. Manage stream ecosystems to maintain and protect their dimension, pattern, and profile to minimize erosion and support aquatic biota.**

**Rationale:**

- This region has a wealth of aquatic resources, and their protection should be prioritized during resource management activities.
- Lake and river shorelands are the critical riparian interface between the uplands and the waters. These become the most critical areas for protecting our waters and the fisheries habitat they contain from the adverse often unforeseen but cumulative effects of human development of the lands.
- Undeveloped shorelines are a finite resource. They provide critical habitat for shoreline dependant species (loons, herons, waterfowl, terns, eagles, ospreys, kingfishers, beavers, muskrats, frogs, turtles) as well as fish and numerous other songbirds and mammals. They are critical to support lake ecosystems for quality fisheries and clean water.

**Potential Monitoring Indicators:**

- Site-level monitoring program - spatial analyses of land use.
- Changes in miles of impacted shoreline.
- Water quality conditions of the lakes and rivers (Watershed Restoration and Protection Strategies (WRAPs) reports).
- Downstream water treatment costs or requirements.

**Objective 1: Public Shorelands.** Discourage the sale and/or development of publicly held shorelines.

**Objective 2: Land Exchanges.** Exchange land for critical shoreline when available. Encourage conservation easements to protect critical or high quality shorelines.

**Objective 3: Barrier Removal.** Support the restoring of the free passage of water and aquatic organisms where there are restrictions or blockages that impact forest resources and where it will not be detrimental to intact ecosystems, such as promoting the spread of an invasive species. This includes removing barriers such as log jams from blowdowns, problem beaver dams, and poorly designed or constructed road culverts.

**Objective 4: Performance-Based Ordinances.** Promote adoption of performance-based ordinances that emphasize lakeshore protection.

**Objective 5: Runoff Control.** Install, repair, and upgrade rain gardens, infiltration basins, and vegetated buffers in areas with high runoff concentrations.

**Objective 6: Local Support.** Encourage local, grass-roots, government, and organizational support (townships, lake associations, etc.) to identify and promote protection of these shorelines.

**Objective 7: Landowner Education.** Engage in existing programs and efforts from local and statewide organizations to educate lakeshore owners and lake associations on the environmental benefits of natural shorelines and available cost share programs to improve shorelines.

**Objective 8: Easements and Tax Incentives.** Promote easements and tax incentives to protect forested shorelines such as 2C and SFIA.

**Objective 9: Fee Title Acquisition.** Promote the strategic use of fee title acquisitions to permanently protect high-risk and high-quality parcels.

**Objective 10: Qualified Logging and Forestry Professionals.** Promote the education of forestry and logging professionals in the implementation of best management practices that protect shorelands and stream ecosystems.

## B. Economic Resource Initiatives

From an economic perspective, in 100 years the North Central Landscape Committee envisions a landscape with the following Desired Future Conditions:

- **DFC 1: Economic Diversity and Vitality.** A diverse and sustainable forest-based economy capable of adapting to current, long-term, and emerging demands while supporting vibrant and proactively responsive local communities.
- **DFC 2: Sustainable Forest Management.** Forest management promotes diverse, healthy ecosystems able to respond to climatic, natural, or introduced threats and ensure market sustainability.
- **DFC 3: Ecosystem Services.** Users of ecological services both inside and outside the North Central Landscape recognize the economic value of services produced within the region.
- **DFC 4: Private Forest Management.** Private landowners have access to necessary resources and incentives which promote sustainable forest management, including a thriving forest industry.



The following economic goals, objectives, and action items outline the steps the committee believes are necessary to achieve these desired conditions.

### Goal 1: Ensure a diverse and stable forested landscape that supports multiple sustainable economic benefits.

#### Rationale:

- The North Central region has multiple industries based on forest resources (paper mills, OSB, sawmills), tourism and recreation – all of which are vital to the local economy .
- Promoting tax incentive programs would mitigate land conversion.
- Large blocks allow for more cost effective management, such as efficient harvesting and management of diverse cover types in a larger area.

#### Potential Monitoring Indicators:

- FIA (Forest Inventory and Analysis) and NLCD (National Land Cover Database) forest land cover data.
- Forest cover diversity and age class distributions
- Number of third party certified acres.
- Good Neighbor Authority - number of projects, cords harvested, acres treated.

**Objective 1: Cover Type and Age-Class Diversity.** Manage for a mix of age classes and site appropriate cover types across ownerships to maintain or increase sustainable harvest levels and support forest based economies.

**Objective 2: Multiple Use Management.** Look for opportunities to achieve multiple resource objectives while providing sufficient forest products to sustain current and future forest-based industries in the region.

**Objective 3: Research.** Research market opportunities associated with forest certification programs and provide information about potential economic impacts.

**Objective 4: Forest Certification.** Encourage landowners and land managers in the region to participate in forest certification programs and to utilize trained logging professionals.

**Objective 5: Collaborative Management and Education.** Promote cooperative and collaborative education efforts that support economic benefits of forest management and effective water protection and other diverse benefits.

**Action Item 1: Good Neighbor Authority.** Encourage Good Neighbor Authority projects to treat significant acres and increase timber output in a meaningful way.

**Action Item 2: Master Woodland Owners.** Create/encourage educated landowners (i.e. Master Woodland Owner) groups.

**Action Item 3: Education and Management Outreach.** Provide forest management education and implementation advice to landowners, managers, and loggers.

**Goal 2: Support a diverse and stable forest products industry and infrastructure with a diverse forest land ownership.**
**Rationale:**

- Without a stable forest products industry and infrastructure, management capacity decreases or becomes non-existent.
- A diverse and stable forest products industry provides multiple job opportunities across the region and fuels economic returns.
- A well-maintained and supported infrastructure allows for access for multiple economic drivers including the forest products industry, recreation, tourism, and supports water quality too.
- A healthy and stable forest products industry allows for better and more careful, sustainable management of resources.
- Increased industry capacity promotes greater sustainable utilization of local resources.

**Potential Monitoring Indicators:**

- Growth in the logging industry and local wood products.
- Facility expansion and diversity.
- Cords harvested by species.
- Treated acres across ownerships.
- Number of MN Department of Transportation bridge downgrades and reductions in speed limit impacting forest management operations.
- Private forest land adjacent harvest/management on small acre parcels.

**Objective 1: Forest Land Management.** Maintain diversified forest land ownership and active forest management across ownerships, especially on non-industrial private forest lands, in order to provide a steady supply of necessary fiber to small and large mills.

**Objective 2: Business and Industry Expansion.** Develop a forest industry retention/expansion plan that addresses infrastructure needs, supports expanding of the local tax base, and promotes forest businesses that support sustainable management of forests and complement existing industries.

**Objective 3: Skilled Workers.** Create a skilled local workforce to provide industry with employees who want to live and work locally.

**Action Item 1: Logger Business and Education.** Assist the logging sector by supporting the easy transition of existing businesses and start-up of new companies, advocate for better logging curriculum in schools, and support continued logger and forest professional training.

**Action Item 2: Student Engagement.** Advocate for skilled trades programming in local schools.

**Objective 4: Public/Private Sector Relationships.** Strengthen public/private sector relationships that support vibrant and diverse natural resources-based businesses which advocate the long term stewardship of the resources and that engage landowners in north central Minnesota's forest products industry.

**Objective 5: Product Diversity and Technology:** Establish and support the creation and marketing of a variety of locally produced forest products and developing forest product technologies, particularly wood-based energy, value-added, and non-traditional forest products (e.g. decorative greenery, medicinal plants). Diversify species that can be utilized.

**Goal 3: Promote natural resource-based recreation and tourism. Increase statewide recognition of the broad economic and social value of North Central region’s forests.**

**Rationale:**

- Recreation and tourism are vital to the economy of the region and important suppliers of local jobs.
- The forests in the North Central Landscape are vital to protecting source water for local and downstream communities. Broad recognition of this fact will help increase public and political support for conserving the region’s forest resources.

**Potential Monitoring Indicators:**

- Annual revenues generated in the region from tourism and recreation.
- Use of the Chippewa National Forest, state forests, state parks, and wildlife management areas, number of visitor days.
- Total value of state and federal grants being used to conserve forests and promote sustainable forest management in the region.

**Objective 1: Awareness of Diverse Recreation Opportunities.** Raise awareness of diverse multi-season and year-round outdoor recreation opportunities within the scenic beauty of the landscape, including trails for motorized and non-motorized activities.

**Objective 2: Visitor Experience.** Ensure high-quality experiences for visitors by ensuring access to lands and waters open to public use, managing watersheds to support healthy lakes that offer diverse visitor opportunities, and support local resorts and businesses.

**Objective 3: Riparian Lands.** Maintain and enhance ecological integrity and water quality benefits from riparian lands across all ownerships.

**Objective 4: Financial Assistance.** Provide financial incentives that encourage multi-season opportunity expansion and diversified forest-based economic development.

**Objective 5: Statewide Recognition of Clean Water as a Forest Product.** Build statewide and downstream customer recognition of the economic value of the source water protection provided by well-managed forested watersheds in the region.

**Goal 4: Stabilize and improve employment and incomes by sustainable use of landscape assets.****Rationale:**

- Improving employment opportunities will help attract and keep young people to sustain the economy.

**Potential Monitoring Indicators:**

- Per capita income.
- % poverty level.
- % unemployed.
- Median age of workers.
- Increased number of forest related jobs.

**Objective 1: Non Industrial Private Forest Land Management.** Increase outreach to private landowners and encourage the commission of professional science-based forest management plans that reflect appropriate diverse market and other economic opportunities for the landowner.

**Objective 2: Economic Development and Business Assistance.** Encourage sustainable economic development and community planning through existing organizations and provide increased financial incentives for business start-up and expansion.

**Objective 3: Employment and Business Opportunities.** Utilize tax incentives to bring businesses to the North Central Landscape, including American Indian reservations, while also promoting jobs that are attractive to young adults and a diverse, vibrant community.

**Action Item 1: Artisans.** Connect Native American and other local artisans to markets.

**Objective 4: Education and Civil Engagement.** Enhance higher education, natural resource degree programs, and civil engagement opportunities within the region to support economically viable forest-based businesses.

## C. Social Resource Initiatives

From a social perspective, in 100 years the North Central Landscape Committee envisions a landscape with the following Desired Future Conditions:

- **DFC 1: Awareness and Education.** Forests in the region are managed and used to educate residents and visitors in a way that can promote and show the importance of ecologically intact forests and the benefits they provide for watersheds and ecosystems as a whole. Permanent and seasonal residents value clean lakes, healthy forests, and abundant wildlife and fish, and are knowledgeable and educated about these resources.
- **DFC 2: Water Quality.** Healthy forests, lakes, and wetlands are broadly recognized as key to protecting water quality and quantity across the landscape. Forests are managed in ways that maintain, enhance or restore soil quality, nutrient cycling, hydrologic functions, water quality, riparian areas, and other concerns relating to watershed health.
- **DFC 3: High Quality of Life.** Forests within the region are recognized by citizens as an integral contributor to the quality of life enjoyed by current as well as future generations and maintain this as a place for high quality recreation, living, and working opportunities within a vibrant economy. Landscape planning is balanced with social needs and development is managed in ways that support sustainable forest management.



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The following social goals, objectives, and action items outline the steps the committee believes are necessary to achieve these desired conditions.



**Goal 1: Improve natural resource education to students and cultivate public awareness about the importance of forests and ecologically sound forest management.**

**Rationale:**

- Educating the public on the importance of forests and ecologically sound forest management makes people aware of the value of forests on the landscape for water quality, ecosystem services, fish and wildlife resources, aesthetic, and recreational values.

**Potential Monitoring Indicators:**

- Enrollment in natural resource degree programs.
- Number of active school forest programs.
- Environmental learning center activities and visitor numbers.
- Other natural resource workshops (Native Plan Communities, Sustainable Forests Education Cooperative).

**Objective 1: Natural Resources Curriculum.** Work with local school boards to improve/expand existing K-12 curriculum to include awareness of local economic and ecosystem services of forests and the role of forest management in maintaining those services.

**Action Item 1: School Forests.** Work with local school boards to incorporate school forests into K-12 education to demonstrate the benefits of forests and forest management on the landscape.

**Action Item 2: Natural Resources in the Classroom.** Work with local natural resource professionals and local schools to arrange for natural resource professionals to regularly visit schools and speak on relevant topics.

**Action Item 3: Student Skill Building.** Promote student participation in skill-building activities that increase confidence and comfort in the outdoors and skilled trades, could include state-level environmental topic competitions.

**Action Item 4: Higher Education.** Promote natural resources higher education in the region, including potential new programs (e.g. four year forestry degree at Bemidji State University)

**Objective 2: Environmental Learning Centers.** Promote awareness and use of environmental learning centers and other natural resource based youth education programs. Support increased funding for those institutions as well.

**Action Item 1: Local Centers.** Actively use environmental learning centers - particularly local centers such as Deep Portage Preserve, Long Lake Conservation Center, and Forest History Center, Leech Lake Area Watershed Foundation Water Center, and others - for outreach and education about the importance of forests and forest management in local communities.

**Objective 3: Educator Training.** Provide and participate in forestry, ecology, and natural resource education for teachers. Incorporate lessons that tie the ecological, economic and social aspects together under these natural resource training exercises.

**Objective 4: Natural Resource Outreach and Education Programs.** Support the development and distribution of information about sustainable natural resources policies, programs, projects, and practices for people living, working, and recreating in the region.

**Action Item 1: Education Program Expansion.** Expand State Park and other naturalist programs that relate to recreation and forestry.

**Objective 5: Traditional and Social Media.** Provide more environmental information to mass media outlets and develop targeted social media outreach efforts.

**Action Item 1: PSAs.** Develop Public Service Announcements for radio, television and print media.

**Goal 2: Protect aquatic resources for clean and healthy water and improve the connection of forest and water quality.**

**Rationale:**

- Forests, water quality and fish habitat all tie together in the landscape to benefit the citizens of Minnesota.

**Potential Monitoring Indicators:**

- Lakes and stream water quality remains high in the forested regions of the state.
- No new TMDL (Total Maximum Daily Load) listings and/or impaired waters.

**Objective 1: Watershed Protection.** Manage for diverse forests and increase productive forest lands to protect the minor watersheds (DNR level 07) of the North Central landscape. A protection goal of 75% undeveloped land in the watersheds of lakes and 60% undeveloped in stream watersheds should be a target to be maintained or achieved in this landscape.

**Action item 1: Proposal Development.** Develop a large scale riparian forest L-50 Conservation Tax Credit/Clean Water Fund proposal.

**Objective 2: Sustainable Development.** Encourage local governments to promote protection of forest and aquatic resources. Local governments provide the interface with the private landowners. Local governments should be supported in their efforts to provide land-use planning, sound ordinances, and outreach and education services which will provide measures that reduce parcel fragmentation, prevent forest land conversion, and protect natural shorelines.

**Objective 3: Risk Identification.** Identify sub-watersheds (minor or catchment scale - DNR level 07 and 08) at risk for forest conversion, including those with low levels of existing forest protection or with significant risk factors (such as proximity to agriculture or developing areas) and work with the local officials to protect these forests.

**Objective 4: Awareness and Outreach.** Promote awareness of water quality and forests. Educate water users in the North Central landscape about invasive species rules, regulations and the impacts these invasive species have to lakes and streams in this landscape.

**Action Item 1: Clean, Drain, Dry.** Promote “Clean, Drain, and Dry” and the terrestrial invasives program “Play, Clean, Go” through the Counties and MNDNR.

**Objective 5: Ecosystem Services Awareness.** Educate residents and non-residents about sources of clean water and other ecosystem services.

**Goal 3: Increase private forest management.**

**Rationale:**

- Landowners can benefit when they better understand their forest properties and benefits they can receive when they manage it, such as profits from timber harvests, increased wildlife, and partnerships in programs that keep forested lands on the landscape.

**Potential Monitoring Indicators:**

- Cords of timber from private lands.
- % of private lands being actively managed.
- Acres of conservation easements on private forested lands.
- Number of registered stewardship plans.
- Acres enrolled in 2C and SFIA.

**Objective 1: Outreach and Education:** Increase outreach to private forest owners and educate them on the benefits of understanding their forest and possible management options.

**Action Item 1: Workshops.** Facilitate private forest management workshops in collaboration with federal, state, and local government, industry, and non-governmental organizations.

**Action Item 2: Landowner Engagement.** Work with My Minnesota Woods staff, implement TELE (Tools for Engaging Landowners Effectively), and make landowners aware of the tools available to them to manage their property.

**Objective 2: Consulting Foresters.** Promote the use of a consulting forester for writing/implementing forest stewardship plans.

**Objective 3: Technical and Financial Support.** Increase awareness and landowner access to cost-share implementation funding and technical resources.

**Objective 4: Conservation Stewardship Programs Awareness.** Educate landowners about private conservation easement opportunities.

**Action Item 1: Funding.** Leverage funding to facilitate private conservation easements.

**Objective 5: Tax Incentives.** Maintain or strengthen incentives that increase or maintain managed forest lands and reward active forest management on private lands (e.g. SFIA and 2C).

**Objective 6: Forest Management Assistance.** Increase and promote the use of qualified logging professionals. Improve the connection between the management/harvest plan and the harvest contract.

**Goal 4: Promote high quality forest based experiences and the wellbeing of the people living and working in the North Central Landscape.**

**Rationale:**

- Connecting with the forest improves perspectives on natural resource issues.

**Potential Monitoring Indicators:**

- Annual visitation estimates to parks and forests.
- Availability of experiences – number of campgrounds and sites, number of public water landings, miles of trails, number of days parks are open.

**Objective 1: Trail Systems.** Expand non-motorized and motorized trail systems and consider designation of these trails to satisfy diverse user groups and to minimize user group conflicts.

**Objective 2: Trail User Collaboration.** Collaborate with trailer user groups and trail ambassadors to monitor trail conditions and identify maintenance needs.

**Objective 3: Hunting Opportunities.** Support high quality hunting opportunities for both residents and visitors.

**Action Item 1: Habitat Management.** Include the NPC-based goals and strategies listed in Section 7 in public and private forest management plans in the region. Implementing these goals and strategies will help improve habitat for most wildlife, including game species.

**Objective 4: Educational Materials.** Provide educational signs, maps, pictures, and other materials to enhance visitor experience and knowledge.

**Objective 5: Forest-Community Connection.** Support projects and activities that seek to strengthen the interconnections between public lands, natural resources, and local communities.

**Action Item 1: Group Events.** Coordinate group events aimed at new outdoor recreationalists.

**Action Item 2: Youth Programs.** Ensure adequate youth programs exist to encourage the next generation to get outdoors and secure a sense of ownership to the forests.

**Goal 5: Maintain the natural resource identity of the landscape and balance growth with resource protection.****Rationale:**

- The North Central Landscape is rich in natural resources which is part of the identity of the landscape, and maintaining the natural resources helps to maintain a strong “sense of place”.

**Potential Monitoring Indicators:**

- Miles of scenic byways.
- NLCD (National Land Cover Database) land cover trends.
- Forestry elements in county and municipal comprehensive plans.
- Forest protection provisions in local ordinances.

**Objective 1: Planning.** Encourage county and community planning that best fits sustainable management of forests on the landscape.

**Objective 2: Development.** Encourage local officials and planning boards to incorporate goals of the North Central plan into their planning and zoning efforts.

**Objective 3: Public Land.** Promote county zoning tools and strategies to protect existing public land and forested lands.

**Objective 4: Strategic Land Asset Management.** Work with the State’s Strategic Land Asset Management program to build on public land complexes and trade and sell lands appropriately.



## Section 7

### Ecological Mid-Level Direction

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This section of the Plan further provides land managers with more specific guidance for achieving the Plan's broader ecological goals and moving the landscape towards the Desired Future Conditions described in Section 6. It accomplishes this by establishing the A) Vegetation Management Framework and B) Climate Adaptation Framework. Together, these frameworks assist users of the plan with managing forest land while considering the existing and potential future environmental conditions of each site.

#### A. Vegetation Management Framework

The 2003 North Central Landscape Plan laid out a series of long-term goals for five upland Ecological Plant Communities in the North Central Landscape on a 100-year timeframe. A major responsibility of the Landscape Committee was to maintain the general direction of the original goals while integrating new sources of information and understanding of North Central Minnesota's forested plant communities. The Landscape Committee used several sources of information including, but not limited to: Native Plant Community (NPC) descriptions and disturbance regime history, climate change projections, Public Land Survey interpretations, Forest Inventory and Analysis data, and MN DNR Tree Suitability Tables, in addition to social and economic considerations to determine the 100-year goals and strategies.



This Vegetation Management Framework provides landowners and managers a more detailed series of goals and strategies for implementing this plan. These goals and strategies are based on the MN DNR's NPC Classification Framework at the ecological system level. More information on the NPC Classification Systems is available in Appendix D.

Readers will note that at the beginning of the goals and strategies for each NPC system, there is some background information included to assist the reader of the plan. The information includes: 1) basic geographic information, 2) an inventory of the NPC classes by landowner type, 3) a value ranking (high, medium, low ranking) as determined by the North Central Committee for forest productivity, recreation opportunities and ecological vulnerability, 4) climate change vulnerability determination summaries from the 2014 Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis report, and 5) current and emerging forest issues and challenges as determined by the North Central Committee.

Land managers and owners are encouraged to adopt and implement these more specific goals and strategies as well as support the recommended collaborative projects. Partners are encouraged to view Ecological Classification System (ECS) and NPC as tools to provide relevant information to their decision making processes. These concepts are not an end or a goal in and of themselves. The Landscape

Committee further encourages landowners to use these concepts as ways to mimic natural systems and habitats in order to promote the sustainable management of forests across the North Central Landscape.

This NPC based vegetation management vision updates and replaces the range of natural variation (RNV) framework established in the 2003 North Central Landscape Plan. The science of forest resources management has evolved since the late 1990s and the Planning Committee sought to utilize this new information while maintaining the course established in the original plan. To support implementation and monitoring it will be important for organizations to communicate management activities between the NPC system with cover types and other ecological classification systems.

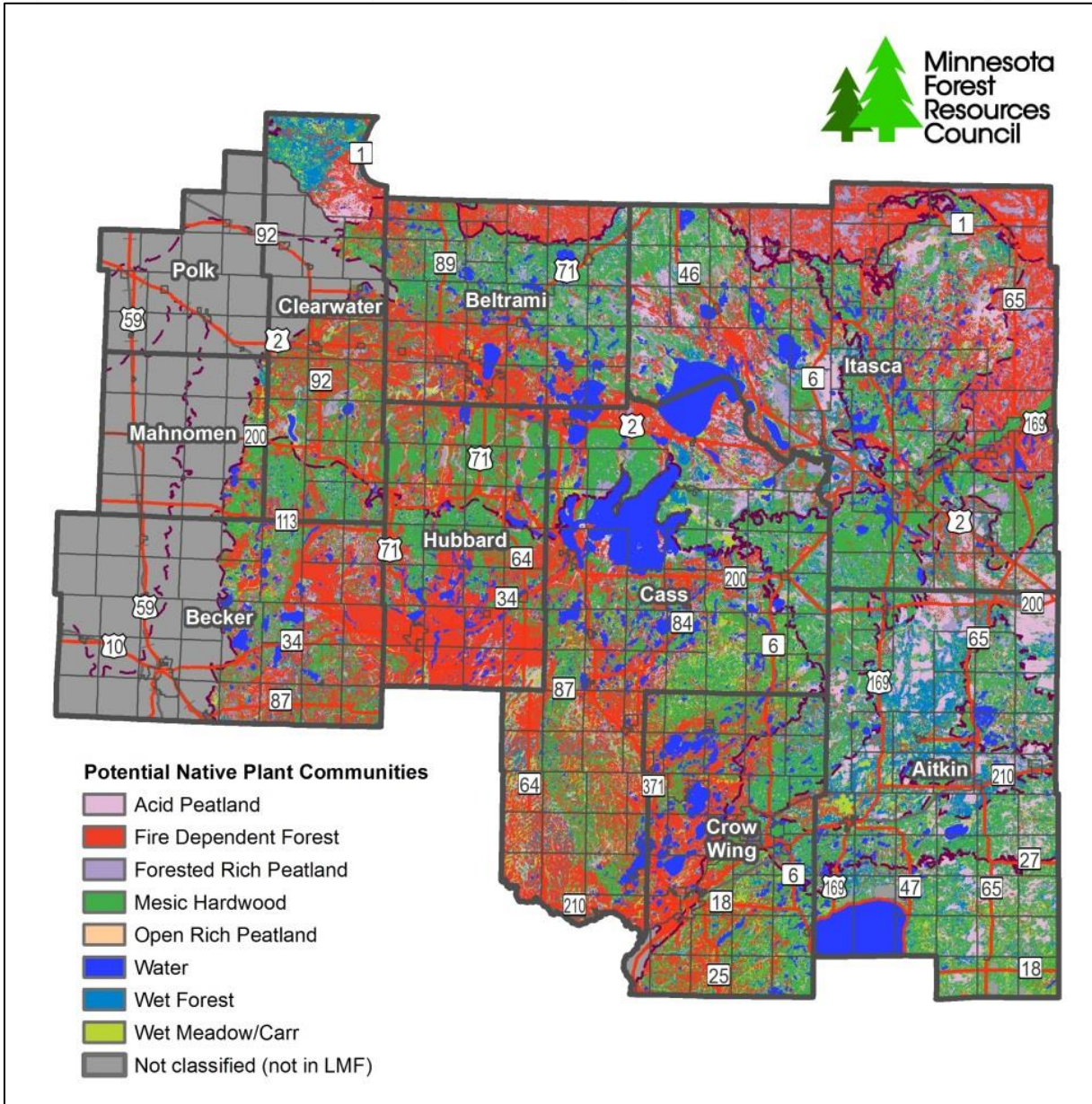
The table below summarizes the vegetation communities that structure the 2003 and 2017 vegetation management frameworks.

**Table 7.1. First and Second Generation North Central Landscape Plan Plant Community Crosswalk.**

2003 Plan Ecological Plant Communities	Native Plant Community (NPC) Classification System		2017 Plan
Upland Forests			
Dry Pine	FDc23: Central Dry Pine Woodland	FD: Fire-Dependent Forest	
	FDc24: Central Rich Dry Pine Woodland		
Dry-Mesic Pine	FDn33: Northern Dry-Mesic Mixed Woodland		
	FDn43: Northern Mesic Mixed Forest		
Dry-Mesic Pine-Oak	FDc34: Central Dry-mesic Pine-Hardwood Forest		
Boreal Hardwood-Conifer	MHn44: Northern Wet-Mesic Boreal Hardwood-Conifer Forest	MH: Mesic Hardwood Forest	
	MHn46: Northern Wet-Mesic Hardwood Forest		
Mesic-Northern Hardwoods	MHn35: Northern Mesic Hardwood Forest		
	MHn47: Northern Rich Mesic Hardwood Forest		
	MHc26: Central Dry-Mesic Oak-Aspen Forest		
	MHc36: Central Mesic Hardwood Forest (Eastern)		
Lowland Forests			
--	AP: Acid Peatland	AP: Acid Peatland	
--	FF: Floodplain Forest	FF: Floodplain Forest	
--	FP: Forested Rich Peatland	FP: Forested Rich Peatland	
--	WF: Wet Forest	WF: Wet Forest	



**Figure 7.1. Potential NPC Ecological System Level Map for the North Central Landscape.**



Source: Natural Resources Research Institute and MN Geospatial Commons.

## Fire-Dependent NPC System Goals and Silvicultural Strategies

### Area:

- 2,214,134 acres.
- 24.4% of the North Central Landscape.
- 28.5% of the Laurentian Mixed Forest in North Central Landscape.
- 49.4% of the upland area in the Laurentian Mixed Forest in North Central Landscape.

**Table 7.2. Current Land Management (Acres).**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
FD	Fire Dependent	0	2	0	0	0	19	0	20
FDc23	Central Dry Pine Woodland	8,268	8,117	18,706	547	10,909	171,013	1,148	218,708
FDc24	Central Rich Dry Pine Woodland	32,698	29,430	45,717	7,432	31,083	382,405	2,699	531,465
FDc34	Central Dry-Mesic Pine-Hardwood Forest	43,039	58,588	92,659	1,990	23,455	350,590	1,310	571,630
FDn12	Northern Dry-Sand Pine Woodland	1,295	1,765	6,369	121	1,443	8,407	30	19,431
FDn33	Northern Dry-Mesic Mixed Woodland	123,610	56,455	68,963	5,059	20,951	219,690	1,531	496,260
FDn43	Northern Mesic Mixed Forest	20,017	46,531	82,492	33,103	60,833	132,937	708	376,620
	<b>Total</b>	<b>228,927</b>	<b>200,888</b>	<b>314,906</b>	<b>48,252</b>	<b>148,674</b>	<b>1,265,061</b>	<b>7,426</b>	<b>2,214,134</b>

Source: Natural Resources Research Institute and MN Geospatial Commons.

**Table 7.3. Forest Management Values.**

Code	NPC System	Description	Forest Productivity	Recreation Opportunities	Ecological Vulnerability	Climate Ch. Vulnerability
FD	Fire Dependent	Strongly influenced by wildfires, coarse or gravelly soils or thin soils over bedrock.	H	H/M	M	M

Source: MFRC North Central Landscape Committee.

**Table 7.4. Climate Change Vulnerability.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Fire-Dependent Forest	Negative	Moderate-High	Moderate	Medium	Medium

Source: USDA general technical report Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler et al. 2014).

**Specific Forest Management Opportunities and Challenges:**

- Changing forest composition and structure as a result of:
  - Climate change.
  - Fire suppression.
  - Insect pests and diseases – spruce budworm, white pine tip weevil, white pine blister rust, jack pine budworm, diplodia.
  - Deer herbivory.
  - Extreme weather events.
  - Lack of management, especially on private forest lands.
- Lack of stand diversity.
- Retaining old growth forests on the landscape.
- Cost of site preparation, especially for private landowners.
- Lack of quality seedlings.
- Lack of summer access wood.
- Lack of public awareness about management and the importance of fire.
- Conversion of pine and spruce forests.
- Expanding populations and ranges of birds dependent on older conifers (bald eagles, common ravens, Red-breasted nuthatches, pine warblers).

**NPC Goals and Silvicultural Strategies:**Goal 1: Restore or emulate natural disturbances within the landscape to sustain fire-dependent species composition and longevity.

- Utilize harvest approaches that mimic/reflect natural disturbance regimes.
- Increase use of prescribed fire, or fire surrogates, on the landscape.
- Encourage spring/summer harvest to enhance scarification, where appropriate.
- Include scarification/site prep specifications in timber sale contracts.

Goal 2: Increase species and structural diversity of stands.

- Promote a diversity of NPC appropriate conifer species across the landscape.
- Encourage the use of silviculture systems that support the range of species and structural diversity characteristic of fire-dependent systems.
- Promote and retain herbaceous and berry shrubs during all stages of conifer management.

Goal 3: Manage for diverse age class structures and species.

- Utilize strategies stated underneath Goal 2.
- Consider longer rotation ages to older age classes in appropriate NPC's, particularly in sensitive, high conservation value forests. Implement in entire stands and as older components in young stands through variable retention harvests and reserve areas.
- Increase application of intermediate treatments.
- Increase rotation ages in natural origin red and white pine stands.

Goal 4: Increase presence of conifers on landscape, especially in underrepresented age-classes.

- Transition unsuitable hardwood stands towards NPC-appropriate conifer species.
- Promote no net loss of forest lands. Use acquisition, easement, and zoning approaches to prevent conversion of forests to other land uses in order to protect resources and the important ecosystem services that they provide.
- Reserve and manage native seed sources.
- Where appropriate regenerate to a jack/red/white pine mixed stand; harvest jack pine and hold red and white pine for older growth stages on moister sites.
- Identify white pine emphasis areas where cover type conversion goals can be realized and where multiple stands already exist that can be managed to attain multiple age classes and growth stages.
- Utilize strategies stated underneath Goal 5.

Goal 5: Reduce depredation of all species by deer.

- Increase bud capping, fencing, artificial regeneration of pine.
- Advocate for deer density that reflect ecological carrying capacity.
- Encourage land managers to consider deer depredation in harvest design.
- Recognize that the ecological carrying capacity of deer can be altered through forest management.
- Develop a scientifically based carrying capacity for deer across all Minnesota habitats that is ecologically and biologically driven not based solely on socio-economic criteria.

Goal 6 Increase forest adaptability to climate change.

- Favor species and genotypes that are better adapted to anticipated future conditions directly through forest management actions.
- Manage native seed sources to increase adaptability to climate change and other stressors by selecting genetic material from across a greater geographic range.
- Promote diversity in pine stands during all growth stages.
- Promote varied age class distribution and species diversity.
- Retain and promote structural diversity in all stands.

Goal 7: Manage forests to ensure defensive spaces around communities and infrastructure.

- Encourage forest management, mechanical fuels treatment, and prescribed burning to reduce and/or manage fuel loading, particularly within wildland-urban interface areas.

**Potential Collaboration Projects:**Outreach & Education Projects

- Inform citizens about the role of fire and wind disturbance in ecological systems.
- Promote MN Extension's Master Woodland Program.
- Promote the Interagency Prescribed Burn Partnership.

Research and Development Projects

- Effectiveness of jack pine seeding on sites.
- Deer herbivory on naturally vs artificially regenerated pines.
- Selective herbicides for invasive and competitive species.

Opportunity Area Projects – Pilots or Demonstration Projects

- Lydick area prescription burns.
- Badoura Jack Pine Woodland SNA – promote prescription fire, even and multi aged management.
- La Salle Creek SNA – deer browse control, community disturbance response.
- Interagency prescribed burning on public/private.
- Scarification to mimic burning.
- ASCC on cutfoot/variable retention in red pines, red pine prescribed burn study.
- Blandin Golden-Wing Warbler study area.
- Skidsteer mounted mechanic brushing to mimic burning, sharptail habitat projects in Aitkin County.
- Minnesota DNR adaptive forest management projects (e.g. Central floristic region jack pine management.)

## Mesic Hardwood NPC System Goals and Silvicultural Strategies

### Area:

- 2,270,738 acres.
- 25.0% of the North Central Landscape.
- 29.3% of the Laurentian Mixed Forest in North Central Landscape.
- 50.6% of the upland area in the Laurentian Mixed Forest in North Central Landscape.

**Table 7.5. Current Land Management (Acres).**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
MH	Mesic Hardwoods	5,553	6,875	10,850	5,618	2,803	20,462	219	52,379
MHc26	Central Dry-Mesic Oak-Aspen Forest	21,140	71,998	158,513	2,756	8,278	216,450	1,221	480,356
MHc36	Central Mesic Hardwood Forest (Eastern)	51	3,369	3,988	0	759	59,808	273	68,248
MHc47	Central Wet-Mesic Hardwood Forest	332	581	1,326	9	20	3,913	2	6,184
MHn35	Northern Mesic Hardwood Forest	165,853	135,833	212,756	2,597	53,805	405,042	1,200	977,086
MHn44	Northern Wet-Mesic Boreal Hardwood-Conifer Forest	63,917	68,407	94,362	4,466	45,320	246,926	1,060	524,458
MHn45	Northern Mesic Hardwood (Cedar) Forest	0	494	1,197	0	5,159	2,018	0	8,869
MHn46	Northern Wet-Mesic Hardwood Forest	21,697	11,329	20,214	8,023	4,676	61,331	350	127,620
MHn47	Northern Rich Mesic Hardwood Forest	5,488	1,778	3,591	38	3,563	10,903	179	25,538
	<b>Total</b>	<b>284,031</b>	<b>300,664</b>	<b>506,797</b>	<b>23,507</b>	<b>124,383</b>	<b>1,026,853</b>	<b>4,504</b>	<b>2,270,738</b>

Source: Natural Resources Research Institute and MN Geospatial Commons.

**Table 7.6. Forest Management Values.**

Code	NPC System	Description	Forest Productivity	Recreation Opportunities	Ecological Vulnerability	Climate Ch. Vulnerability
MH	Mesic Hardwood	Upland sites with moist soils, usually protected from fire.	<b>H</b>	<b>H</b>	<b>M</b>	<b>M</b>

Source: MFRC North Central Landscape Committee.

**Table 7.7. Climate Change Vulnerability.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Mesic Hardwood Forest	Moderate	Moderate-High	Moderate	Medium	Medium

Source: USDA general technical report Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler et al. 2014).

### **Specific Forest Management Opportunities and Challenges:**

- Changing forest composition and structure as a result of:
  - Climate change.
  - Insect pests and diseases - forest tent caterpillar, gypsy moth, Armillaria.
  - Invasive plants – garlic mustard, reed canary grass, European buckthorn.
  - Exotic earthworms.
  - Deer herbivory.
  - Natural succession following early 1900’s harvest.
  - Lack of management, especially on private forest lands.
- Retaining old growth forests on the landscape.
- Lack of timber quality, both pulp and saw materials.
- Lack of stand diversity, particularly conifers.
- Summer access harvest pressure/ lack of summer available harvests.
- Fragmentation and land-use change.
- Lack of consideration for the unique flora and fauna within mesic northern hardwood ecosystems.

### **NPC Goals and Silvicultural Strategies:**

#### Goal 1: Increase species and structural diversity of stands.

- Use diverse silvicultural prescriptions and encourage harvests that emulate a variety of patch sizes and retention approaches.
- Retain older growth stage characteristics in managed hardwood stands.
- Harvest a variety of gap sizes to maintain/promote canopy species diversity.
- Promote and retain structural diversity in all management activities.

#### Goal 2: Maintain and enhance species and age-class diversity across the landscape.

- Increase intermediate treatments to improve timber productivity while providing some mature forest habitat conditions.
- Utilize different silvicultural systems and practices to create diverse set of age structures and cover types that make sense for site specific needs/conditions.
- Increase presence of declining species such as yellow birch, white pine, and white cedar by planting or promoting natural regeneration on sites where they are suited, and reserving in harvest sites.
- Maintain aspen inclusions on good sites to provide age class and structural diversity.
- As appropriate for the NPC, favor retention and transition toward other appropriate hardwood and conifer species.
- Preserve older forests and maintain age-class diversity by using old-forest remnants as reserve patches.

Goal 3: Maintain a substantial amount in even-aged aspen.

- Regenerate older aspen stands.
- Manage aspen species using even-age management and clear-cutting with leave patches as guided by MFRC site-level guidelines.
- Increase conifer component in young aspen by interplanting spruce/fir as appropriate for the NPC.
- Retain other species for diversity
- Retain coarse woody material up off the ground for structural diversity for wildlife

Goal 4: Increase the conifer component within stands and across the region.

- Underplant or promote natural regeneration of long-lived conifers in hardwood systems where conditions are appropriate or following shelterwood harvests.
- Reserve patches of white and red pine legacy trees.
- Manage some older age class aspen mixed forests for late succession, conifer dominated forests; allowing conversion to conifer or mixed hardwoods where site conditions permit.
- Identify some low density stands for conversion or increase of conifers and mixed hardwoods.
- Plant conifers at low density in aspen clearcut areas to accelerate mixedwood development.

Goal 5: Reduce depredation of all species by deer.

- Increase bud capping, fencing, artificial regeneration of pine.
- Advocate for deer density that reflect ecological carrying capacity.
- Encourage land managers to consider deer depredation in harvest design.
- Recognize that the ecological carrying capacity of deer can be altered through forest management.
- Develop a scientifically based carrying capacity for deer across all Minnesota habitats that is ecologically and biologically driven not based solely on socio-economic criteria.

Goal 6: Limit the spread of invasive species

- Enact a robust integrated pest management (IPM) system, including biological control methods, and make available to private landowners.
- Support the PlayCleanGo campaign and utilize PlayCleanGo materials.
- Adopt the procedures set forth in DNR OP Order 113 regarding the management of invasive species.
- Educate recreation groups (e.g. ATVs and OHV, mountain bikes, horses, etc.).

Goal 7: Increase the timber and fiber quality of forests

- Incorporate planting of long lived species, including white pine and spruce, to maintain quality in stands that are left to older classes.
- Increase the use of intermediate treatments to improve timber quality on appropriate hardwood sites.
- Manage near normal rotation age to capture timber lost to mortality.
- Manage aspen on appropriate age rotations.

Goal 8: Increase private land stewardship plans and cross-boundary implementation.



- Encourage the development of private forest land stewardship plans and plan implementation through cross-ownership forest management.
- Maintain PFM cost share and incentivizing projects.

**Potential Collaboration Projects:**Outreach & Education Projects

- Promote MN Extension's Master Woodland Owner Program.

Research and Development Projects

- Deer herbivory on natural vs artificial regeneration.
- Stand development and structure of MN hardwoods.
- Alternative invasive species control treatments.

Opportunity Area Projects – Pilots or Demonstration Projects

- Southwest Aitkin County - landowner collaborative pine thinnings.
- Public/private invasive species management.
- Aitkin County oak management.
- Blandin mixedwood plantings.
- Blandin Golden Winged Warbler study area.

## Acid Peatland NPC System Goals and Silvicultural Strategies

### Area:

- 496,962 acres.
- 5.5% of the North Central Landscape.
- 6.4% of the Laurentian Mixed Forest in North Central Landscape.
- 15.2% of the lowland area in the Laurentian Mixed Forest in North Central Landscape.

**Table 7.8. Current Land Management (Acres).**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
AP	Acid Peatland	44,990	195,677	112,654	1,083	17,367	106,730	530	479,030
APn80	Northern Spruce Bog	5,627	207	619	9,745	7	1,728	0	17,932
	<b>Total</b>	<b>50,617</b>	<b>195,884</b>	<b>113,273</b>	<b>10,828</b>	<b>17,374</b>	<b>108,458</b>	<b>530</b>	<b>496,962</b>

Source: Natural Resources Research Institute and MN Geospatial Commons.

**Table 7.9. Forest Management Values.**

Code	NPC System	Description	Forest Productivity	Recreation Opportunities	Ecological Vulnerability	Climate Ch. Vulnerability
AP	Acid Peatlands	Conifer, low shrub peat communities, acidic soils, extremely low nutrients, hydrology precipitation based.	L/M	L/M	M/H	M/H

Source: MFRC North Central Landscape Committee.

**Table 7.10. Climate Change Vulnerability.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Acid Peatland	Negative	Low	High	Medium	Medium-High

Source: USDA general technical report Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler et al. 2014).

### Specific Forest Management Opportunities and Challenges:

- Insect pests and diseases - tamarack/eastern larch beetle, tamarack sawfly, larch casebearer, and eastern dwarf mistletoe.
- Peat fires and decomposition with climate change.
- Changes to water table as a result of management and climate change.
- Principal tree species difficult to reestablish on timelines similar to upland sites, especially on raised bogs.
- Limited management access for conventional wheeled equipment during winters with minimal frost.
- Lack of knowledge about black spruce growth rates.
- Retaining old growth forests on the landscape.
- Wildlife habitat value.

**NPC Goals and Silvicultural Strategies:**Goal 1: Maintain or restore hydrology.

- Increase monitoring to detect hydrological changes.
- Encourage ditch law and policies which would maintain or restore hydrological connectivity of peatlands.
- Plan new roads carefully to not adversely affect hydrology.
- Rectify hydrological impacts due to roads.
- Consider hydrologic effects when planning size of harvest blocks.
- Retain seed trees and reserve areas, including snags and tamarack in mistletoe areas.

Goal 2: Encourage the use of silviculture systems to mimic natural disturbance, perpetuate a diverse age class distribution of black spruce /tamarack communities, and address forest health issues and wildlife habitat objectives.

- Use even aged management of black spruce and tamarack for timber production, forest health, and wildlife, including harvest designs to address eastern larch beetle and mistletoe management, where appropriate.

Goal 3: Support critical forest habitats and peatland ecosystems.

- Follow MFRC site-level guidelines for harvest on frozen soils.
- Support sustainable harvest of special forest products.
- Develop markets which allow for management, particularly tamarack.
- Allow for areas of extended rotations beyond economic rotation age in order to retain multiple age classes.

**Potential Collaboration Projects:**Outreach & Education Projects

- Showcase the results of research, including the Marcell Experiment Forest SPRUCE project.
- Increase recognition of the value of peatlands as carbon sinks and providers of other ecosystem services such as water and air quality.

Research and Development Projects

- Research to improve understanding of the hydrological and pH regimes of acid peatland ecosystems.
- Monitor pH in harvests for changes.
- Track number of species that require/use acid peatland NPC habitat.
- Examine potential for research on regional SNA's with peatland resources.
- Investigate black spruce growth rates.

Opportunity Area Projects – Pilots or Demonstration Projects

- Wawina Wetland Restoration, continental divide, T52R22 (Aitkin County).
- Remove abandoned/nonfunctional ditch systems across tax forfeited/public lands.
- Rectify hydrological impacts of roads.
- Marcell Experiment Forest SPRUCE project.

## Forested Rich Peatland NPC System Goals and Silvicultural Strategies

### Area:

- 656,821 acres.
- 7.2% of the North Central Landscape.
- 8.5% of the Laurentian Mixed Forest in North Central Landscape.
- 20.1% of the lowland area in the Laurentian Mixed Forest in North Central Landscape.

**Table 7.11. Current Land Management (Acres).**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
FP	Forested Peatland	72,601	179,085	121,643	2,539	32,725	174,307	836	583,736
FPn63	Northern Cedar Swamp	6,766	25,256	12,323	1,326	4,396	17,490	22	67,579
FPn71	Northern Rich Spruce Swamp (Water Track)	0	1,471	1,630	0	340	1,980	0	5,421
FPn81	Northern Rich Tamarack Swamp (Water Track)	0	78	7	0	0	0	0	85
	<b>Total</b>	<b>79,367</b>	<b>205,890</b>	<b>135,603</b>	<b>3,865</b>	<b>37,461</b>	<b>193,777</b>	<b>858</b>	<b>656,821</b>

Source: Natural Resources Research Institute and MN Geospatial Commons.

**Table 7.12. Forest Management Values.**

Code	NPC System	Description	Forest Productivity	Recreation Opportunities	Ecological Vulnerability	Climate Ch. Vulnerability
FP	Forest Rich Peatlands	Conifer tall shrub wetlands on deep actively forming peat, poorly drained level basins.	M	L/M	M/H	M/H

Source: MFRC North Central Landscape Committee.

**Table 7.13. Climate Change Vulnerability.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Forested Rich Peatland	Negative	Low	High	Medium	Medium-High

Source: USDA general technical report Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler et al. 2014).

### Specific Forest Management Opportunities and Challenges:

- Insect pests and diseases - tamarack/eastern larch beetle, tamarack sawfly, larch casebearer, and eastern dwarf mistletoe.
- Loss of white cedar and lack of regeneration.
- Changes to water table as a result of management and climate change.
- Limited management access for conventional wheeled equipment during winters with minimal frost.
- Lack of knowledge regarding the response of black spruce to harvest in different NPC classes.
- Lack of knowledge regarding the response of moss and shrubs to sunlight following harvesting.

- Retaining old growth forests on the landscape.

### **NPC Goals and Silvicultural Strategies:**

#### Goal 1: Maintain or restore hydrology.

- Increase monitoring to detect hydrological changes.
- Encourage ditch law and policies which would maintain or restore hydrological connectivity of peatlands.
- Plan new roads carefully to not adversely affect hydrology.
- Rectify hydrological impacts due to roads.
- Consider hydrologic effects when planning size of harvest blocks.
- Retain seed trees and reserve areas, including snags and tamarack in mistletoe areas.

#### Goal 2: Encourage the use of silviculture systems to mimic natural disturbance, perpetuate a diverse age class distribution of black spruce /tamarack communities, and address forest health issues and wildlife habitat objectives.

- Use even aged management of black spruce and tamarack for timber production and forest health, including harvest designs to address eastern larch beetle and mistletoe management, where appropriate.

#### Goal 3: Provide for critical forest habitats and peatland ecosystems.

- Follow MFRC site-level guidelines for harvest on frozen soils.
- Support sustainable harvest of special forest products.
- Maintain areas with older forest conditions for wildlife habitat.

#### Goal 4: Regenerate white cedar on the landscape while maintaining species richness and diversity.

- Encourage natural regeneration of white cedar cover types, on appropriate sites. Increase use of appropriate silvicultural systems, such as small gap management, to provide younger age classes of white cedar.
- Proactively manage sites that are likely to decline to community types more tolerant of future climate conditions while reserving some areas as possible refugia sites or carbon sinks.
- Support limited harvest of white cedar for specialty forest products off of private lands.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Silvicultural field days in different NPC's.

#### Research and Development Projects

- White cedar natural and artificial regeneration methods and systems.
- Regeneration capacity in stands affected by eastern larch beetle.
- Effects of hydrology changes on a watershed basis.
- Research to improve understanding of the hydrological regimes of forested rich peatlands.

- Understory response to harvesting.
- Black spruce response to harvesting in different NPC classes.
- Spruce and Peatland Responses Under Climatic and Environmental Change (SPRUCE Study), Marcell Experimental Forest, Chippewa National Forest.
- University of Minnesota black spruce silvicultural studies (at Big Falls).

Opportunity Area Projects – Pilots or Demonstration Projects

- North Minnie fire research.

## Wet Forest and Floodplain Forest NPC System Goals and Silvicultural Strategies

### Area:

- 722,079 acres.
- 8.0% of the North Central Landscape.
- 9.3% of the Laurentian Mixed Forest in North Central Landscape.
- 22.1% of the lowland area in the Laurentian Mixed Forest in North Central Landscape.

**Table 7.14. Current Land Management (Acres).**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
WF	Wet Forest	61,131	155,412	107,541	3,292	22,873	321,704	747	672,699
WFn53	Northern Wet Cedar Forest	--	--	--	--	--	--	--	--
WFn55	Northern Wet Ash Swamp	1,795	0	0	42,897	0	1,923	0	46,615
WFn64	Northern Very Wet Ash Swamp	526	1,101	349	67	108	614	0	2,765
FF	Floodplain Forest*	--	--	--	--	--	--	--	--
FFn57	Northern Terrace Forest	--	--	--	--	--	--	--	--
FFn67	Northern Floodplain Forest	--	--	--	--	--	--	--	--
	<b>Total</b>	<b>63,452</b>	<b>156,513</b>	<b>107,890</b>	<b>46,256</b>	<b>22,981</b>	<b>324,241</b>	<b>747</b>	<b>722,079</b>

Source: Natural Resources Research Institute and MN Geospatial Commons.

**Table 7.15. Forest Management Values.**

Code	NPC System	Description	Forest Productivity	Recreation Opportunities	Ecological Vulnerability	Climate Ch. Vulnerability
WF	Wet Forest	Located in narrow zones along lakes, rivers and peatlands. Also occurs in shallow depressions or other settings where groundwater is near the surface.	L/M	M	M/H	M/H
FF	Floodplain Forest*	Occasionally or annually flooded sites on terraces and floodplains of streams and rivers.	--	--	--	--

Source: MFRC North Central Landscape Committee.

\* Floodplain forests are known to exist in the region but have not been mapped.

**Table 7.16. Climate Change Vulnerability.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Wet Forest	Negative	Low	High	Limited-Medium	Medium
Floodplain Forest	Moderate-Positive	Moderate	Low-Moderate	Limited-Medium	Medium

Source: USDA general technical report Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis (Handler et al. 2014).

### **Specific Forest Management Opportunities and Challenges:**

- Insect pests and diseases – Emerald Ash Borer, Dutch elm disease.
- Loss and conversion of riparian forests.
- Loss of white cedar.
- Lack of regeneration among all species.
- Changes to water table as a result of management or disturbance.
- Limited management access for conventional wheeled equipment during winters with minimal frost.
- Lack of understanding about the ecohydrology of wet forest systems.
- Limited ash markets; concerns about transporting ash wood.
- Retaining old growth forests on the landscape.

### **NPC Goals and Silvicultural Strategies:**

#### Goal 1: Diversify stand structure and composition.

- Plan harvests so as to maintain diversity of canopy and sub-canopy species.
- Use a mix of uneven and even-aged silviculture systems with reserves to mimic natural disturbance and promote mixed species forests.
- Underplant stands and encourage natural regeneration of under represented species (e.g. yellow birch, white cedar, bur oak) on sites anticipated to remain favorable under a range of future conditions.
- Identify stands for intermediate treatments with the goal of increasing the presence of non-ash species.

#### Goal 2: Manage lowland hardwoods to improve stand health and decrease susceptibility to pests and diseases.

- Utilize strategies stated underneath Goal 1.
- Manage ash through EAB guidelines. Facilitate species transitions where EAB infestations are likely.
- Combine American elm restoration with efforts to diversify ash stands ahead of EAB.
- Increase resiliency by proactively managing ash stands through selective harvesting and development/utilization of emerging ash markets.
- Explore certification of ash log loads to ease transportation concerns and encourage policy changes about ash movement.
- Encourage all ownerships to harvest with sound silvicultural prescriptions in lowland hardwoods.

#### Goal 3: Maintain forest land cover in order to protect and maintain water table levels.

- Utilize strategies stated underneath Goal 2.
- Minimize fragmentation and creation of new roads to protect hydrology.



Goal 4: Protect critical forest habitats, especially white cedar cover types and riparian forests.

- Utilize strategies stated underneath Goal 2.
- Retain private forest lands along riparian areas in a forested condition.
- Encourage natural regeneration of white cedar cover types on sites anticipated to remain favorable under a range of future conditions.
- Follow MFRC site-level guidelines and NPC ratings for season of operability, recognizing that northern very wet ash swamps (WFn64) may contain seeps that may not freeze.
- Manage and control beaver populations in key forest habitat areas.

**Potential Collaboration Projects:**Outreach & Education Projects

- Public Education. Support efforts to inform the general public about EAB and various activities that contribute to its spread such as the transport of firewood.
- Share results from regional EAB research projects with MN forest owners and resource agencies.
- Showcase T3 building in Minneapolis as well as wood construction and wood product opportunities within the region.
- Outreach to landowners in riparian areas about conservation easements.

Research and Development Projects

- Research to improve understanding of the hydrological regimes and stand dynamics of wet forest systems, especially within context of EAB.
- Market development for ash (and other hardwoods) as availability increases.
- White cedar natural and artificial regeneration methods and systems.

Opportunity Area Projects – Pilots or Demonstration Projects

- Aitkin County research demo sites on ash.
- USFS Northern Research Cutfoot ash treatments and plantings.
- Restoration of American Elm with disease resistant materials from the Chippewa National Forest Elm Restoration Project.
- Coordinate Lowland Brush restoration projects for Golden-Winged Warbler with the American Bird Conservancy.

## B. Climate Adaptation Framework

The following is a list of climate change adaptation strategies and approaches developed by the USDA Forest Service, Northern Institute of Applied Climate Science (NIACS) for the Northwoods Climate Change Response Framework. The Committee has adopted this outline from the USDA Forest Adaptation Resources (2016) general technical report as a menu of climate change adaptation strategies that may be adapted as appropriate to the needs and unique aspects of the North Central Landscape and utilized in the development of Committee projects. Partners in the region are encouraged to integrate these strategies and adapt them for projects as well.

### Strategy 1: Sustain fundamental ecological functions.

- Reduce impacts to soils and nutrient cycling.
- Maintain or restore hydrology.
- Maintain or restore riparian areas.
- Reduce competition for moisture, nutrients, and light.
- Restore or maintain fire in fire-adapted ecosystems.

### Strategy 2: Reduce the impact of biological stressors.

- Maintain or improve the ability of forests to resist pests and pathogens.
- Prevent the introduction and establishment of invasive plant species and remove existing invasive species.
- Manage herbivory to promote regeneration of desired species.

### Strategy 3: Reduce the risk and long-term impacts of severe disturbances.

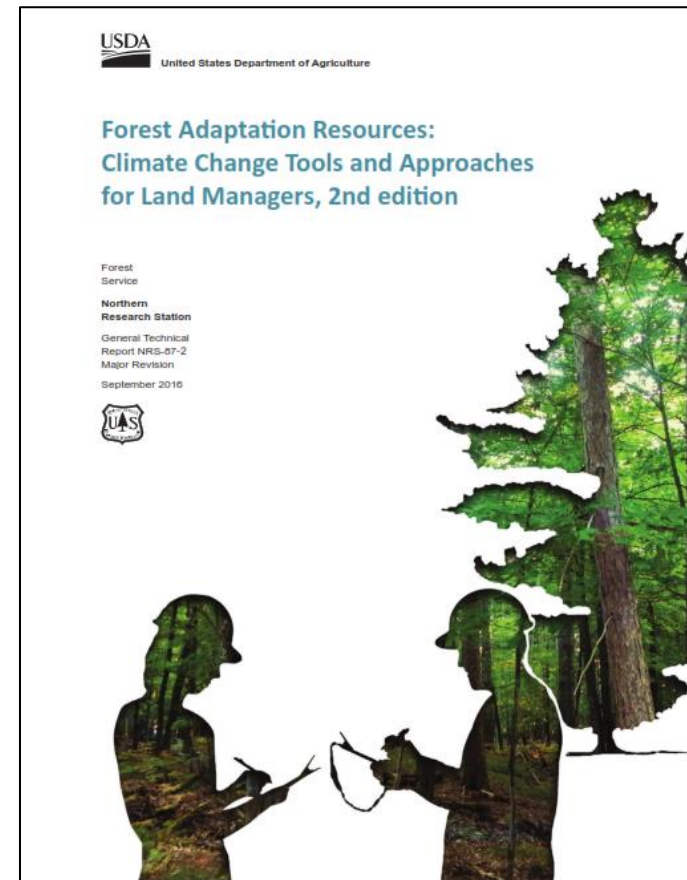
- Alter forest structure or composition to reduce risk or severity of wildfire.
- Establish fuelbreaks to slow the spread of catastrophic fire.
- Alter forest structure to reduce severity or extent of wind and ice damage.
- Promptly revegetate sites after disturbance.

### Strategy 4: Maintain or create refugia.

- Prioritize and maintain unique sites.
- Prioritize and maintain sensitive or at-risk species or communities.
- Establish artificial reserves for at-risk and displaced species.

### Strategy 5: Maintain and enhance species and structural diversity.

- Promote diverse age classes.
- Maintain and restore diversity of native species.
- Retain biological legacies.
- Establish reserves to maintain ecosystem diversity.



Strategy 6: Increase ecosystem redundancy across the landscape.

- Manage habitats over a range of sites and conditions.
- Expand the boundaries of reserves to increase diversity.

Strategy 7: Promote landscape connectivity.

- Reduce landscape fragmentation.
- Maintain and create habitat corridors through reforestation or restoration.

Strategy 8: Maintain and enhance genetic diversity.

- Use seeds, germplasm, and other genetic material from across a greater geographic range.
- Favor existing genotypes that are better adapted to future conditions.

Strategy 9: Facilitate community adjustments through species transitions.

- Favor or restore native species that are expected to be adapted to future conditions.
- Establish or encourage new mixes of native species.
- Guide changes in species composition at early stages of stand development.
- Protect future-adapted seedlings and saplings.
- Disfavor species that are distinctly maladapted.
- Manage for species and genotypes with wide moisture and temperature tolerances.
- Introduce species that are expected to be adapted to future conditions.
- Move at-risk species to locations that are expected to provide habitat.

Strategy 10: Realign ecosystems after disturbance.

- Promptly revegetate sites after disturbance.
- Allow for areas of natural regeneration to test for future-adapted species.
- Realign significantly disrupted ecosystems to meet expected future conditions.

This menu of adaptation strategies for forest management is drawn from the USDA general technical report *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers, 2<sup>nd</sup> Edition* (Swanston et al. 2016; [https://www.fs.fed.us/nrs/pubs/gtr/gtr\\_nrs87-2.pdf](https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf)). These actions can be applied in combinations across a landscape or project area.



## Section 8

### Economic Mid-Level Direction



This section of the Plan further describes direction for forest based economic development in the region. It is intended to provide more specific economic guidance to land managers and owners within regional ‘wood zones’, which are defined as timberlands in the North Central Landscape within 50 miles of the major mills. Goals and strategies in this Section have been established for two wood zones (Bemidji and Grand Rapids) and represent an initial framework or approach to linking forest inventory data within the major mills in each city. This approach can be extended to other cities or locations in the North Central landscape in the future after the plan is approved by the North Central Landscape Committee and partners.

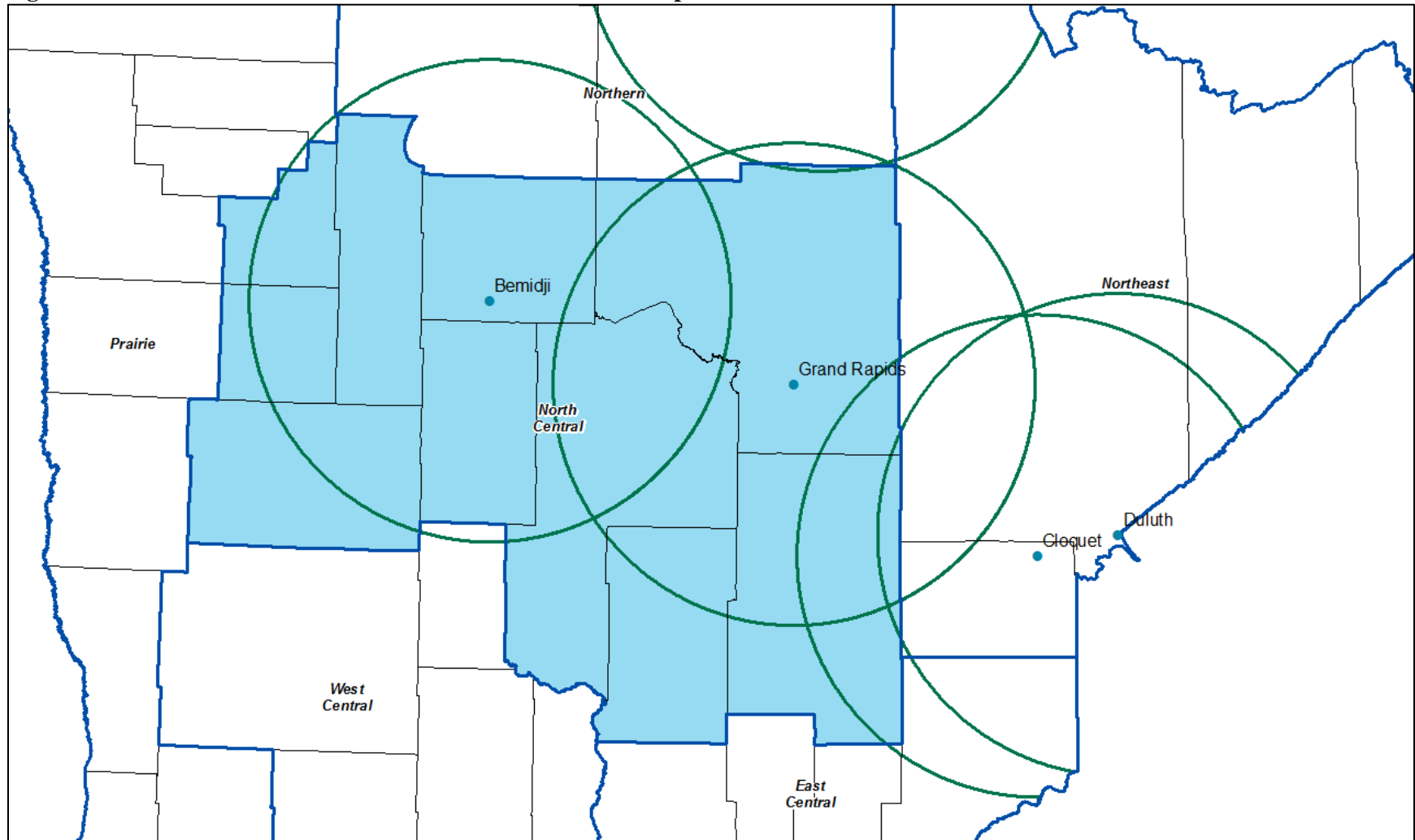
The goals and strategies in this section are built upon the analyses of the following technical report documents compiled by MFRC staff:

- North Central Landscape: Wood Zone Analysis
- North Central Landscape: Timberland Growing Stock Mortality White Paper

The primary source of data in both of these reports is the Forest Inventory and Analysis (FIA) dataset coordinated by the US Forest Service. The objective of the wood zone analyses was to provide estimates of volume, growth, mortality, harvest, ownership, species composition, wood quality, and other variables of interest within regional wood zones. The Timberland Growing Stock Mortality White Paper provides estimates for similar variables of interest as the Wood Zone Analysis, except it focuses on growing-stock trees (live trees which meet minimum merchantability standards) across the entire region and further explores trends in mortality over time.



**Figure 8.1. Wood Production Areas in the North Central Landscape.**



## A. Background - Grand Rapids Wood Production Zone

**Mills:** Blandin Paper, Savanna Pallets, Rajala Mill & Timber Co., and Lonza.

**Primary Species Used By Mills:** Aspen, birch, balsam fir, red pine, white pine, black spruce, white spruce, sugar maple, red oak, bur oak, black ash, basswood, tamarack.

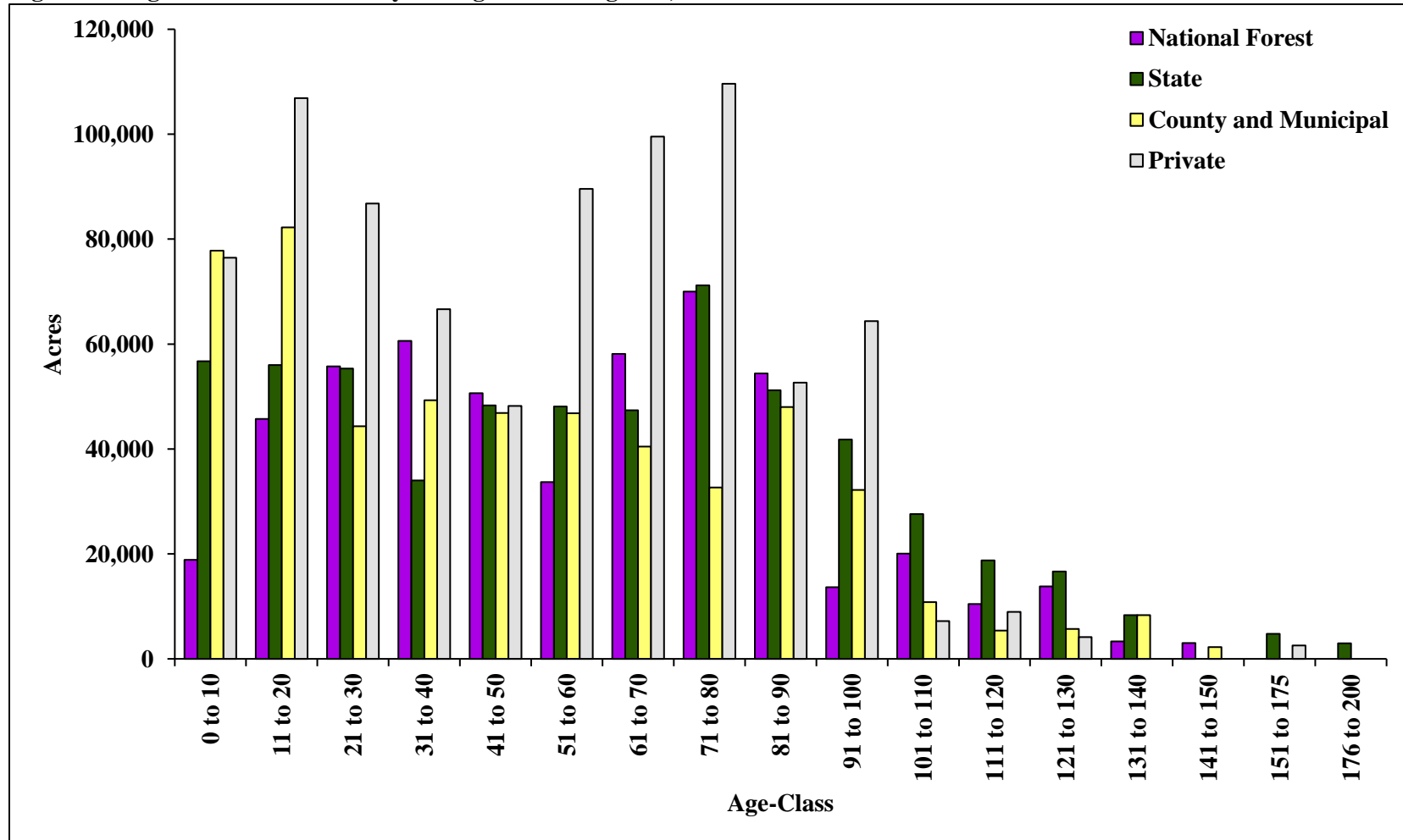
**Timberland Area:**

- 2,457,699 acres
- 51.1 percent of the overall NC landscape timberland.

**Table 8.1. Timberland Ownership, 2016.**

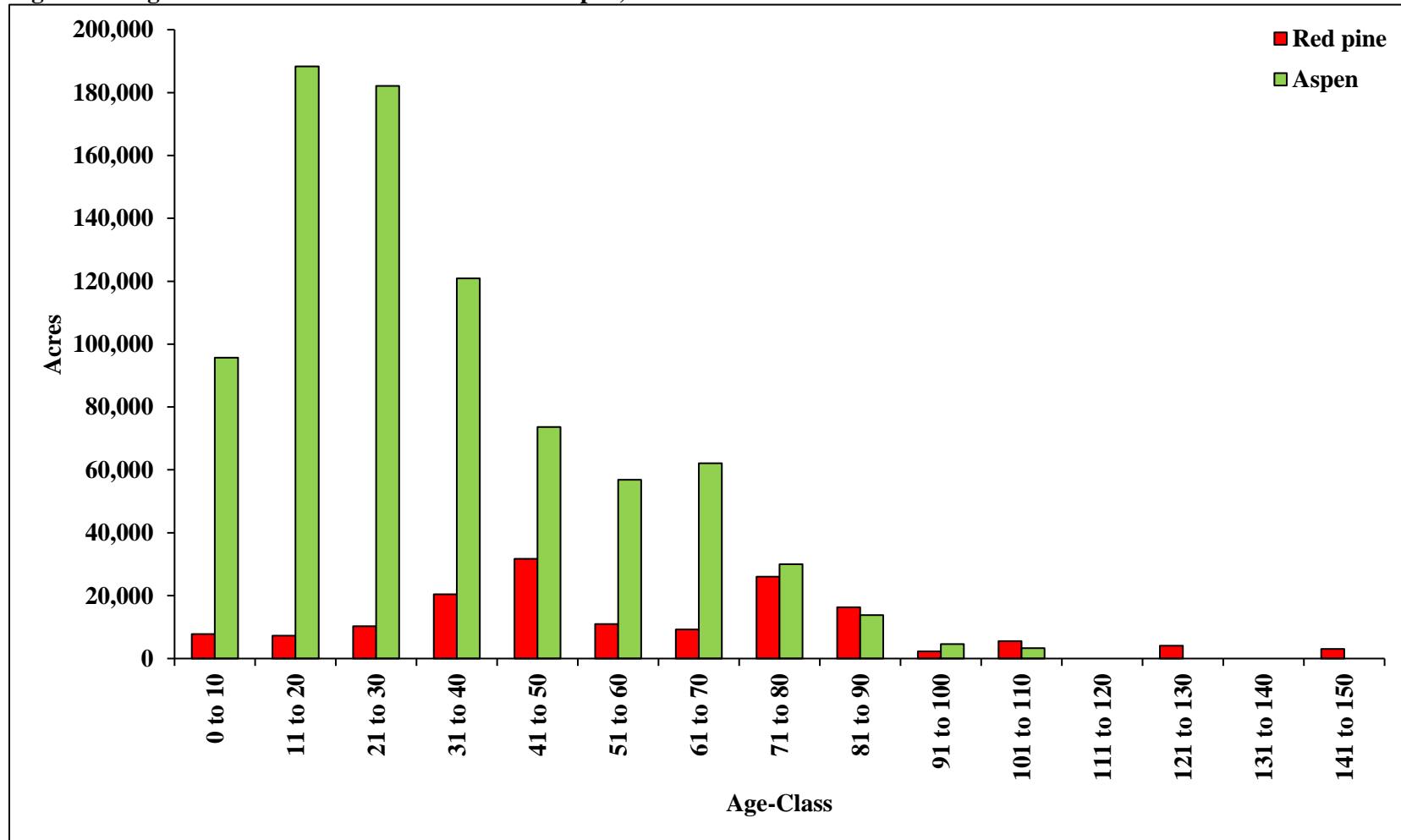
Timberland (acres)						Sampling Error (% based on 1 SE)				
DNR Forest Type	Total	National Forest	State	County	Private	Total	National Forest	State	County	Private
Aspen	831,401	169,340	153,687	224,101	284,274	5.2	10.8	12.4	10.5	9.3
Northern hardwoods	284,927	48,642	39,432	61,123	135,729	9.6	23.3	25.0	20.6	14.2
Tamarack	220,632	38,252	103,966	47,006	31,407	10.9	26.2	16.2	23.9	29.0
Lowland hardwoods	229,039	32,596	53,522	37,938	104,983	10.4	29.1	21.6	24.2	15.1
Black spruce	172,546	14,721	92,717	34,539	30,569	12.6	41.4	17.4	28.8	29.7
Red pine	154,753	86,015	13,999	13,247	41,492	12.1	16.0	38.1	38.2	24.6
Birch	122,498	45,383	27,840	15,870	33,405	13.9	22.7	27.8	40.7	26.2
Oak	109,865	21,956	13,360	16,461	58,088	14.9	33.4	41.2	35.3	21.1
Northern white-cedar	83,774	20,652	34,299	22,975	5,849	17.7	34.4	28.2	35.4	56.0
Balsam poplar	60,597	3,924	17,175	13,160	26,338	20.2	72.3	36.8	44.7	31.3
Balsam fir	44,551	6,104	10,727	6,445	21,275	22.8	60.8	46.6	48.6	34.7
Eastern white pine	24,424	10,569	2,988	3,885	6,982	34.4	53.6	100.1	81.3	63.6
Jack pine	13,281	3,319	411	8,665	885	45.0	98.9	100.5	56.6	96.3
White spruce	11,719	729	2,664	4,068	4,258	38.9	98.9	97.8	61.2	63.5
Non stocked	32,441	6,124	8,223	5,693	12,401	25.4	60.2	48.9	49.7	44.5
Other	61,251	3,752	14,016	17,969	25,514	20.0	62.7	43.0	37.1	31.3
<b>All Forest Types</b>	<b>2,457,699</b>	<b>512,077</b>	<b>589,026</b>	<b>533,145</b>	<b>823,451</b>	<b>2.7</b>	<b>3.7</b>	<b>6.4</b>	<b>6.8</b>	<b>5.3</b>

Source: Forest Inventory Analysis.

**Figure 8.2. Age-Class Distribution by Management Categories, 2016.**

Source: Forest Inventory and Analysis.



**Figure 8.3. Age-Class Distribution of Red Pine and Aspen, 2016.**

Source: Forest Inventory and Analysis.

## B. Background - Bemidji Wood Production Zone

**Mills:** Norbord, Potlatch Corporation, and Cass Forest Products.

**Primary Species Used By Mills:** Aspen, balsam poplar, birch, balsam fir, red pine, white pine, jack pine, white spruce, sugar maple, red maple.

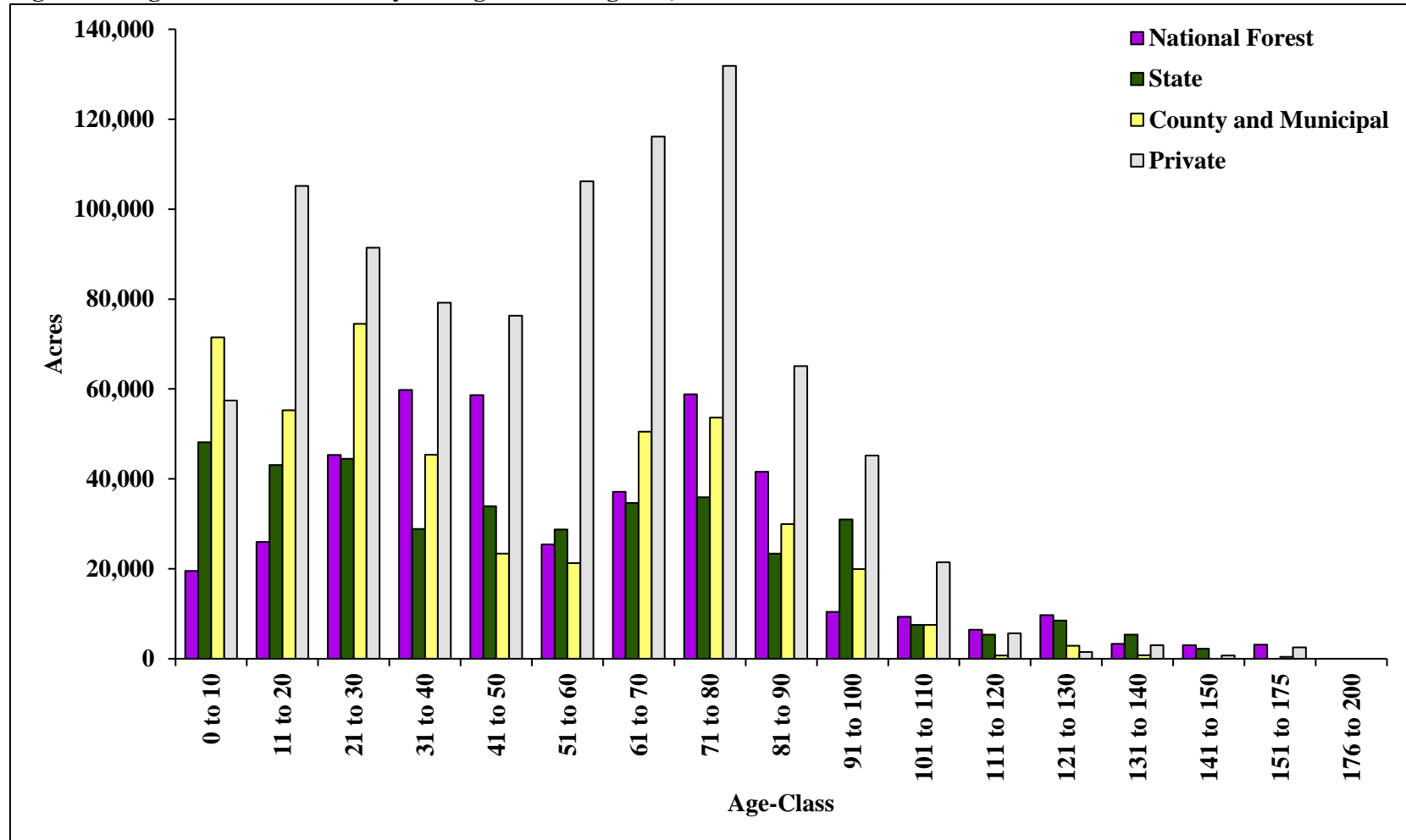
**Timberland Area:**

- 2,166,045 acres
- 45.1 percent of the overall NC landscape timberland.

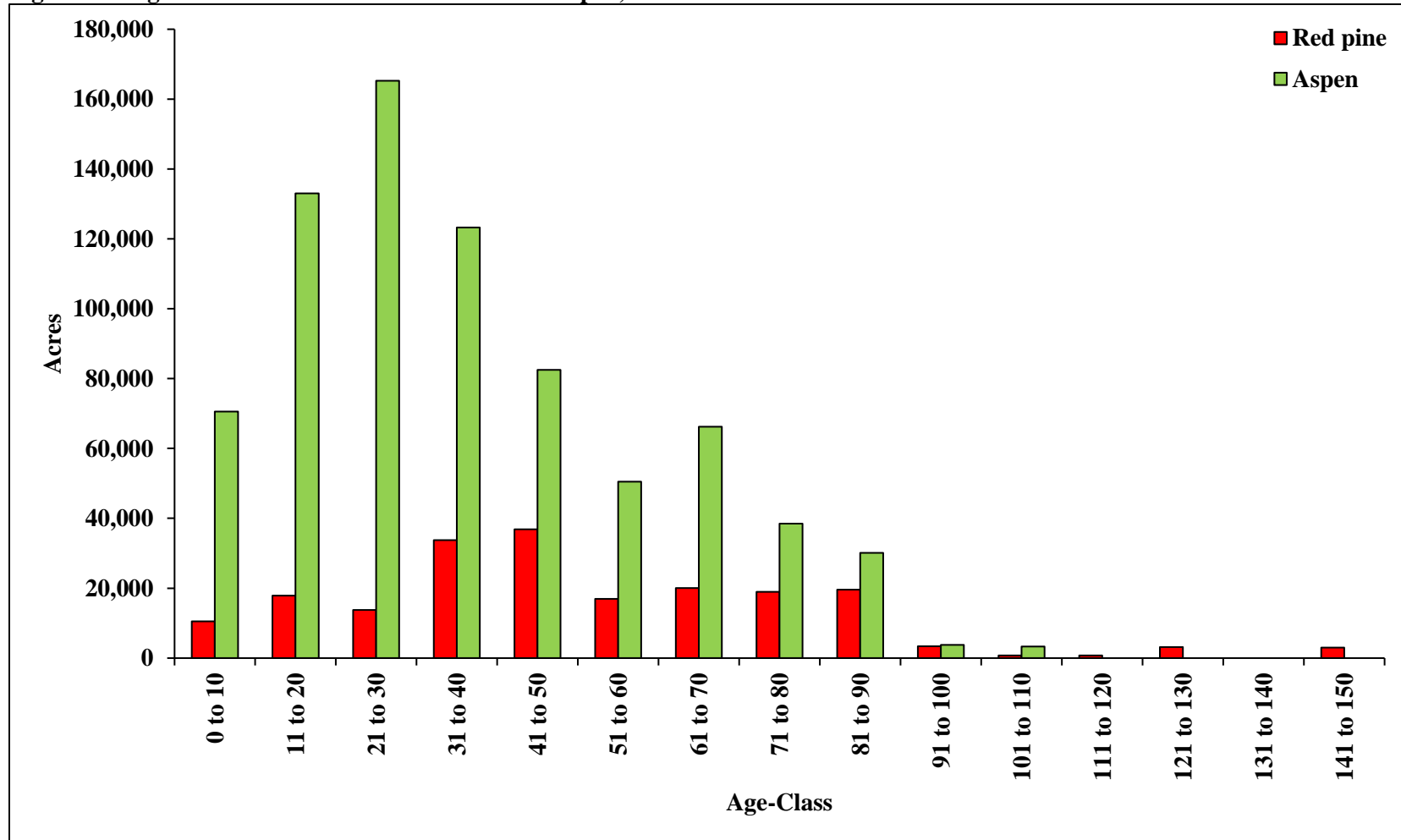
**Table 8.2. Timberland Ownership, 2016.**

Timberland (acres)						Sampling Error (% based on 1 SE)				
DNR Forest Type	Total	National Forest	State	County	Private	Total	National Forest	State	County	Private
Aspen	767,061	158,375	122,618	197,283	288,784	5.5	11.2	14.1	11.2	9.2
Northern hardwoods	237,928	29,381	24,728	56,630	127,190	10.4	29.7	32.0	21.2	14.3
Oak	116,753	22,169	67,113	7,125	20,346	15.3	35.6	20.5	54.8	35.5
Red pine	152,247	13,558	28,234	20,789	89,666	12.5	43.7	29.7	30.4	16.2
Lowland hardwoods	46,286	11,500	25,765	6,276	2,744	24.3	48.1	32.4	69.0	101.4
Birch	199,433	73,711	20,567	32,024	73,131	11.0	17.7	35.2	27.9	18.3
Tamarack	101,033	37,239	4,451	17,074	42,269	15.7	25.1	70.9	36.9	25.2
Other	197,601	21,956	20,504	40,077	115,063	10.9	33.4	34.4	24.0	14.4
Northern white-cedar	65,320	23,783	18,040	5,810	17,687	20.0	33.5	36.6	59.6	39.4
Balsam poplar	64,098	--	13,439	10,344	40,315	19.4	--	43.1	47.3	24.4
Jack pine	34,919	4,587	7,023	13,238	10,070	25.9	77.5	62.6	41.5	44.0
Black spruce	41,595	7,381	3,734	13,507	16,972	24.9	63.6	82.4	45.4	36.5
Eastern white pine	40,915	3,319	4,322	13,987	19,287	24.5	98.9	70.7	42.4	34.9
Balsam fir	5,398	729	221	154	4,294	63.8	98.9	100.1	100.5	78.1
Non stocked	17,459	6,137	5,891	2,988	1,597	34.6	60.2	58.7	100.1	70.2
White spruce	78,001	3,752	14,573	20,372	39,304	16.9	62.7	38.5	34.1	24.1
<b>All Forest Types</b>	<b>2,166,045</b>	<b>417,577</b>	<b>381,224</b>	<b>457,677</b>	<b>908,719</b>	<b>3.0</b>	<b>5.2</b>	<b>8.2</b>	<b>7.3</b>	<b>4.9</b>

Source: Forest Inventory Analysis.

**Figure 8.4. Age-Class Distribution by Management Categories, 2016.**

Source: Forest Inventory and Analysis.

**Figure 8.5. Age-Class Distribution of Red Pine and Aspen, 2016.**

Source: Forest Inventory and Analysis.

## C. Goals and Strategies for the Grand Rapids and Bemidji Wood Production Zones

Note – The North Central Landscape committee initially identified forest management challenges, goals and strategies, and projects for the Grand Rapids and Bemidji wood production zones separately, but decided to combine them due to the economic and ecological similarities between the two zones.

### Specific Forest Management Opportunities and Challenges:

- Abundance of young aspen not yet in the marketable range.
- Tree regeneration challenges due to deer browse, disease, weather, competition, etc.
- Insect pests and diseases - tamarack/eastern larch beetle, mistletoe, emerald ash borer.
- Climate change anticipated to negatively affect many species. Most notably for industry is a projected decrease in aspen, but opportunities for hardwood species may increase.
- More stochastic weather events (wind storms).
- Lack of management on private lands.
- Moderate timber harvesting on federal lands.
- Inaccurate forest inventory records.
- Unsettled management direction on school trust lands.
- Management of natural origin vs plantation pine, and finding funds to cover the cost of protecting pine seedlings from deer.
- Private lands are not managed consistently and steadily through time. Strong markets and high stumpage prices are two of the factors that can encourage private landowners to manage their forest lands. In times of low stumpage prices much of the timber for the industry generally comes from public lands. Increased coordination of private forest management is needed, including the promoting of timber harvesting on private lands.
- Lack of summer access and summer available wood.
- Logging operations are in desperate need of youth to help revitalize the industry.

### Goals and Silvicultural Strategies:

#### Goal 1: Maintain and increase the forest industry base.

- Find a sustainable market for low value conifer species.
- Promote niche forest product markets for small producers.
- Support the development of markets for bioenergy, textiles, lumber, etc.
- Invest in marketing initiatives at a state level.
- Manage Trust Fund parcels holistically (vs stand by stand) for setting aside leave areas.

#### Goal 2: Increase forest management on the landscape, particularly in private lands.

- Manage all cover types.
- Increase thinnings and intermediate treatments in suitable cover types.
- Improve management incentives for non-industrial private forest (NIPF) landowners.

- Encourage intermediate treatments such as mowing, brushing, and prescribed burning in pine and oak ecosystems.
- Develop forestry professionals (loggers and consulting foresters) that specialize in managing small tracts.
- Encourage foresters to promote conversation with adjacent landowners.

Goal 3: Increase timberland access.

- Increase all season access.
- Encourage infrastructure and maintenance and increased investment in infrastructure, maintenance, and easements.

Goal 4: Increase forest diversity to adapt to social, economic, and climate change.

- Favor species diversity through forest management actions, especially towards future-adapted species.
- Manage for a diversity of age classes.
- Take actions to perpetuate larger patch sizes and connectivity on the landscape.
- Proactively manage sites that are likely to decline to community types more tolerant of future climate conditions while reserving some areas as possible refugia sites.
- Manage and retain native seed sources to help maintain species' presence on the landscape.
- Maintain coarse woody debris on site to aid in water retention, create microclimate, and provide cover/habitat for keystone species.
- Encourage all ownerships to harvest with sound silvicultural prescriptions in lowland hardwoods.

Goal 5: Use a variety of forest management tools to manage stands by their potential.

- Encourage the inclusion of NPC classification into stand exam procedures.
- Use NPC classifications inform cover type selections and other management decisions.
- Develop variable rotation ages based on site quality, desired product, stocking, management intensity, and ecological or social objectives.
- Promote the use of Timber Stand Improvement (TSI) and other intermediate treatments.

Goal 6: Maintain a range of aspen age-classes.

- Continue harvest operations to maintain mixed age classes. Select some aspen stands for early harvest to draw the coming age class peak down.
- Expand outreach and education efforts to NIPF landowners to increase harvest of older aspen cohorts.
- Focus short-term management on 81+ old aspen (70-100).
- Maintain reserve aspen patches on good sites to provide age class and structural diversity.

**Potential Collaboration Projects:**

Outreach & Education Projects

- Outreach to surrounding landowners during harvest.
- Private forest management (PFM) opportunities.
- Private harvest bordering county/state harvests to increase production/feasibility.
- Landowner outreach – contact neighboring parcel owners to increase management.
- Cooperation between all PFM cooperators.

- Support DN-R PFM group as a coordinator/focal point for multi-agency PFM.
- PFM – DNR, SWCD, NRCS collaboration.
- Contact local landowners about timber sales.
- Private landowner logging school.
- Support Great Lakes Silviculture Library and encourage inclusion of economic variables.

#### Research and Development Projects

- Jack pine regeneration via seed.
- Deer browse protection.
- Chippewa National Forest: American Elm Genetics Project.
- Biomass marketing and industry development.
- Use of biomass ash residue as fertilizer to improve harvest volume or decrease aspen rotation lengths on marginal soils.
- Cross-laminated timber usage and development - increasing use of underutilized species (i.e. white pine, red maple, balsam fir, etc.).
- Remote sensing forest inventory.
- Natural Resources Research Institute LIDAR project.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Mixed species plantations and woodland – Blandin.
- Hardwood management – Aitkin County.
- Collaborative ash diversification.
- Biomass harvesting of aspen regeneration or hazel.
- Mixed conifer plantations.
- Mixed species stands.
- Gap selection effectiveness.
- Good Neighbor Authority projects.
- Potential collaborative project between Industry Foresters / MLEP and Private Consultants/DNR PFM Foresters/SWCD Foresters/NRCS to increase communication and coordination to link smaller private woodlots together for an assessment and harvest in areas where loggers will be harvesting.
- Federal, state, county, private fencing opportunities.
- Interagency prescribed burn partnership.





## Section 9

### Social Mid-Level Direction

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Social aspects within the North Central landscape are closely intertwined with the environmental and economic aspects of Sections 7 and 8. The Landscape Committee believes that watershed assets and issues are an essential component in this landscape and they serve as a surrogate for the social mid-level direction. How we use land in watersheds greatly impacts quality and quantity of water resources, which can be both good and bad. Readers of this Plan are encouraged to use the Watershed and Land Use frameworks in this section as strategic guidance when developing and implementing their plans, programs and projects.

#### A. Watershed Framework

This part of Section 9, the Watershed Framework, describes initial directions for managing forest resources in two distinct watershed settings in the North Central landscape – lake base watersheds and stream based watersheds.

Lakes in north central Minnesota are among the best in the nation for providing recreational opportunities, and collectively comprise some of the state’s most valuable ecological, economic, and social assets. The North Central landscape is also headwaters to the nation’s grand old river, the Mississippi. Given that maintaining healthy forests in a watershed is one of the best methods for protecting high quality water resources, this section is intended to provide land managers and owners with overarching guidance for maintaining and enhancing water quality and fish habitat in both lake based and stream based watersheds through the lens of sustainable forest management.



Forests play a critical role in keeping water clean by absorbing and filtering water, preventing erosion through soil stabilization, and allowing for groundwater recharge. Clean water is vital to not only the ecological and economic vitality of the region but also to the social health of the resource-rich North Central Minnesota region. As such, forest land is a legitimate and essential land use component for the landscape. The National Association of State Foresters recognized this role of forest land in the connection of healthy forests to clean water by its policy statement:

*“Water, in all its uses and permutations, is by far the most valuable commodity that comes from the forest land that we manage, assist others to manage, and/or regulate.”*

## The Land / Water Geography

### Physical Arrangement and Delineation

While no two watersheds are the same, there are some basic similarities in watersheds that allow them to be clumped into more manageable categories. For the purposes of this landscape plan, watersheds are divided into two broad categories: **1) Lake Based** and **2) Stream Based** watersheds. “*Lake Based*” watersheds are those watersheds that have relatively large storage areas within, lakes and reservoirs. The lake based watersheds cover 5,732,919 acres (63%) of the 9,069,715-acre North Central landscape. “*Stream Based*” watersheds are dominated by rivers and tributaries and tend to have fewer lakes. These types of watersheds cover 37% (3,336,796 acres) of the Landscape.

In general terms, watersheds within a landscape can be further divided into three geo-physical settings including: 1) Storage / Conveyance features – lakes and wetlands, streams and rivers, 2) Near Shore Areas – riparian land areas, which are generally more attractive for land development, and 3) Upland – the large remaining land surface areas outside the riparian area that flow to storage and conveyance features and ultimately farther downstream.

Much of the North Central Landscape is characterized by sandy soils. Large blocks of forest land are effective at greatly reducing surface water flows but also are responsible for providing the primary connection to the region’s clean cold-water lakes and streams through shallow groundwater recharge systems. When we overdevelop lands in the Near Shore areas, increased volumes of water are forced to travel overland which causes increased erosion, sediment transport, and water degradation. Forest resources and how they are managed directly affect all three of these physical settings. In this context, forests are major form givers to not only surface water but to ground water and ultimately our source water (drinking water). Forests can also be a major form giver to our land use patterns and help shape development.

*“Protecting the sponge, the forest land cover and its underlying geology, is absolutely vital to our coldwater fisheries. And it is this fisheries resource that is the foundational to our region’s as well as our state’s tourism economy”.*

*Peter Jacobson, DNR Fisheries Senior Research Scientist*

### Defining Major Drivers for Spatially Integrating Land and Water Management

Two major land use drivers generally define water quality of lakes and streams in a landscape. They include “land disturbance” and “forest land protection”. Land disturbance generally means a man-made change to the land cover that potentially changes its stormwater runoff characteristics. From a landscape perspective, land disturbances involve the conversion of land from native land covers (forests, prairies, brushland, wetlands) to man-made activities and uses (agricultural, urban, suburban and shoreland). The more developed lands become, the greater the amount of runoff and corresponding transport of sediment, nutrients and pollutants tends to occur. Furthermore, disturbances occur on a broad temporal spectrum from those activities that cause a more permanent change in land cover – roads and land development – to those that are shorter in duration or temporary. Timber harvest and forest management generally are more temporary in nature.

Forest land protection relates to the maintaining of forested and other native land covers by some governing or societal mechanism. A mathematical way to calculate land protection is simply to add up the amount of land area in a given watershed: 1) starting with the land area

in public ownership, plus 2) land under conservation easements (which precludes land development and conversions), plus 3) privately owned wetlands (regulated by the Minnesota Wetland Conservation Act). Lands under public management or some long-term form of governmental control “protect” the native land cover and the concurrent stormwater runoff conditions. It should be noted that forest management which includes timber harvest is a part of this definition.

The SFRA directs the MFRC through its regional landscape committees to develop regional forest management plans (aka – landscape plans) that pursue the sustainable management, use, and protection of forest resources to achieve economic, environmental, and social goals. "Forest resources" are defined as, “those natural assets of forest lands, including timber and other forest crops; biological diversity; recreation; fish and wildlife habitat; wilderness; rare and distinctive flora and fauna; air; water; soil; climate; and educational, aesthetic, and historic values”. By addressing forest land cover, composition and age class in ecological, economic and social settings including through the lens of watersheds or hydrology, this landscape plan provides not only a more meaningful context for the planning of forest resources but also for subsequent water, land use, and other natural resource plans. This approach is intended to more fully embrace the spirit and direction set forth in the state law as envisioned by the Governor, the state legislature and the forestry community overall.

## Lake Based Watershed Approaches

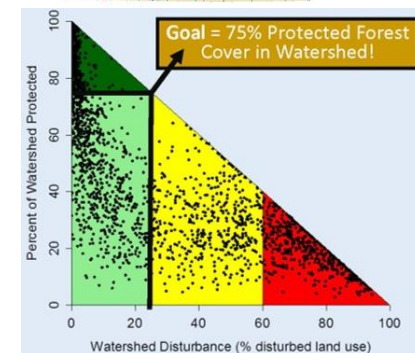
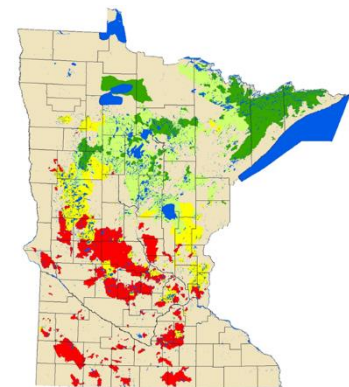
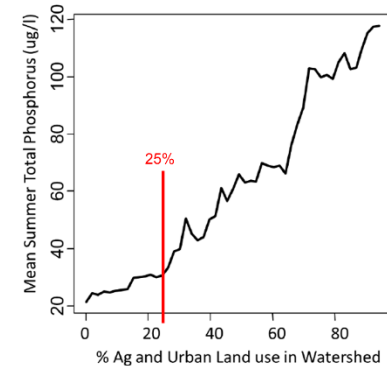
### Prioritizing Forest Land Cover Protection for “Lake-Based” Watersheds

Modeling of over 1300 lakes by the Minnesota DNR Fisheries Research Unit has revealed that phosphorus concentrations in lakes are directly related to land use disturbance in the watershed. Land use disturbance includes urban development, agriculture, and mining land uses. Phosphorus concentrations become elevated when land use disturbance reaches 25% of a lake's watershed and are greatly elevated when land use disturbances exceed 60%. These thresholds set the foundation for identifying appropriate water quality management strategies for lakes. Lakes with relatively undisturbed watersheds need protection, while lakes with heavily disturbed watersheds need restoration. Many watersheds in the forested ecoregions of Minnesota are protected by public ownership (federal, state, and county). Lakes in the northern part of the state benefit from extensive public holdings within the Superior and Chippewa National Forests, state forests, state and national parks, state and federal wildlife areas and county lands. Lands in public ownership are usually maintained with relatively undisturbed land cover, including forests, grasslands, and wetlands. Lakes with undisturbed watersheds, with high levels of protection, should maintain good water quality. Considerably less public land exists in the southern, agricultural part of the state.

Using land use disturbance and protection status allows for the categorization and prioritization of lakes and their watersheds into a protection vs. restoration framework.

- **Vigilance (dark green)**: Lakes with watershed disturbances less than 25% and protection greater than 75% can be considered sufficiently protected. These lakes have the suggested approach of “vigilance” (keeping public lands protected in a forested land cover).
- **Protection (light green)**: Lakes with watershed disturbances less than 25%, but levels of protection less than 75% are excellent candidates for protection efforts.
- **Full Restoration (yellow)**: Lakes with watersheds that have moderate levels of disturbance (25-60%) have realistic chances for full restoration of water quality.
- **Partial Restoration (red)**: Restoration of lakes with intensive urban and agricultural watersheds (>60% disturbance) to natural levels may not be realistic. The suggested approach for these lakes is partial restoration of water quality that restores some degree of ecological integrity (e.g., reducing phosphorus concentrations sufficiently to allow for the establishment of rooted aquatic vegetation in turbid, eutrophic prairie lakes to benefit fish habitat.)

The map and graphs to the right shows the geographic and data breakdown of this approach for the DNR's managed fish lakes across Minnesota. The table on the next page breaks down the extent of the different lake watershed conditions in the North Central



Source: Mike Duval & Pete Jacobson, Minnesota Department of Natural Resources.

Landscape. Also see Figure 9.2.

**Table 9.1. Habitat Condition of Lake Based Watersheds in the North Central Landscape.**

County	Lake Catchment Acres	*Habitat Condition (% of Catchment)			
		Vigilance	Protection	Full Restoration	Partial Restoration
Aitkin	623,382	38.2%	58.5%	3.3%	0.0%
Becker	703,614	15.2%	37.5%	42.7%	4.6%
Beltrami	397,826	3.9%	71.5%	24.6%	0.0%
Cass	1,121,424	49.6%	42.9%	7.5%	0.0%
Clearwater	270,226	31.4%	20.0%	48.5%	0.0%
Crow Wing	562,424	5.3%	76.7%	18.0%	0.0%
Hubbard	621,191	13.5%	65.8%	16.2%	4.5%
Itasca	1,184,562	41.2%	57.6%	1.2%	0.0%
Mahnomen	80,757	60.0%	28.1%	9.1%	2.8%
Polk	80,494	0.1%	3.1%	64.8%	32.0%
<b>Total North Central Region</b>	<b>5,645,900</b>	<b>29.3%</b>	<b>53.1%</b>	<b>16.1%</b>	<b>1.6%</b>

\* This data covers all landownerships – both public and private, but does not include stream watershed acres (see Table 9.2 for stream watersheds)

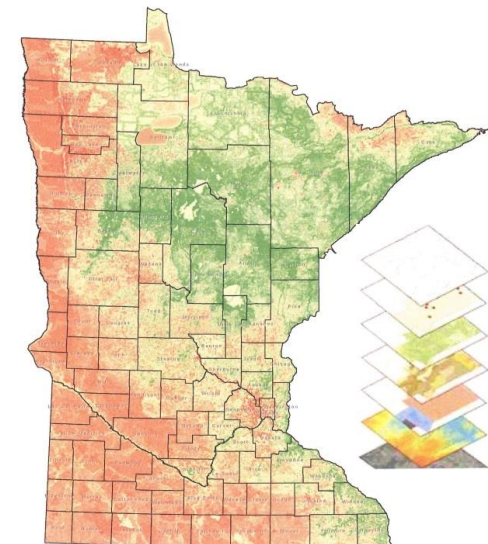
Source: MN DNR Fisheries.

### Forest Lands with High Recreational, Economic and Ecological Values

The Minnesota Forests for the Future Program (MFF) has developed a GIS-based tool to help identify and target parcels for protection. This statewide analysis used recreational, economic and ecological data to provide indices of priority forest lands. The image to the right is the composite map of the sum of the recreational, economic, and ecological values. It shows a gradient of low to high values – the highest values (green) representing areas with high scores for recreational, economic, and ecological values. See Figure 9.3 for map of the composite forest values for the North Central Landscape.

In addition to the MFF analysis tool, other modeling efforts have been developed to assist with identifying and targeting conservation projects (e.g., TNC Zonation Model, NRI Parcelization Risk Model, DNR Watershed Health Assessment Framework, PFM Spatial Analysis Project and Important Forest Resource Areas, MBS Biodiversity Significance, and others) are available. Information about other mapping and modeling efforts are listed in Appendix G.

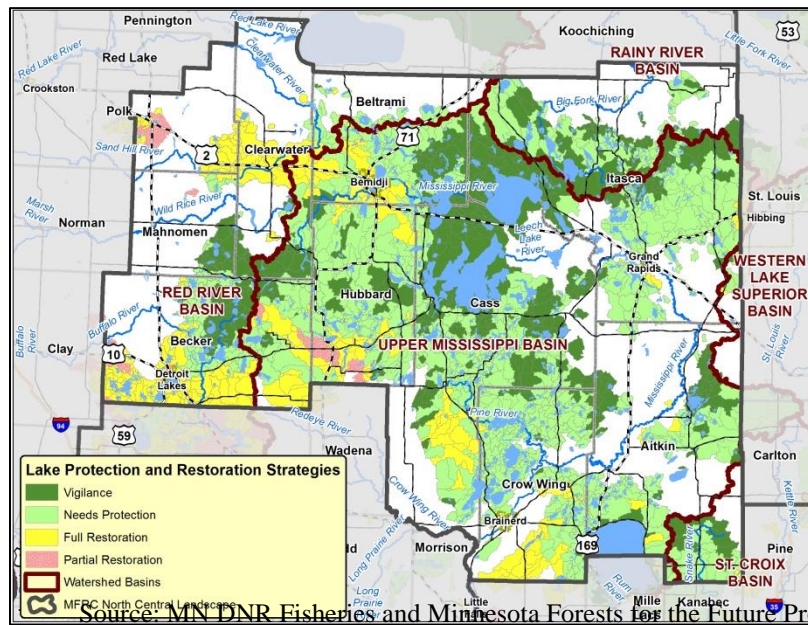
**Figure 9.1. Minnesota Forests for the Future Composite Value Map.**



Source: Minnesota Forests for the Future Program.



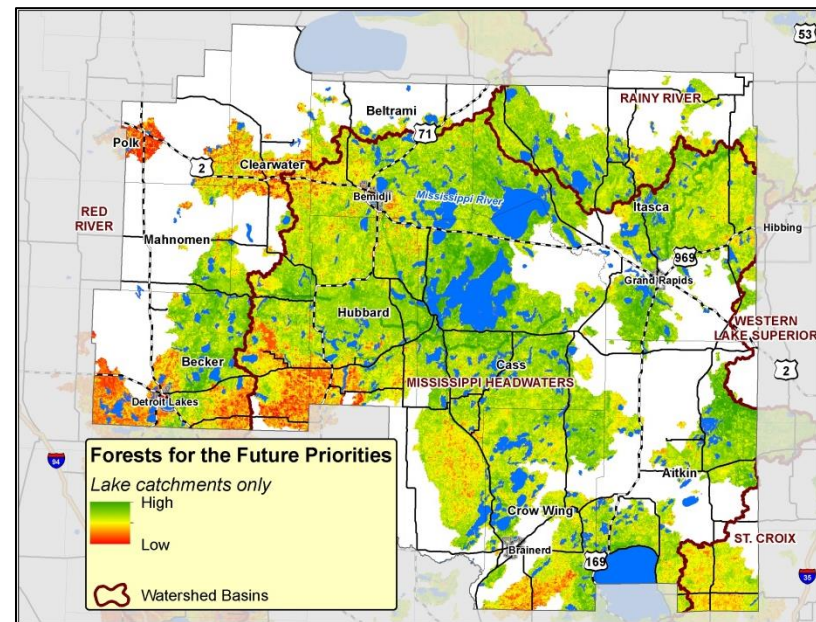
Figure 9.2. Lake Based Watershed Framework.



Source: MN DNR Fisheries and Minnesota Forests for the Future Program.

Note: Stream base watersheds are shown in white and addressed later in this section.

Figure 9.3. Minnesota Forests for the Future Priority Forests.



Both of these modeling approaches exercises identify similar areas to focus conservation efforts, but the spatial resolution between the two is quite different. The Lake Based Watershed Management Framework classifies entire lake watersheds into one of four basic categories, whereas the output of the MFF priority forests model assigns a spectrum of forest values on a 30 m x 30 m grid. Such fine-scale resolution is useful for comparing site-level values to help target specific projects, whereas the watershed-level categorizations are more appropriately used for assigning regional and sub-regional priorities.

The following narrative provides initial landscape level guidance to landowners and managers for managing forest resources in the four **lake based watershed** categories.

## **“Vigilance” Lake Based Watersheds (Dark Green)**

### **Area:**

- 2,149,323 acres
- 23.7% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Large public land base – Chippewa National Forest, tribal, state and county lands – minimizes need for land protection.
- Includes largest lakes – Leech, Cass, Winnie, part of Mille Lacs. High levels of Near Shore land development and related pressures.
- Opportunity to extend and restore large terrestrial habitat blocks and areas of high biodiversity from adjacent vigilance watersheds.
- Need to increase infrastructure maintenance – culverts, forest roads, increased harvest access, stream crossings, recreational vehicles.

### **Goals and Strategies:**

#### Goal 1: Maintain land protection levels above 75% for Vigilance Lake Based watersheds.

- Strategy 1: Maintain public land base, support land trades & exchanges, promote cooperative forest research and funding.
- Strategy 2: Support collaborative public improvement projects, promote coordinated timber sales, integrate Landscape Plan with partner plans.

#### Goal 2: Keep disturbance levels to less than 25% disturbed in Vigilance Lake Based watersheds.

- Strategy 1: Encourage robust implementation of Shoreland BMPs, especially the reforestation of the Near Shore areas; rain gardens; septic system inspections, time of transfer improvements and upgrades, and other locally defined shoreland management issues.
- Strategy 2: Integrate Landscape Plan goals, objectives and strategies into local water plans and land use plans.
- Strategy 3: Engage lake property owners and associations.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Federal, tribal, state and county land managers – transfer forest management expertise, apply concepts in the Landscape Plan, and more efficiently address challenges and opportunities.
- Shoreland landowner and local officials – forest/water quality connection, importance of shoreland BMPs.

#### Research and Development Projects

- Inventory accessibility to public lands for summerwood harvest and approaches to increase coordination on shared access.
- Enhance cooperative boundary line management using new technologies.

Opportunity Area Projects – Pilots or Demonstration Projects

- Support Chippewa NF + Leech Lake Band collaborative projects.
- Promote a collaborative project in Becker-Mahnomen counties in their vigilance watersheds.



## **“Protection” Lake Based Watersheds (Light Green)**

### **Area:**

- 2,995,531 acres
- 33.0% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- We are close to reaching 75% protection levels on these watersheds. Support for conservation easements and fee title efforts to increase protections.
- Larger amount of private landownership than Vigilance watersheds. Need to strategically extend out from the existing public land base.
- High quality large lakes typically with high levels of Near Shore land development and more intensive recreational uses.
- Need to increase both watershed protection and Near Shore management, need to protect the region’s economy through these citizens.
- Example lakes – Borden, Roosevelt, Washburn. Many of these high quality recreation lakes with active lake associations (partners).

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 75% in Protection Lake Based watersheds.

- Strategy 1: Dramatically increase funding support for conservation easement and fee title projects, coordinated with SFIA. Further develop an agreed upon list of prioritized lake watersheds. Work with all partners, to secure funding together, from multiple sources over next 20 years.
- Strategy 2: Continue to prioritize and target landowner outreach through landscape stewardship approaches.

#### Goal 2: Keep disturbance levels to less than 25% disturbed in Protection Lake Based watersheds.

- Strategy 1: Integrate Landscape Plan concepts with local land use plans and land use controls and local water plans.
- Strategy 2: Promote forest stewardship plans, costs share, SFIA and Near Shore BMPs including reforestation and riparian enhancements.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Support the implementation of TELE project (US FS program – Tools for Engaging Landowners Effectively) through landscape stewardship.
- Support the integrated and coordinated outreach of forestry/water quality concepts to NIPFs through lake associations, watershed groups, youth groups, woodland committees, etc.

#### Research and Development Projects

- Support research on landowner motivations and the effectiveness of incentive programs to keep lands forested.
- Identify specific areas to extend for specific forest management efforts on public lands – DNR management opportunity areas.

Opportunity Area Projects – Pilots or Demonstration Projects

- Pine River landscape stewardship project.
- Suomi Hills landscape stewardship project.
- Upper Mississippi River Headwaters Restoration Project (Joint Chief’s Project with USFS and NRCS).

## **“Full Restoration” Lake Based Watersheds (Yellow)**

### **Area:**

- 927,579 acres
- 10.2% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Private landownership much larger base of the watersheds. Significantly less existing public land base in western portion of landscape.
- Higher levels of agricultural land uses. Increased drainage of wetlands over time.
- Near Shore more intensively developed with higher levels of intense recreational use of surface waters. Focus on shoreland BMPs.
- More popular lakes are located near and around regional centers – Detroit Lakes, Bemidji.
- Example lakes – Serpent, Bemidji, Detroit, Sallie, Cormorant.
- Land values are higher, greatly increases the cost of land protection.

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 25% in Full Restoration Lake Based watersheds.

- Strategy 1: Target specific parcels for land protection that deliver a maximum water quality benefits. Coordinate with local water plans.
- Strategy 2: Aggressively promote SFIA and 2c in strategic areas within the watersheds.

#### Goal 2: Keep disturbance levels to less than 60% disturbed in Full Restoration Lake Based watersheds.

- Strategy 1: Support the implementation of shoreland BMPs, especially reforestation and riparian buffer enhancements.
- Strategy 2: Promote forest stewardship plans and cost share projects.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Increase awareness about forestry/water quality connection with lake associations and watershed groups.
- Promote forest management practices through education efforts on shoreland and agricultural BMPs.

#### Research and Development Projects

- Low grade hardwood utilization for biomass, wood shavings and bedding products and other niche markets.
- Becker County pine thinning project.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Lake Bemidji landscape stewardship project.
- Smokey Hills landscape stewardship project.

## **“Partial Restoration” Lake Based Watersheds (Red)**

### **Area:**

- 88.526 acres
- 1.0% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Private landownership and agricultural land uses dominate the watersheds. Increased stormwater runoff volumes.
- Watersheds around cities of Park Rapids, Detroit Lakes and Erskine. Opportunity to increase urban forestry, stormwater management.
- Watersheds need major landscape policy changes in order for significant restoration to become viable.
- Most expensive to restore these types of watersheds and as a result may be lower priority for land protection in the short term.

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 10% in Full Restoration Lake Based watersheds.

- Strategy 1: Support very strategic land protection projects that restore forest land cover and maximize water quality benefits.
- Strategy 2: Coordinate land protection with wellhead protection efforts.

#### Goal 2: Keep disturbance levels to less than 80% disturbed in Full Restoration Lake Based watersheds.

- Strategy 1: Promote and support forest stewardship plan, cost share, SFIA, and 2c.
- Strategy 2: Promote and support the implementation of agricultural and shoreland BMPs.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Increase awareness about forestry/water quality connection through farm organization, SWCDs, NRCS, Extension and MDA.
- Increase awareness about forestry/water quality connection with the cities of Detroit Lakes, Park Rapids, Bemidji and other municipalities.

#### Research and Development Projects

- Partner with the West Central Landscape Committee to research better ways to convert hybrid poplar plantations.
- Use of woody biomass in agricultural food processing plants and municipal energy needs in Park Rapids.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Park Rapids area landscape stewardship project.
- Union Lake Sarah watershed landscape stewardship project – Erskine area

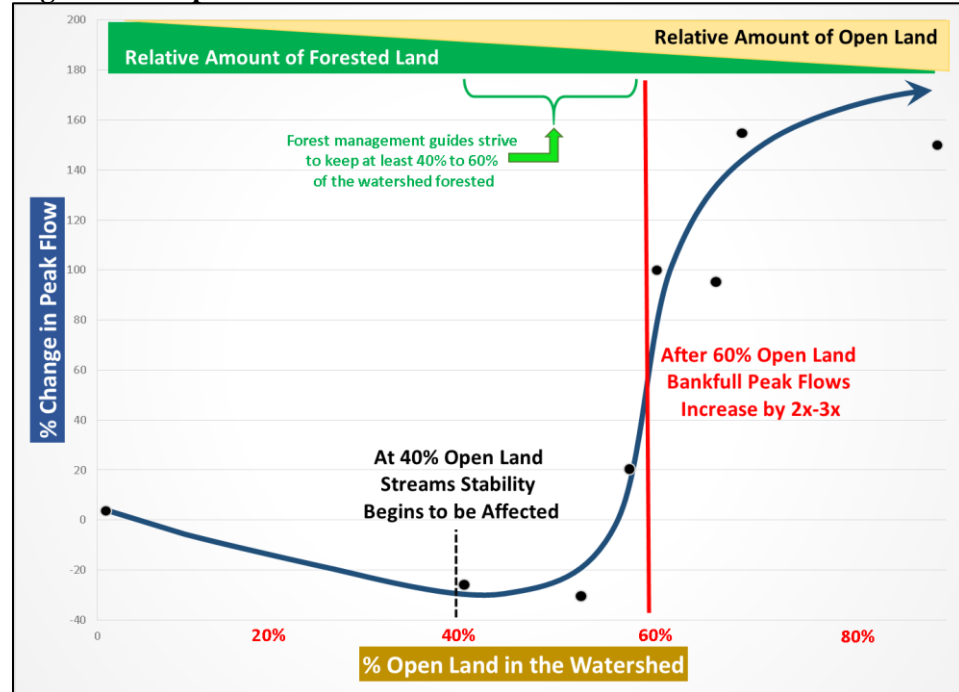
## Stream Based Watershed Approaches

### Prioritizing Forest Land Cover Protection for “Stream-Based” Watersheds

Water quality in stream-based watersheds, as it is in lake-based systems, is partially tied to land use disturbances in the watershed. Applying the same protection vs. restoration framework described on page 9-4 but to stream-based watersheds yields the distribution of habitat conditions shown in Table 9.2. This approach generally categorizes watersheds in the Mississippi headwaters area and the Rainy River Basin into ‘vigilance’ and ‘protection’ categories, and watersheds in the more agriculturally-dominated Red River Basin into ‘full restoration’ and ‘partial restoration’ categories. An important caveat to this approach for streams is that the protection and restoration categories for stream catchments are not based upon a particular scientific basis like they are for lakes. The thresholds for land use disturbance and protection may be different between the two systems.

U.S. Forest Service Hydrologist Sandy Verry determined that the amount of mature forest cover on the landscape is a driving factor in sediment and nutrient delivery to downstream water bodies. As forested watersheds become more open or pasture becomes row crop or agriculture lands become urban, the channel-forming flow in channels doubles, triples or quadruples. Land use change sets in motion an accelerated cycle of channel erosion and deposition that impacts the habitat quality of streams and increases the frequency of infrastructure repair and replacement. Channels may get either wider, deeper or both. They also get steeper as they adjust to a new channel-forming flow. The relation between forest land and open land in watersheds and the size of bankfull / channel-forming flow peaks is shown in the graphic to the right, which uses data from controlled watershed studies in Minnesota and Wisconsin. The amount of forest land in the watershed can be thought of as watershed roughness, thereby intercepting and slowing the delivery of water to the soil where a porous soil also retards water flow. Forest management guidelines often strive to keep forests in at least 40- to 60% of the watershed in order to avoid the habitat degradation and infrastructure failure caused by larger channel-forming peak flows and to keep sources of timber available for landowner objectives of habitat and financial returns. This aligns with the graphic above that shows that negative changes to watershed hydrology begin to occur when the percentage of forest converted to open lands reaches 40%. That number forms the basis for establishing a protection goal of 60% in forested landscapes.

**Figure 9.4. Impact of Forest Cover on Peak Flow in Streams**



Source: MFRC Minor Watershed Landscape Stewardship Plan.

This research concluded that in minor watersheds in steeper landscapes (e.g. moraines and dissected till plains), land use change on only a half square mile (320 acres) can initiate accelerated channel erosion and deposition cycles in these generally steeper channels. In flat landscapes (e.g. glacial lake beds and outwash plains) land use change on 10 square miles will initiate accelerated channel erosion and deposition cycles in these lower-sloped channels. Rivers and streams subjected to adjacent land use change have increased bankfull velocities and discharge are dynamically unstable where channel slope, width, depth proceed in an accelerated cycle of increased water flow and sediment transport and deposition.

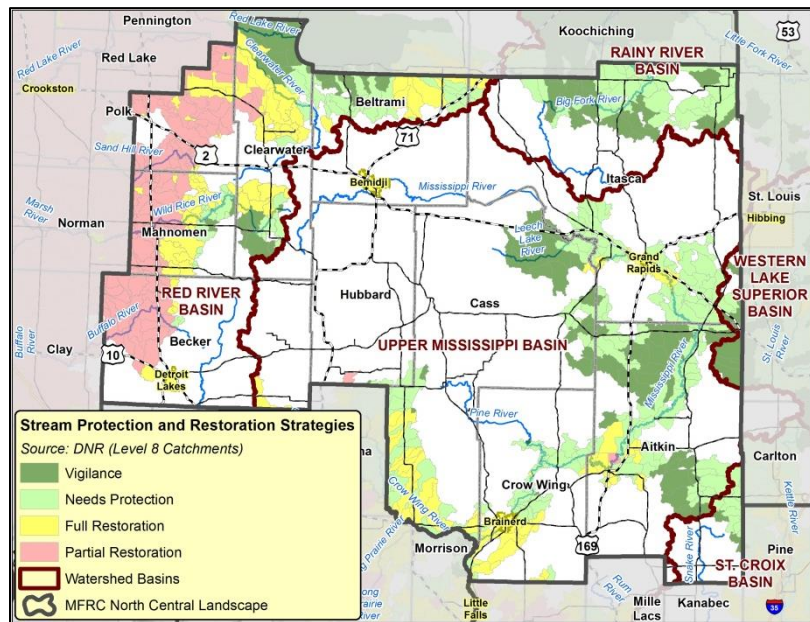
**Table 9.2. Habitat Condition of Stream Based Watersheds in the North Central Landscape.**

County	Stream Catchment Acres	*Habitat Condition (% of Catchment)			
		Vigilance	Protection	Full Restoration	Partial Restoration
Aitkin	637,496	44.8%	46.3%	8.2%	0.6%
Becker	221,434	0.0%	1.5%	13.6%	84.9%
Beltrami	207,992	16.9%	51.5%	31.6%	0.0%
Cass	422,706	36.4%	35.0%	28.6%	0.0%
Clearwater	388,781	34.8%	15.9%	41.8%	7.5%
Crow Wing	177,357	0.7%	58.6%	40.7%	0.0%
Hubbard	18,322	2.1%	72.0%	0.0%	25.9%
Itasca	687,781	24.8%	69.8%	5.4%	0.0%
Mahnomen	292,774	2.2%	12.4%	31.4%	54.0%
Polk	268,778	0.1%	0.0%	15.2%	84.7%
<b>Total North Central Region</b>	<b>3,323,421</b>	<b>23.7%</b>	<b>37.6%</b>	<b>20.3%</b>	<b>18.4%</b>

\* This data covers all landownerships – both public and private, but does not include stream watershed acres (see Table 9. for lake watersheds)

Source: MN DNR Fisheries.

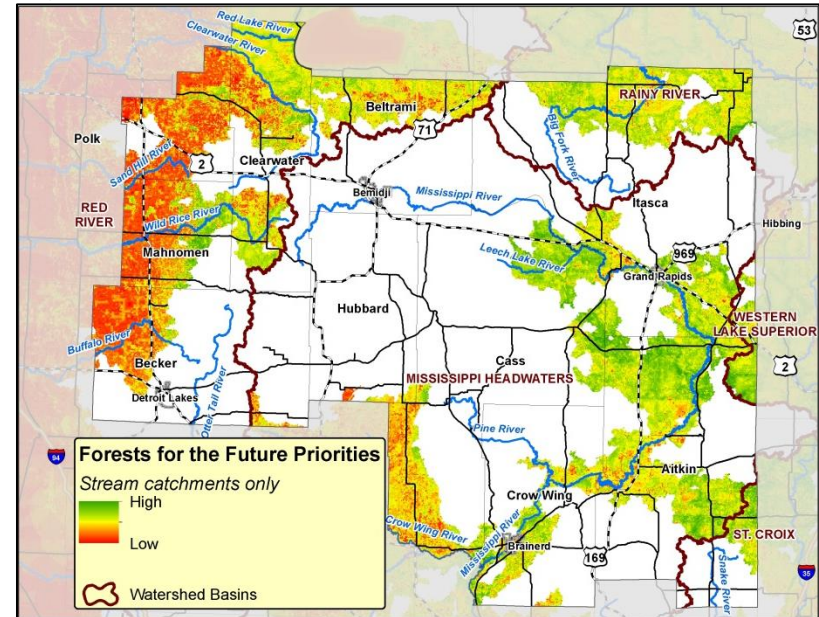
Figure 9.5. Stream Based Watershed Framework.



Source: MN DNR Fisheries and Minnesota Forests for the Future Program.

Note: Lake base watersheds are shown in white and were addressed earlier in this section.

Figure 9.6. Minnesota Forests for the Future Priority Forests.



Both of these prioritizing approaches identify similar priority areas for conservation, but the spatial resolution between the two is quite different. The Stream Based Watershed Management Framework classifies entire stream based watersheds into one of four basic categories, whereas the output of the MFF priority forests model assigns a spectrum of forest values on a 30 m x 30 m grid. Such fine-scale resolution is useful for comparing site-level values to help target specific projects, whereas the watershed-level categorizations are more appropriately used for assigning regional and sub-regional priorities.

The following narrative provides initial landscape level guidance to landowners and managers for managing forest resources in the four **stream based watershed** categories.

## **“Vigilance” Stream Based Watersheds (Dark Green)**

### **Area:**

- 789,154 acres
- 8.7% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Largest concentrations – northern and central Aitkin, northeastern Cass – opportunity to enhance Mississippi River corridor and streams.
- Large blocks in southern and northern Clearwater counties – opportunities to coordinate with Red Lake and White Earth bands.
- Opportunity to protect major riparian corridors along streams and connect large terrestrial habitat blocks and areas of high biodiversity.
- Watersheds have lower levels of land development potential and risk. Land values are lower, challenge to protect private in-holding tracts.
- Need to increase infrastructure maintenance – culverts, stream crossings, forest roads.
- Challenges with increased harvest access year round and recreational vehicles, need to minimize impacts on aquatic and terrestrial habitats and populations.

### **Goals and Strategies:**

#### Goal 1: Maintain land protection levels above 60% for Vigilance Stream Based watersheds

- Strategy 1: Maintain public land base. Focus the acquisition of voluntary conservation easements and fee title acquisition along rivers and major streams, tributaries.
- Strategy 2: Promote the use of SFIA on private lands in watersheds away from streams where there is less risk for land development pressure.

#### Goal 2: Keep disturbance levels to less than 40% disturbed in Vigilance Stream Based watersheds

- Strategy 1: Promote implementation of the state buffer program and Shoreland BMPs.
- Strategy 2: Support collaborative public improvement projects, culvert and stream crossing inventories, promote coordinated timber sales.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Aitkin County/DNR CFM staff - target PFM outreach to riparian landowners in watersheds in northern and central parts of county.
- CNF/DNR/Tribal staff – coordinate PFM outreach to landowners in northeastern Cass County.

#### Research and Development Projects

- Target site level guideline monitoring on vigilance stream based watersheds.
- Effectiveness of conservation easements on protecting riparian corridors and blocks for populations of keystone wildlife species.



Opportunity Area Projects – Pilots or Demonstration Projects

- Northern Itasca County stream protection project – CNF, Itasca County SWCD, DNR.
- Red Lake and White Earth stream protection projects.

## **“Protection” Stream Based Watersheds (Light Green)**

### **Area:**

- 1,248,734 acres
- 13.8% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Largest concentrations – around Vigilance Stream based watersheds in Aitkin, Itasca, Beltrami and Clearwater. Opportunities to significantly extend protection and link habitat corridors along rivers and streams adjacent to Vigilance watersheds.
- Opportunity to build resilience in major blocks of terrestrial and aquatic habitats by connecting with corridor projects.
- Lower land values and less development pressures and risk, especially in northern portion of the Landscape.

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 60% in Protection Stream Based watersheds.

- Strategy 1: Promote acquisition of conservation easements along rivers and major streams and in priority watershed areas.
- Strategy 2: Support the fee title acquisition of key riparian tracts that expand habitat blocks and extend protection from Vigilance watersheds.

#### Goal 2: Keep disturbance levels to less than 40% disturbed in Protection Stream Based watersheds.

- Strategy 1: Support the implementation of riparian buffer program and BMPs. Promote the DNR cost share program.
- Strategy 2: Support collaborative public improvement projects, culvert and stream crossing inventories, promote coordinated timber sales.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Extend Aitkin County PFM outreach to Protection Stream Based watersheds in the county. Support the use of TELE to reach landowners.
- Support the use of TELE on Itasca County projects.

#### Research and Development Projects

- Enhanced forest management through health project – LCCMR proposal.
- 20-year terrestrial and aquatic habitat improvement monitoring project for two projects listed below.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Northern Itasca County NIPF protection project – County, CNF, DNR CFM.
- Support MHB Mississippi River corridor projects from Camp Ripley LSP to Aitkin thru to Grand Rapids.

## **“Full Restoration” Stream Based Watersheds (Yellow)**

### **Area:**

- 674,001 acres
- 7.4% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- Largest concentrations – Clearwater and Mahnomen, southwestern Cass – challenge of increasing levels of agricultural land uses and private landownership. There is less orientation towards forestry. Challenge to get private landowners to manage forest lands.
- Watersheds are located in the headwaters of the Red River Basin, adjacent watersheds downstream are partial restoration watersheds.
- Opportunity to expand protection of water resources and forest resources around three large blocks of federal lands in Mahnomen and Becker counties.
- Southwestern Crow Wing, southern Cass – land development pressures, opportunity to increase PFM through Camp Ripley ACUB project.

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 60% in Full Restoration Stream Based watersheds.

- Strategy 1: Prioritize land protection around public land base first, then along rivers and major streams.
- Strategy 2: Actively promote forest stewardship plans and SFIA on lands away from the riparian corridors and in the watersheds.

#### Goal 2: Keep disturbance levels to less than 40% disturbed in Full Restoration Lake Based watersheds, or portions of where possible.

- Strategy 1: Promote increased PFM cost share practices in the headwaters and along the major stem of the rivers and major streams.
- Strategy 2: Support implementation of the state buffer program.

### **Potential Collaboration Projects**

#### Outreach & Education Projects

- Promote PFM and forest/watershed management with SWCDs, NRCS, FSA and Extension.
- Support the use of TELE through landscape stewardship projects.

#### Research and Development Projects

- Update the Pine Regen/Deer Browse study (2007) with particular emphasis on the western counties in the Landscape and these watersheds.
- Silva-pasture management – research local approaches that are successful yet minimize impacts on watershed functions.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Tamarack Wildlife Refuge landscape stewardship project.
- Camp Ripley Sentinel Landscape – support the robust implementation of the Camp Ripley landscape stewardship plan.



## **“Partial Restoration” Stream Based Watersheds (Red)**

### **Area:**

- 611,533 acres
- 6.7% of the North Central Landscape

### **Specific Forest Management Opportunities and Challenges:**

- All watersheds are located in the headwaters of the Red River Basin. Watersheds are dominated by agricultural land uses and private land ownership. Land cover conversions throughout most of watersheds make it very difficult to fully restore water quality.
- Challenge to engage landowners in PFM.
- Land values are higher for agricultural lands than forested lands making it more expensive to acquire easements or fee title.
- Public landownership is scattered across the watersheds making connectivity of blocks of conservation land more difficult.

### **Goals and Strategies:**

#### Goal 1: Increase land protection levels to or greater than 10% in Full Restoration Stream Based watersheds.

- Strategy 1: Work with landowners, SWCDs and local officials in headwaters areas of the watersheds to identify potential small blocks of protection.
- Strategy 2: Coordinate forest protection on appropriate sites with prairie land protection efforts and the Prairie Conservation Vision.

#### Goal 2: Keep disturbance levels to less than 90% disturbed in Full Restoration Stream Based watersheds.

- Strategy 1: Promote ag BMPs across the watersheds.
- Strategy 2: Support the implementation of the state buffer program.

### **Potential Collaboration Projects:**

#### Outreach & Education Projects

- Increase awareness about forestry/water quality connection through farm organization, SWCDs, NRCS, Extension and MDA.
- Promote the benefits of farm field wind breaks and farmstead shelter belts.

#### Research and Development Projects

- Work with the West Central Committee to support the inventory of ash resource along rivers and streams in advance of EAB.
- Long term impacts of buckthorn invasion on riparian woodlands located in the prairie-forest transition zone.

#### Opportunity Area Projects – Pilots or Demonstration Projects

- Ash Replacement Project – along stream corridors prone to flooding and log jams.
- Buckthorn control.

## Overall Goals and Strategies for All Watersheds

### Goal 1: Increase and enhance outreach and education to private landowners.

- Educate landowners on the value of forests to society, the economy, and the environment (including wildlife), and the importance of not reducing current acreage and tract sizes (i.e. encourage incentives for both forest retention and forest management and provide educational material on the positive benefits of larger parcel sizes on forest values and their management.)
- Advocate the use of landowner outreach approaches and tools supported by the US Forest Service and DNR such as the Landscape Stewardship Initiative, Tools for Engaging Landowners Effectively (TELE).
- Directly reach out to private landowners in sensitive areas in watersheds.
- Work with MFA and private woodland committees to expand outreach and education to specific landowner groups.
- Work with youth groups and school forest programs to increase outreach to private landowners.
- Establish contact with landowners through workshop tours, coffee shop sessions, radio, and direct mailings. Use social media to showcase success stories, and good and bad practices to increase social acceptance. Track and record the effectiveness of various outreach approaches and share with DNR Forestry PFM staff.

### Goal 2: Enhance and improve the coordinated delivery of services to private landowners with all service providers.

- Support the integrated training of service providers (consulting foresters, industry foresters, loggers and contractors, SWCD, DNR, NRCS, FSA, and others) through existing education entities such as SFEC, MLEP, MFA, and Extension.
- Support the “institutional knowledge” of network of professionals such as private consultants and industry foresters (timber sales), SWCDs (conservation practices, conservation easements), DNR PFM (forest health, markets, etc.)
- Support the DNR Forestry annual CFM meetings.
- Support the re-instituting of plan writer workshops sponsored by DNR Forestry. Work with DNR staff to increase the number and quality of workshops as well as the number of certified plan writers working in the Landscape.
- Promote the implementation of the goals and objectives in this Landscape Plan at all PFM service provider training events.

### Goal 3: Promote coordinated forest and water resources planning.

- Increase the awareness of the DNR PFM System Framework Plan with water resource and conservation professionals in the region and seek their support in its implementation.
- Support the development of landscape stewardship plans on a watershed basis such as the Camp Ripley Landscape Stewardship Plan and the Pine River Landscape Stewardship Plan.
- Coordinate the development of local water plans (1 Watershed 1 Plans, county water plans) with this Landscape Plan as well as with landscape stewardship plans. Align and coordinate strategies and priorities from MPCA WRAP reports. Support the adoption of this Landscape Plan and landscape stewardship plans as reference or appendix documents in local water plans and vice versa.
- Support collaborative private forest management efforts through lake associations and land owner organizations.

### Goal 4: Promote the protection of working private forest lands and limit parcelization / forest fragmentation.

- Support the coordinated implementation of the private implementation tool box (see Section 10 for a description of the tool box concept) through the work of all service providers to private landowners.
- Support projects that increase the number and acreage of lands with forest stewardship plans.

- Support revisions to the SFIA program as recommended by the MFRC. Work with service providers to encourage private landowners, especially those with lands that are not as high of risk to land conversion to enroll in the program.
- Work with partnering organizations in the region to encourage landowners to consider conservation easements, especially on those lands where there is a high risk of land conversion and provide substantial public benefits in remaining as working forest lands.
- Where appropriate, work with local officials and partnering organizations to support the fee title purchase and or land trade of private lands that have provide very high conservation values to the public.

Goal 5: Increase buffers along lakes, rivers, streams and wetlands.

- Advocate the use of the MFRC site level guidelines, riparian management zones, filter strips, and best management practices.
- Support efforts by conservation organizations to work with landowners to keep livestock and other disturbances away from riparian areas.
- Urge lawmakers to pass legislation similar to the 2015 Buffer Law that provides incentives for forest management in riparian zones.
- Support research and demonstration planting that promote Dutch Elm Disease-resistant elms and climate-resistant trees for black ash stands.
- Assist landowners with creating working vegetated buffers.
- Advocate the updating of local land use regulations (zoning ordinances, subdivision regulations) to better protect riparian areas.
- Support efforts that seek to minimize unnecessary damage from off-highway vehicle use in riparian areas. Advocate for the inclusion of site level forest management guidelines in ATV Safety Training courses.

## B. Land Use Framework

Human activities have dramatically altered the landscapes of the state as well as the North Central region over the past 200 years and more. While timber harvest coupled with the conversion of forest land to agricultural use was a primary cause of forest loss over this time period, after 1950, the rate of forest conversion for shoreland and urban uses has been a significant and ongoing impact, especially in high amenity and ecologically sensitive areas. More recently, the conversion of pine forests to potato fields in the western parts of the Landscape have caused decreases in the forest land base. These changes have reinforced the need for greater integration of forest resource and land use planning. This Land Use Framework provides an initial landscape level overview on how the Committee can help facilitate and coordinate the integration of forest resources and land use planning with stakeholders in the region.

### Regional Land Supply and Demand Projection

#### Future Demand for Rural Land for Residential Development

Approximately two thirds of the population in the North Central Landscape live in townships, one third live in cities. At a county level, two exceptions to this include Crow Wing and Polk counties with 45 percent and 64 percent living in townships, respectively.

**Table 9.3. City and Township Populations of counties in the North Central Landscape, 2015.**

County	2015 Total Population	2015 City Population	2015 Township Population	Township Percent of County Population
Aitkin	17,460	3,467	13,993	80.1
Becker	34,893	12,493	21,400	61.3
Beltrami	46,103	16,657	29,446	63.9
Cass	30,656	6,632	24,024	78.4
Clearwater	9,062	2,442	6,620	73.1
Crow Wing	66,818	36,652	30,166	45.1
Hubbard	21,980	4,892	17,088	77.7
Itasca	47,344	23,191	24,153	51.0
Mahnomen	5,647	1,698	3,949	69.9
Polk	32,252	21,386	10,866	33.7
<b>North Central Landscape*</b>	<b>356,585</b>	<b>129,510</b>	<b>227,075</b>	<b>63.7</b>

Source: Minnesota State Demographic Center.

\* The MFRC North Central Landscape splits Beltrami and Polk Counties. These counties could not be split for these population estimates and therefore the 'North Central Landscape' summary row does not represent the true population of the region.



As documented in the technical support document, North Central Landscape Demographic Data Report, the projected populations of most counties will grow at relatively modest levels or remain flat. Some counties are projected to experience some population declines as illustrated in the following table:

**Table 9.4. Population projections for Minnesota and counties in the North Central Landscape, 2015-2045.**

County	2015	2025	2015-25 % Change	2035	2025-35 % Change	2045	2035- 45 % Change	2015-45 % Change
Aitkin	17,460	17,086	-2.1%	15,809	-7.5%	15,076	-4.6%	-13.7%
Becker	34,893	37,593	7.7%	39,203	4.3%	40,961	4.5%	17.4%
Beltrami	46,103	49,517	7.4%	51,946	4.9%	54,142	4.2%	17.4%
Cass	30,656	31,827	3.8%	31,765	-0.2%	32,599	2.6%	6.3%
Clearwater	9,062	9,383	3.5%	9,507	1.3%	9,555	0.5%	5.4%
Crow Wing	66,818	70,450	5.4%	71,555	1.6%	73,122	2.2%	9.4%
Hubbard	21,980	22,815	3.8%	22,789	-0.1%	23,162	1.6%	5.4%
Itasca	47,344	48,834	3.1%	48,543	-0.6%	47,721	-1.7%	0.8%
Mahnomen	5,647	5,982	5.9%	6,240	4.3%	6,469	3.7%	14.6%
Polk	32,252	33,317	3.3%	34,024	2.1%	34,229	0.6%	6.1%
<b>North Central Landscape*</b>	<b>312,215</b>	<b>326,804</b>	<b>4.7%</b>	<b>331,381</b>	<b>1.4%</b>	<b>337,036</b>	<b>1.7%</b>	<b>7.9%</b>
<b>Minnesota</b>	<b>5,497,933</b>	<b>5,841,619</b>	<b>6.3%</b>	<b>6,093,729</b>	<b>4.3%</b>	<b>6,234,930</b>	<b>2.3%</b>	<b>13.4%</b>

Source: Minnesota State Demographic Center.

Note: Projections are based on 2014 projections from the 2010 U.S. Census Data.

\* The MFRC North Central Landscape splits Beltrami and Polk Counties. These counties could not be split for these population estimates and therefore the 'North Central Landscape' summary row does not represent the true population of the region.

#### Rural Residential Land Demand by 2045

Given the projected population increase of 24,821 people by the year 2045 and assuming a comparable split between city and township populations (64 percent), there will be a projected increase of 15,811 new residents living in rural areas of the North Central Landscape in thirty years. Assuming a rate of 2.3 people per household, a total of 6,874 new housing units will be needed in the North Central Landscape townships to accommodate this population growth. The following land areas would be needed assuming varying average lot sizes (does not include streets, utilities, parks or other community facilities):

- 0.5 acre lot size – 3,437 acres
- 1.0 acre lot size – 6,874 acres.
- 2.5 acre lot size – 17,185 acres.
- 5.0 acre lot size – 34,370 acres.
- 10.0 acre lot size – 68,740 acres.
- 20.0 acre lot size – 137,480 acres.

### Generalized Regional Land Supply

According to the 2011 National Land Cover Dataset, over 4.9 million acres or 54 percent of the North Central Landscape was in one of three upland land cover categories including upland forest, shrub and grass land covers. Agricultural land covered another 666,000 acres of 7.4 percent of the landscape as documented in the technical support document, North Central Landscape Conditions and Trends Report. With approximately sixty percent of the landscape under private landownership, the potentially developable land area in the North Central landscape is well over 3 million acres.

**Table 9.5. 2011 Land Cover Inventory, North Central Landscape.**

Comparative Class	Area (Acres)	% of Total	Change 2006 to 2011 (Acres)	Change 2006 to 2011 (% Cover)
Upland Forest	3,735,130	41.2	-74,766	-0.8
Upland Shrub	324,015	3.6	28,449	0.3
Upland Grass	869,579	9.6	18,632	0.2
Lowland Vegetation	2,228,779	24.6	-24,881	-0.3
Agriculture	666,773	7.4	-664	0.0
Open Water	901,124	9.9	-1,801	0.0
Barren	10,250	0.1	1,099	0.0
Developed	334,065	3.7	53,932	0.6
<b>Total North Central Region</b>	<b>9,069,715</b>	<b>100.0</b>		

Source: MN Geospatial Commons, Multi-Resolution Land Characteristics Consortium.

Note: Some changes in areas of cover types from one dataset to another may be due to changes in scale and/or classification methodologies used in creation of each dataset. However, the NLCD 2001, 2006, and 2011 datasets are directly comparable.

Obviously, public lands, lakes and rivers, and private wetlands in the region are not available for future land development. And while lands within the already developed portions of the urban and rural development will include some redevelopment and may consume some of the projected housing units, most of the land for new development, whether for growing cities or rural development, will come from the forest land, cultivated lands and/or hay/pasture/grassland categories.

Choices will be made incrementally over the next five, ten, twenty and thirty years by landowners. And decisions will be made by local land use authorities throughout the North Central landscape as to where and how much land development should occur. The 10 counties, 355 townships and 96 cities in the region all play important and leading roles in guiding the development of land which can place significant impacts on the subsequent management of the forest resources in their jurisdiction.

## Research Studies and Forest Policy Efforts

*“Minnesota’s forest land base is enlarged and protected. No net loss of forest land occurs and some previously forested areas are returned to forest cover. The forest land base is protected from decreases and fragmentation caused by land use changes.”*

*MFRC, Vision Statement, 1996*

When the MFRC developed its organizational vision statement in 1996, the first goal they established to accomplish their vision was to maintain and even enlarge the state’s forest land base. Over twenty years, the MFRC has developed a myriad of policy recommendations to keep forests as forests and supporting the acquisition of conservation easements on large tracts of forested lands, encouraging family forest owners to plan for the long-term stewardship of their property, and conducting research on the extent of forest land parcelization.

The state’s goal of no net loss of forest lands cannot be achieved without the help of Minnesota’s forested counties, townships, and private forest landowners. Local governments are authorized by law to prepare plans for the future development of their jurisdictions and to adopt land use regulations implementing those plans. Many counties also manage large tracts of forest lands. The best way to ensure that Minnesotans continue to enjoy the economic, environmental, and recreational benefits of healthy forests is for local officials to protect local forest resources and maintain the forest land base. To support efforts by local officials, the MFRC has completed a number of forest policy and research studies over the past ten years including the following:

- Maintaining the Forest Land Base in Minnesota: Forest Land Parcelization and Policy Tools
- Protecting Minnesota Forests From Parcelization with Conservation Easements
- Forest Land Parcelization in Northern Minnesota: A Multi-County Assessment
- Using Taxation to Maintain Minnesota’s Forest Land Base
- Using Land Use Planning and Zoning to Maintain Minnesota’s Forest Land
- Land Acquisition, Land Exchange and Conservation Easements
- The Legal Foundation for Establishing a Forestry/Source Water Protection Program
- Private Forest Land Management Study
- Recommendations for Revisions to the Sustainable Forest Incentive Act by the SFIA Stakeholder Group
- These and other related documents contain a wealth of information relevant to land use planning and the integration of forest resources into that process. These should be referred to by local units of government when developing their land use plans. See the forest policy documents posted on the MFRC website at <http://mn.gov/frc/forest-policy-reports.html>

## Model Forest Resources Plan Element

One document of particular usefulness to local officials in the linking the planning of forest resources with land use is the document, “The Model Forest Resources Plan Element”. The document provides a detailed outline on steps that a county or township can take on developing and adopting a forest resources element into its local comprehensive plan. The model shows local planners, planning commissions, elected officials, and interested citizens how to:

Describe and analyze forest resources in their comprehensive plans.

Document the values forest lands offer, including their contributions to both the local economy and the community's appeal to residents and visitors.

Identify and document the issues, including land parcelization, that affect forest resources in their jurisdiction; and

Craft policies and ordinances that can serve as a defensible basis for actions that protect forest resources for the use and enjoyment of present and future generations.

### **Forest Resource Modeling Tools for Land Use Planning Applications**

The MFRC and partners have developed a series of forest resource modeling tools that can be very useful to local land use planning efforts, including applications for land use planning and management. Help to identify areas that should be protected from land development.

- Quantifying Parcelization Potential of Forest Lands in Itasca County (this study will soon be expanded to cover the entire North Central Landscape) – MFRC
- Biodiversity Significance Assessment, High Conservation Value Forests, Private Forest Management Important Forest Resource Areas (IFRAs), Minnesota Forest for the Future, Watershed Health Assessment Framework – MN DNR
- Zonation Model – TNC and DNR
- LANDIS II – US FS

Local officials, resource agency staff, land managers and landowners are encouraged to work together to use and apply these modeling tools to help prioritize and target forest resource conservation efforts in ways that help that support the more robust implementation of this Plan.

## C. Conclusion

The Watershed Framework in this section provides an initial strategic approach to sustainably managing forest resources in two watershed settings with four different sets of watershed conditions. This Framework provides a simple yet powerful paradigm on how to intersect the management of water and forest resources. The planning of forest resources in Minnesota on a hydrological or watershed basis as one of the lenses to envision the future of our landscapes is essential to finding a better balance for competing interests. We can manage our watersheds more comprehensively- while achieving ecological, economic and social goals as laid out in Section 6.

From the Land Use Framework, it should be clear that there is more than enough land in the region to accommodate future shoreland and urban land development for many decades to come while at the same time maintaining a wealth of working forests across the landscape. Land use is a matter of local control, and best when done in close working relationships with its citizens and landowners. Forest land is a legitimate land use in northern Minnesota and should be considered as such in land use planning efforts by local governments in the region. Refining and implementing the Land Use frameworks in partnership with local governments can help to ensure a strong tax base for local government with managing the costs of providing public services for their citizens and businesses.

Through the refinement and implementation of the Watershed and Land Use Frameworks at more local scales, multiple public and private benefits can be achieved concurrently over the next ten to twenty years. Understanding the ecological, economic and social geographies of forest resources provides real world perspectives in which to view and more comprehensively plan for the balancing of various interests and needs. Good landscape planning integrated with water and land use planning and coordination can help all stakeholders work together to balance the various interests and meet multiple societal, economic and ecological goals.

With this strategic vision now in place, how do we more robustly achieve a broad range of public and private benefits in the North Central landscape? The next part of this Plan, **Part 3: Operationalizing the Plan**, provides an initial outline on how to make this overall vision as well as the three Mid-Level components of this Plan happen over the next ten to twenty years.



### **Part 3. Operationalizing the Plan:**

How will we get there?

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## Section 10

### Coordination and Implementation Framework

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A critical component of any planning document is the section that describes how the “vision” will be implemented. Successful implementation of a regional plan that affects dozens of agencies and organizations and thousands of private interests requires clear and meaningful development. The purpose of this section is to outline the organizational structures and coordination strategies that the North Central Committee believes are necessary to support the successful implementation of this Plan.

#### A. How will this Plan Get Implemented?

How will the ideas suggested in the Strategic Policy section of this plan (Part 2) get done? Who will do the work? How much will it cost? How long will it take? As with past successes in forest management, progress is achieved through intentional **cooperation**, **coordination**, and **collaboration**. This plan proposes to significantly increase and enhance the ways that interested persons and stakeholder groups can work together to implement sustainable forest management across the North Central Landscape.

It is important to remember the regional context of this document and its primary role is to support and coordinate sustainable forest management by interested stakeholders. The primary work across the millions of acres in the North Central Landscape will continue to be done on the ground by foresters and loggers, contractors, land managers, resource agency staff, forest products industry, individual forest landowners, and local officials, among many others.



While the **planning horizon** for MFRC landscape plans typically span 100 years or longer, the **implementation horizon** for this Plan is ten to twenty years. After five to ten years, parts of the Plan will need to be reconsidered as changes merit. The MFRC and the Coordination Committee should collectively determine the point at which this Plan needs to be either amended or updated as time moves forward.

#### B. Coordination Strategies

By participating in the coordination and implementation of landscape plans, partners in the MFRC regions experience significantly increased benefits through the collaborative management of the forest resources they are responsible for. Over the past fifteen or so years, the MFRC regional landscape committees have developed a series of coordination strategies that have evolved to enhance the successful implementation of the landscape plans.



Regional committees meet on a regular basis to coordinate land management activities and support the development and implementation of collaborative projects. In general terms, the MFRC landscape plans are implemented through four basic approaches including:

- **Encourage consideration of the landscape-level context** by all agencies, organizations, industry, and private landowners when developing their resource management plans and implementation projects.
- **Coordinate and support projects by partnering organizations** that promote sustainable forest management practices in the landscape region.
- **Develop and implement committee projects** that proactively address the goals and strategies outlined in the regional forest resource plans. Regional committees have been catalyst for securing of funds for Committee and partner project development and implementation.
- **Monitor activities and outcomes** of projects implemented by the committees, as well as those by partnering organizations and landowners across the landscape region.

### **Support and Maintain the North Central Regional Landscape Committee**

One of the primary ways that the MFRC sustains the Landscape Program is through its ongoing funding and staffing support of the regional committees. This staff support and funding allows the regional committees to focus more effectively on the coordination, implementation, and monitoring of landscape plans.

When considering how to coordinate the implementation of this Plan, it is an appropriate time for committees to review their membership and operations. Committees should also address the budgetary needs to support the implementation of their plans. Funding for the MFRC and its programs, including the Landscape Program comes from the State general fund. The MFRC operating budget has and will likely continue to support staffing for the basic operations of the Landscape Program and the regional committees. With a very modest operational budget over the last ten years, to support the successful coordination and implementation of this Plan, increased funding for the Landscape Program through the MFRC is needed.

In addition to the operating budget, the MFRC budget has provided seed moneys to the regional committees. These funds, while relatively small (up to \$5,000 per year), have helped initiate numerous projects in each region developed or supported by the regional committees. In the North Central Landscape, these funds have been used to help support some of the collaborative projects and match federal grant funds. While the Landscape Program budget has not been designed to be a primary source of implementation dollars, the seed funding over the past ten years has helped to leverage additional funds for sustainable forest projects in the Landscape. As the Committee begins its second generation of coordination efforts, securing additional funding to support committee efforts will be critical to the successful implementation of this Plan.

In 2015, the North Central Committee developed an operations guide to help it become more efficient and effective in its operations, enhance commitment amongst its members and partners, and increase the implementation of the Landscape Plan. The guide was intended to help make better use of committee member's time and efforts at and in between meetings. The Committee intends to continue to operate under the operational guidance set forth in the Guide (see Appendix H) over the life of this Landscape Plan.

By working through a series of coordinated strategies with stakeholders in the region, each partnering entity that participates in the coordination and implementation of this Plan will more likely experience significantly increased benefits from forest resources over time. The following is a list of coordination strategies that have been developed by the Committee to enhance the implementation of this Plan:

1. Information Sharing
2. Landscape Plan Outreach
3. Promote Integration of the Landscape Plan into Partners' Plans
4. Actively Support the Forest Policy and Research Development Processes
5. Develop Regional Priorities to Guide Investment in the Region
6. Promote Cross Boundary Demonstration Projects

### **Strategy #1: Information Sharing**

Regional committees meet on a quarterly basis to provide an open public forum for diverse interests to cooperatively promote forest sustainability. By bringing together representative interests from landscape regions, the committees serve as springboards for effective forest management activities that address specific needs and challenges in each region. One of the core functions that the regional landscape committees have done since the approval of their first-generation plans has been to support the sharing of information. They have done this through presentations by topical experts, exchanging reports and studies, and providing updates on work that members are doing. The Committee will continue to support this information sharing function at their future coordination meetings.

### **Strategy #2: Landscape Plan Outreach**

One of the key steps in encouraging the more robust use and application of this Plan is to increase awareness of the Plan by landowners and managers beyond the Committee members. Immediately after the approval of this Plan by the Council, the Committee will develop and implement an outreach strategy that increases awareness of the directions set forth in this Plan and stakeholders throughout the region can support the implementation of this Plan. The outreach strategy will include workshops, presentations to local boards, direct mailings, and maintaining a robust and useful MFRC website.

### **Strategy #3: Promote Integration of the Landscape Plan into Partners' Plans**

One of the primary ways that MFRC landscape plans are implemented is through the integration of goals and strategies from the landscape plans into the forest and related natural resource management plans developed by partners in the region. The Committee will actively encourage all agencies, organizations, industry, and private landowners to integrate the goals from this Plan into their resource management plans and implementation projects. The Committee plans to:

1. Review existing and proposed forest and related resource management plans to see how they fit with the goals and strategies in this Plan. Documents reviewed include: National Forest Plans, DNR Section Forest Resource Management Plans, tribal resource plans, county plans, private forest stewardship plans, fish and wildlife management plans, local water management plans, and local land use plans.
2. Determine how much each landowner can voluntarily contribute toward the landscape goals.

3. Look for ways to cooperate and coordinate on-the-ground management activities to achieve landscape goals.
4. Analyze the cumulative effects of current and planned activities across the region.
5. Assist MFRC staff in collecting necessary monitoring information as described in the “Monitoring Framework” of this Plan and periodically report accomplishments to the Council.

As a part of the development of this Plan, the Committee developed a series of technical support reports and research studies. These documents provide a wealth of knowledge on a broad range of relevant forest resource topics. A summary of these documents and suggestions on the applications of them is provided in the Users’ Guide, located at the end of Part 3. By using these landscape level documents, partnering groups in the region can save time and money in their planning and land management efforts while at the same time increase implementation of this Plan.

#### **Strategy #4: Actively Support Forest Policy and Research Development Processes**

As established in the SFRA, the landscape committees are to provide regional perspectives to the Council on broad range of sustainable forestry matters. With this statutory responsibility, regional committees play a critical role in shaping forest policy in Minnesota. The Committee will continue to support this by providing recommendations to the MFRC in the future as a part of their strategic forest policy development program and on relevant forest policy matters.

As a part of the development of this Plan, the Committee developed a series of recommendations in Section 12 to assist leadership in the forestry community to more quickly understand actions they can take to address a range of forest policy issues. These recommendations, if addressed by the partnering groups, will increase the ability of the Committee to more effectively facilitate and coordinate the implementation of this Plan.

#### **Strategy #5: Develop Regional Priorities to Guide Investment in the Region**

Over the past ten years, the Committee provided input to various agencies and organizations responsible for making major funding decisions. Input has been gathered at the Committee meetings through a series of Committee discussions and worksheets. The Committee will help set priorities that promote the implementation of the Plan and support increased coordination amongst partners in the region.

#### **Strategy #6: Promote Cross Boundary Demonstration Projects**

Since 2003, the Committee has supported numerous sustainable forest resource projects including the Lake Pines Collaborative, Camp Ripley Landscape Stewardships project, Wild Rice Lakes project, and Cisco Lakes PFM/CWL project. The Committee will continue to support the coordination and implementation of these projects. The Committee will also seek out new Landscape Stewardship projects within the region that promote collaborative or cross-boundary efforts, both local and multi-state, that support the implementation of this Plan, the state’s Forest Action Plan, the 25-Year Lessard-Sams Outdoor Heritage Council Habitat Vision, and other relevant policy documents. The Committee will develop and refine these potential projects through its 10-Year Work Plan and Annual Work Program development process described later in this section.

## C. Implementation Approaches on Public Forest Lands

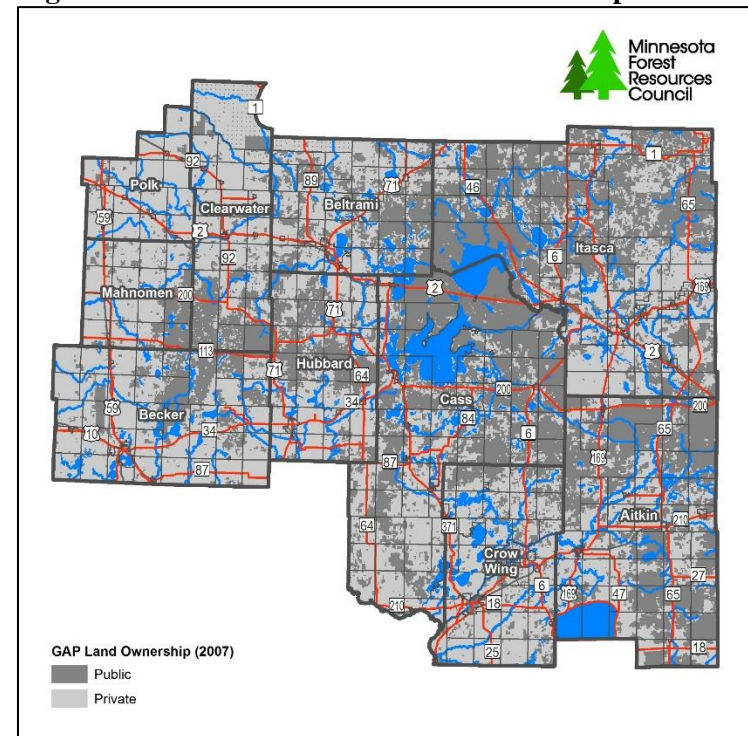
One of the primary challenges facing the MFRC regional landscape committees in coordinating the implementation of landscape plans is to decide where to start, especially considering the large geographic areas that the landscape regions cover. A second major challenge in implementing landscape plans is the complicated land ownership patterns. As noted in the North Central Landscape Conditions and Trends Report, this region has a very complex landownership mosaic of public and private lands.

Public forest lands in the North Central Landscape make up over half of all forest land in the region (see map and table below). These public lands are managed by a wide and diverse number of agencies. These agencies each have their own set of laws, mandates, and directives which their forest managers must comply with.

**Table 10.1. Estimated Forest Land Ownership in the North Central Landscape by County, 2016.**

County	Public			Private*	Percent Public
	Federal	State	County & Municipal		
Aitkin	10,749	285,070	199,831	314,296	61.2%

**Figure 10.1. Public and Private Land Ownership.**



Becker	31,074	49,519	67,426	161,130	47.9%
Beltrami	62,709	30,903	142,386	186,250	55.9%
Cass	259,240	143,312	199,742	243,156	71.2%
Clearwater	847	49,828	68,260	186,783	38.9%
Crow Wing	0	17,094	83,063	270,887	27.0%
Hubbard	0	75,099	119,759	194,471	50.0%
Itasca	268,325	285,069	270,860	556,001	59.7%
Mahnomen	0	17,147	2,954	82,100	19.7%
Polk	329	6,218	0	33,192	16.5%
<b>North Central Landscape</b>	<b>633,273</b>	<b>959,258</b>	<b>1,154,280</b>	<b>2,228,266</b>	<b>55.2%</b>
Minnesota	2,875,998	4,151,872	2,659,598	7,897,552	55.1%

Source: Forest Inventory Analysis.

\* The FIA database combines Tribal, Forest Industry, and Non-industrial Private as ‘Private’. For some analysis these categories cannot be separated due to disclosure laws.

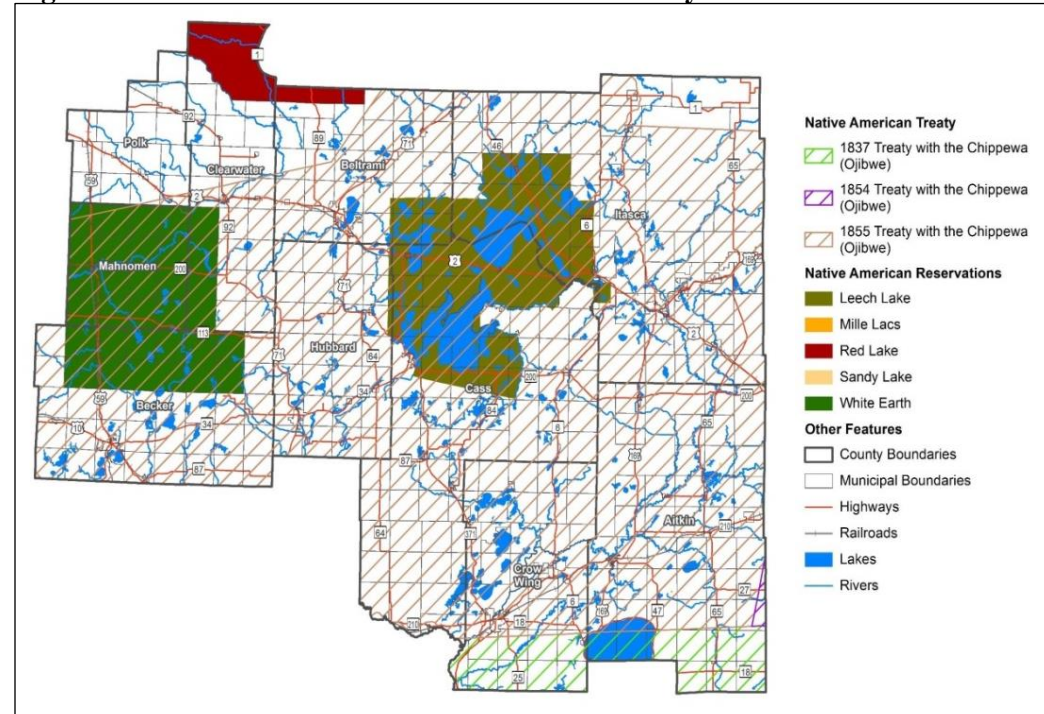
Source: MN Geospatial Commons.

The following narrative summarizes some of the developed concepts developed by the Committee in the planning process to provide public land managers with additional guidance on how to implement this Plan.

### Coordination with Tribal Lands and Treaties

Tribal reservations cover a significant portion of the Landscape and an important component of the complicated land ownership mosaic. Approximately 89 percent of the Landscape is covered by one of treaty rights areas. As a part of the planning process, Leech Lake Band members gave a presentation to the Committee on their land base and treaty rights. The Band members discussed some initial approaches to enhance coordination with other land managers in the Landscape including increasing awareness about the treaties. Landowners and land managers are encouraged to coordinate with the appropriate tribes for their work areas.

**Figure 10.2. Native American Reservations and Treaty Locations.**



Source: US Forest Service and MN Geospatial Commons.

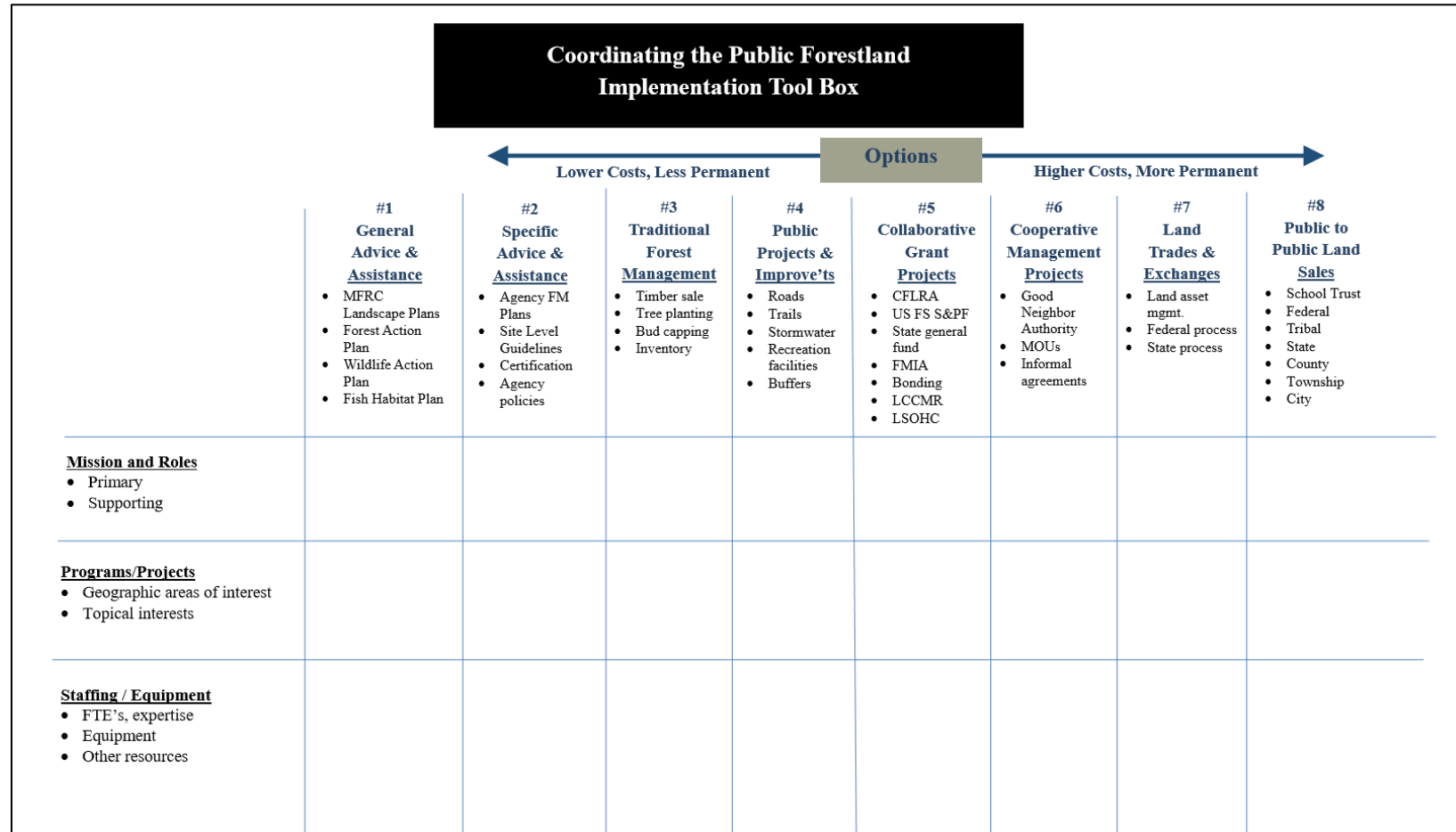
Note: The NC Committee recognizes there is a dispute on the boundary of the White Earth Reservation in Clearwater County (Nora, Minerva, Rice and South Clearwater Unorganized townships). This map is not intended to resolve the boundary dispute in any way.

### Integrating Agency Forest Management Plans and Projects with the Vegetation Management Framework

Public land managers in the North Central Landscape are encouraged to refer to and integrate the desired future conditions, goals and objectives of this plan into their agency's forest management plans and projects. The Users' Guide provides an outline on steps agency staff can follow to apply concepts in this Plan. Partnering agencies and organizations in the region are also encouraged to support the collaborative implementation of Committee-led projects described later in this section.

## Public Forest Land Implementation Toolbox

There are a number of implementation approaches or “tools” that public land managers commonly use to manage the large portfolios of land assets their agencies are mandated to do. The following diagram illustrates these implementation tools for public forest lands on a spectrum based on cost and level of effort or permanence as a way to help land managers more effectively and quickly communicate their planned or desired efforts to other landowners and managers.



During the planning process, Committee members provided input on the: 1) mission and roles, 2) programs and projects, and 3) staffing and equipment resources that each public agency has. After approval of this Plan, the Committee will continue to sort out and refine the roles and resources available to public land managers to identify and coordinate cross boundary management efforts that implement this Plan.

## **D. Implementation Approaches on Private Forest Lands**

There are thousands of individual private landowners within the approximately 9.1 million-acre North Central Landscape, most of who own tracts smaller than 160 acres. Each landowner is responsible for making decisions on how to manage their land. Connecting decisions of thousands of private landowners with landscape level goals is big challenge and not easy to attain. This task is more daunting when considering that less than ten percent of the private lands have a current forest stewardship plan. With over 44 percent of the forest lands in the North Central Landscape under private ownership, successful implementation of this Plan will require finding more effective ways to work with larger numbers of private woodland owners on an ongoing, sustained and very strategic basis. Sustainably managing private woodlands over such a large landscape is a formidable challenge.

### **MN DNR Private Forest Management (PFM) Program**

The state's Private Forest Management (PFM) program, which works in conjunction with the federal Forest Stewardship Program, is administered by the DNR Division of Forestry. One of the primary services the PFM program coordinates – in cooperation with other agencies and private consulting foresters – is forest stewardship planning and project planning/implementation for private woodland owners. Property-specific management plans provide technical advice and long range forest management planning to interested landowners. The plan covers the entire property except for active agricultural acres that will remain as such. This voluntary program is open to qualified private landowners, including corporations whose stocks are not publicly traded and own between 20 - 1,000 qualifying acres of land. Project planning and implementation services through the DNR and a large network of service providers are available to all landowners.

While Minnesota's PFM Program has one of the premier state private lands assistance programs in the country, budget cuts over the past ten years followed by a five-fold increase in 2016, have seriously complicated the program's capacity to serve. In response to these challenges, the Minnesota DNR has proactively sought out collaborative opportunities with partners both within and outside the state, including the US Forest Service.

### **Landscape Stewardship Initiative**

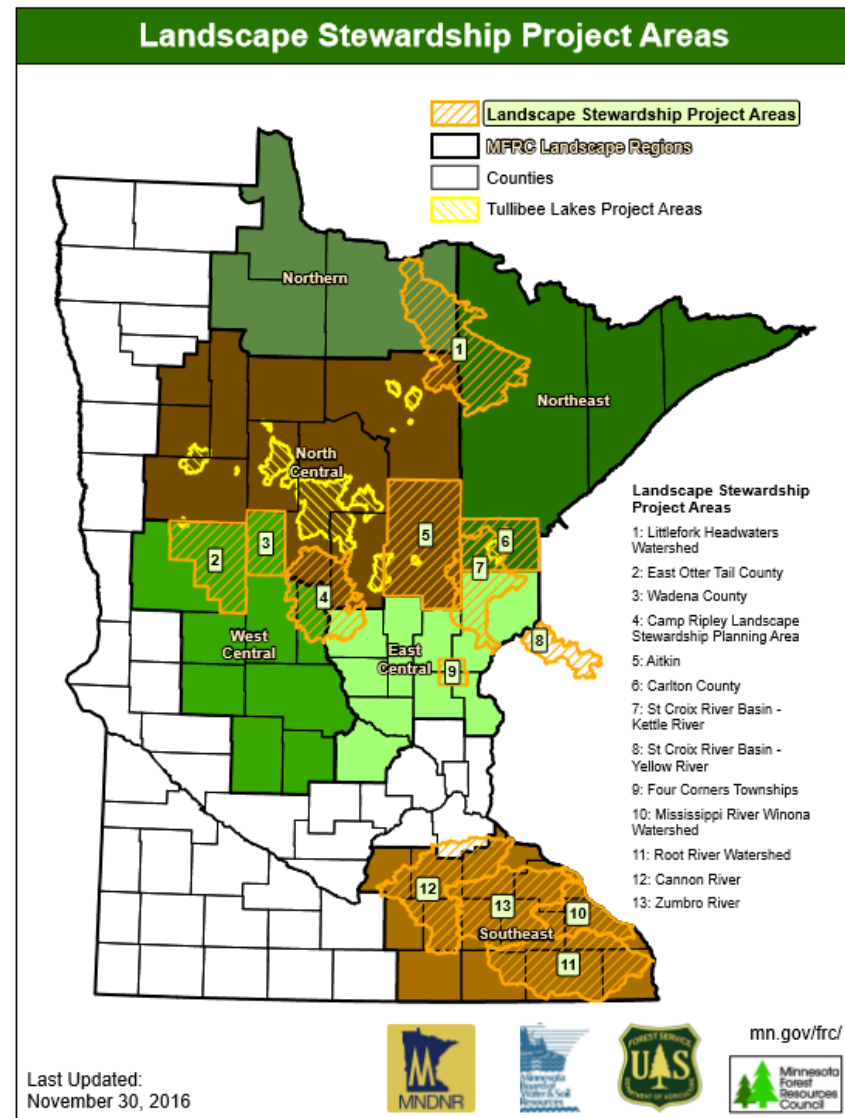
Promoting private forest management is a fundamental mission of the U.S. Forest Service. Historically, one of its principal tools to support that mission has been the Forest Stewardship Program. Over the past decade, about 7.5 million acres of privately-owned forest land in the 20 northeastern U.S states have benefited from the program. Yet this represents only about 8 percent of all privately-owned forest land in the Northeast and Midwest U.S. In response, previous Secretary of Agriculture Tom Vilsack stated: "We must dramatically accelerate the scale and pace of forest stewardship ...on both public and private lands."

In 2008, the US Forest Service created the Landscape Stewardship Initiative to address declining budgets coupled with increasingly complex challenges facing the management of private woodlands. The U.S. Forest Service determined that significantly different approaches to private forest management are needed if meaningful progress is to be made on addressing the threats facing privately-owned forest lands across the nation. The purpose of the Landscape Stewardship Initiative was to help states develop more effective tools, approaches and strategies that will enable the broader forestry community to dramatically expand the reach and effectiveness of services provided to private woodland owners.



Landscape stewardship is an “all-lands” approach to forest conservation that works across multiple ownerships to address issues and opportunities identified in the State’s Forest Action Plan and in Minnesota, the MFRC landscape plans. A landscape stewardship project is a collaborative effort to achieve desired social, economic, and environmental objectives shared by the stakeholders through community and landowner engagement. A landscape stewardship plan is one element of a landscape stewardship project.

Over the past eight years, DNR Forestry PFM Program staff has worked closely with the six MFRC regional landscape committees to develop landscape stewardship projects across the state. Ten federal grants have been awarded to DNR Forestry PFM Program and its partners for a total of over \$3.9 million in federal and state funds. The North Central Committee has supported several landscape stewardship projects including: Camp Ripley, Tullibee Lakes, Wild Rice Lakes, Aitkin County and the Littlefork Headwaters NIPF pilot projects. The map to the right illustrates the locations of landscape stewardship projects in the region and the state.



### Important Forest Resource Areas

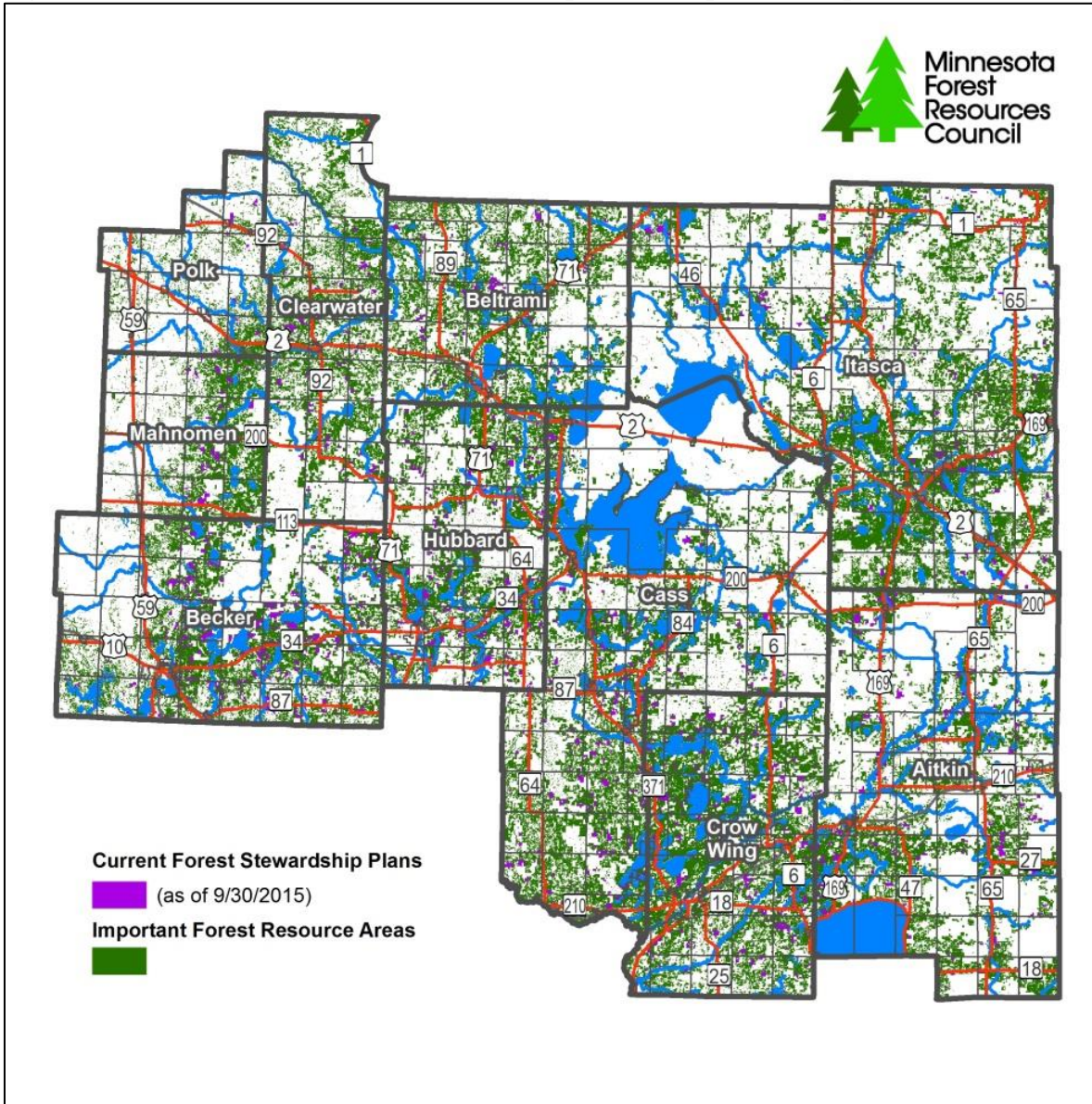
The federal Forest Stewardship Program provides assistance to owners of forest land and other lands where good stewardship, including agroforestry applications, will enhance and sustain the long term productivity of multiple forest resources. The US Forest Service encourages states to develop their private forest management programs that give “special attention to landowners in important forest resource areas and those new to, or in the early stages of managing their land in a way that embodies multi-resource stewardship principles.”

The Spatial Analysis Project (SAP) is a GIS mapping tool initially developed by the USDA Forest Service in 2008 and prepared by each state forestry agency to identify and spatially display important private forest lands that are rich in natural resources. As reported on the table and the map (below), there are over 2.6 million acres of Important Forest Resource Areas (IFRA) lands in the North Central Landscape. As of September 30, 2015, there were just over 204,000 acres of private land with a registered forest stewardship plan in the region. While not all forest stewardship plans are registered with the DNR and there are other lands receiving varying degrees of professional forestry assistance without site specific management plans, there is a significant amount of land in the region not under professional management or consultation through the Forest Stewardship Plan process. The IFRA map and related data provides the Committee with a useful foundation to strategically focus future efforts in promoting private forest management. This map and data is being used in the selection and development of current and future landscape stewardship projects in the region. The IFRA map and related data provides the Committee with a starting point to strategically focus future efforts in promoting private forest management. This map and data is being used in the selection and development of current and future landscape stewardship projects in the region.

**Table 10.2. Current Registered Forest Stewardship Plans (as of 9/30/2015) and Important Forest Resource Areas (IFRAs).**

Study Area	Acres	Acres covered by current forest stewardship plans	Acres of IFRAs	Acres of IFRAs covered by current Forest Stewardship Plans	Percent of IFRAs covered by current FSPs	Percent of FSP area that is an IFRA
Aitkin	1,275,804	27,560	318,113	19,601	6.2	71.1
Becker	925,073	41,365	268,732	30,850	11.5	74.6
Beltrami	693,691	9,388	222,719	7,538	3.4	80.3
Cass	1,544,170	32,933	396,946	25,917	6.5	78.7
Clearwater	659,017	9,621	200,179	7,035	3.5	73.1
Crow Wing	739,801	26,447	338,242	20,635	6.1	78.0
Hubbard	639,536	28,040	230,586	22,782	9.9	81.2
Itasca	1,872,385	19,810	549,420	15,543	2.8	78.5
Mahnomen	373,535	6,714	96,396	5,049	5.2	75.2
Polk	346,703	2,295	49,610	958	1.9	41.7
<b>North Central</b>	<b>9,069,715</b>	<b>204,173</b>	<b>2,670,943</b>	<b>155,908</b>	<b>5.8</b>	<b>76.4</b>
<b>Minnesota</b>	<b>53,997,289</b>	<b>623,038</b>	<b>9,898,192</b>	<b>434,910</b>	<b>4.4</b>	<b>69.8</b>

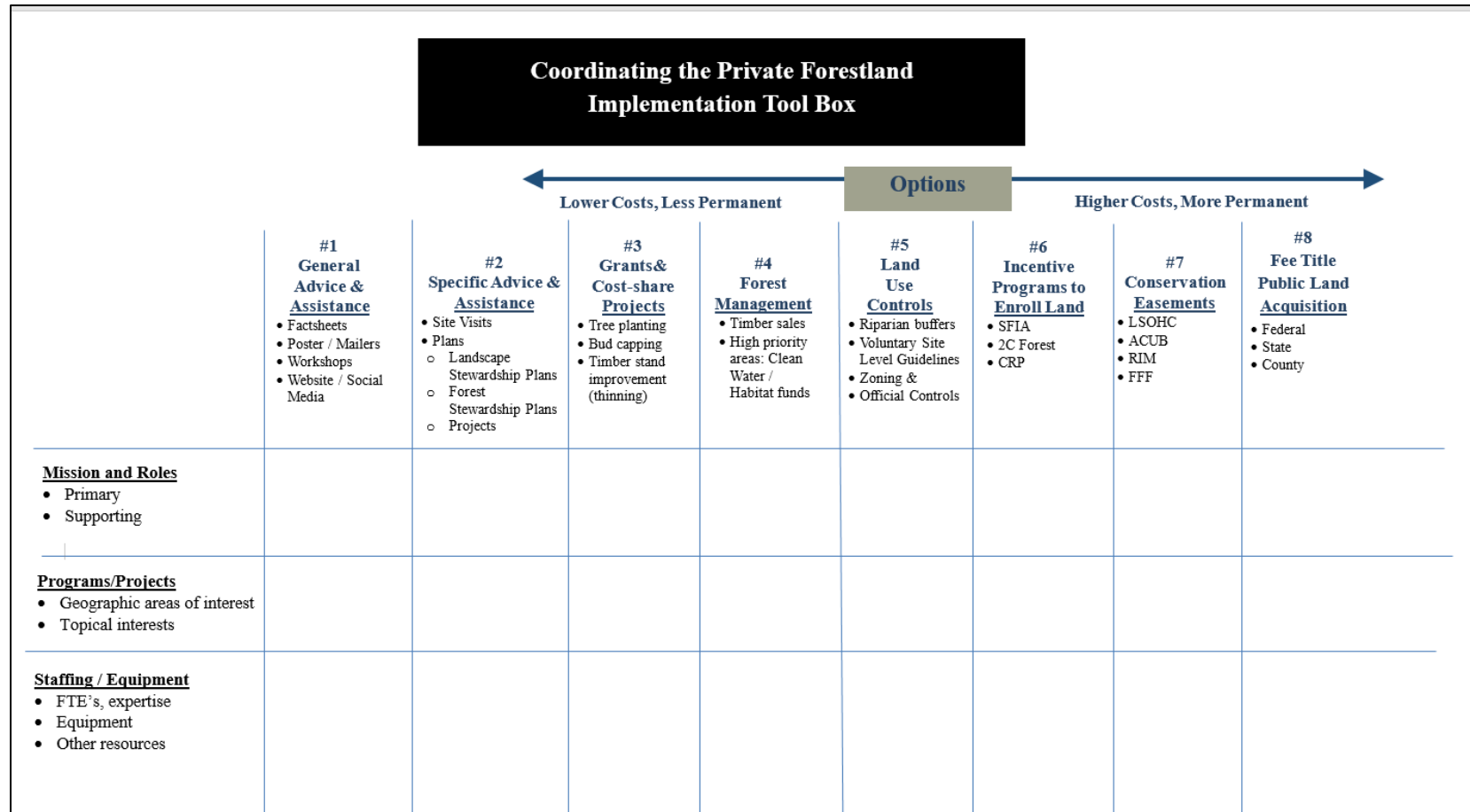
Source: Spatial Analysis Project (SAP), Minnesota DNR Forestry Community and Private Lands Program (2006).

**Figure 10.3. Areas covered by Forest Stewardship Plans compared to Important Forest Resource Areas (IFRA).**

Source: Spatial Analysis Project (SAP), Minnesota DNR Forestry Community and Private Lands Program (2006).

## Private Forest Land Implementation Toolbox

Just as with public forest lands, there is no one strategy that will solve the challenges of significantly increasing forest stewardship on private lands across the region to keep forests as forests. One of the benefits of using a landscape approach to forest stewardship is that it encourages partners and stakeholders to consider multiple strategies at varying scales, bring those strategies together in a cohesive plan, and then take complementary actions that are relevant to the local community's culture and traditions. The following diagram illustrates many of the major implementation tools for private forest lands that can be utilized to achieve forest stewardship goals.



Source: The forestry implementation tool box concept was developed by Dan Steward, BWSR.

As the diagram suggests, services provided to landowners on the left end of the range of options tend to be less costly, but are also less permanent in nature and less explicitly connected with societal benefits. In contrast, techniques listed further to the right side of the spectrum, while costlier, generally tend to have a greater degree of permanence and produce more easily recognized benefits to society.

The diagram summarizes the broad range of services that are available to private landowners to enhance their management of their woodlands. There are also a large number of service providers representing many different public, non-profit and private sector entities. To private landowners, this confusing array of services and service providers is discouraging. This diagram is one of several tools and methods that the Committee discussed and helped to shape in this landscape planning process.

After approval of this Plan by the Council, the Committee will continue to sort out the roles and responsibilities of the public, non-profit and private sector entities that deliver service to private landowners and organize collaborative service delivery approaches through cross boundary projects like the Camp Ripley and Pine River landscape stewardship projects. They will continue to work closely with the MN DNR Private Forest Management Program to pursue federal and state funding for collaborative projects to significantly ramp up private forest management efforts in the region that concurrently support the implementation of this Landscape Plan. The Committee will also continue to identify priority areas within the Landscape on where to focus its limited time and resources on private lands and support the coordination of projects that implement the Plan goals and objectives in Section 6 and the Mid-Level Directions and Frameworks in Sections 7, 8 and 9.

### **Implementing the Watershed Framework by Drilling Down to the Minor Watershed Level**

The Watershed Framework in Section 9 provides an initial landscape approach to sort watersheds into two basic categories, lake based and stream based. This framework provides a useful step towards prioritizing areas in the large landscape to focus efforts on. Yet, additional prioritizing and targeting of conservation forestry efforts are needed to be to implement this Plan as well as partners' goals.

One of the federal landscape stewardship grants that the DNR Forestry PFM Program/MFRC Landscape Program team received supported the development of the Minor Watershed methodology. This project established a methodology that “drills down” within this broader forested landscape to encourage targeted private forest management that is the basis for a number of other conservation-related tools in the private forest landowner toolbox. The methodology was developed in light of the growing recognition by state and federal governments of the threats facing privately-owned forest lands across the nation, specifically the challenge of the USDA Forest Service’s Landscape Stewardship Initiative to “develop more effective approaches, strategies and tools that will enable the broader forestry community to dramatically expand the reach and effectiveness of services provided to private woodland owners”.

In Minnesota, the influx of new funds for conservation efforts (in large part due to the Legacy Amendment) brought with it additional accountability as well as an influx of various tools and technology driven applications to improve the planning effort, all happening in an ever-increasingly data-rich environment. With more implementation, water/watershed plans needed to go further than prioritization. Bringing all of this together is the concept “Prioritize-Target-Measure” (or PTM) which is being promoted by the Minnesota Board of Water and Soil Resources (BWSR) as a method to plan for and implement effective projects at the local level.



To **prioritize** is to recognize that not all valued resources and identified issues can be addressed at the same time—some items will be addressed before others. To **target** is to take a closer look at priority areas and issues and identify specific cost-effective and measurable actions necessary to achieve goals and address issues. To **measure** is the ability to demonstrate progress towards the achievement of restoration and protection goals over time. (Source: *BWSR*). The graphic to the right shows the results of PTM at scale. Whether the planning effort is at the county scale (traditional county water planning) or at the major watershed scale (one watershed, one plan), that unit is on average about 1000 sq. miles. Prioritizing efforts go from a 1000 sq. mile unit down to a 15 sq. mile unit at the minor watershed scale (66x smaller). From there, targeted efforts get down to the individual landowner (240x smaller, assuming a 40 acre parcel), from which specific, measure-able projects are implemented. These projects can be measured at the minor watershed scale as well as at the major watershed or county scale (or statewide). One of the products prepared for this project was the Minor Watershed Methodology Manual (see Appendix I). Partners are encouraged to refer to the manual when designing forestry/watershed projects.

The Minor Watershed methodology was crafted to be practical, data-based, logical, parcel-based, and flexible enough to work at multiple scales. In other words, it is designed to be:

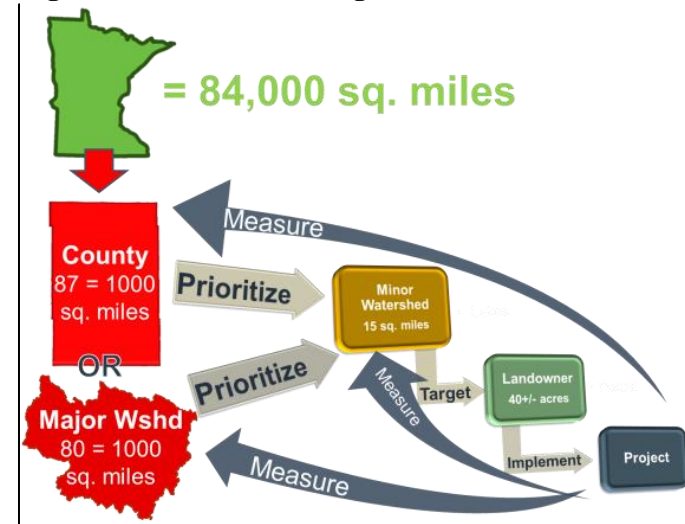
- Direct enough to get local elected officials attention,
- Scientific enough to get the funders attention,
- Specific enough to serve as an local government unit (LGU) application,
- Accurate enough to serve as an LGU work plan,
- Flexible enough to work on multiple watershed scales,
- Simple enough to be easily understood by landowners, technical staff, and policy makers alike.

## E. Project Development

Since approval of the original North Central Landscape Plan, the Committee has been developing collaborative projects to promote cross boundary efforts. These efforts have demonstrated ways to increase the implementation of the goals in the Plan. The Committee's Operations Guide provides a set of guidelines to help the Committee and its partners define and organize projects and what their involvement should be. Over the past ten years, the Committee has developed three general types of projects including:

- Outreach and education efforts.
- Research and development projects.
- On the ground, pilot or demonstration projects.

**Figure 10.4. Prioritize-Target-Measure**



Source: MFRC Minor Watershed Landscape Stewardship Plan.

The amount of involvement the Committee has taken on these projects has varied depending on the scope of the project and resources the Committee and partners have available including:

- **Supporting Projects** – Projects where the Committee supports a project from direct to indirect approaches, but not leading. Possible roles include: letters of support for funding proposals; sharing of information - GIS data and maps; or encouraging the integration of the DFCs, goals and strategies from the Plan into grant proposals.
- **Joint Projects** – Projects where the Committee provides some matching and increased level of support whether it is a financial, technical and/or administrative effort in a partnering role. Providing seed monies to the Leech Lake Pines Collaborative or the Aitkin County NIPF Pilot project are two examples.
- **Committee Led Projects** – Projects where Committee members volunteer to lead the development and implementation of a project. Examples include the “Unveiling the Plan” workshop on April 5, 2006, or the Pine Regeneration/Deer Browse Study developed by the USDA Forest Service North Central Research Station.

The Operations Guide includes a set of general guidelines for establishing landscape stewardship projects that support collaborative on the ground efforts. The guidelines provide the Committee with a consistent approach to conceptualizing and developing these projects:

1. **Major Players** – 2, 3 or more major landowners who want to work in given area or on a specific forest management or research topic.
2. **Project Size** – 10,000 to 200,000 acres.
3. **Geographic Considerations** – boundaries could be based on natural features – watersheds, Land Type Associations, riparian corridors, etc.; or could be based on manmade boundaries – townships, portions of counties, major transportation corridors, or other geo-political jurisdictional areas.
4. **Land Ownership Considerations** – project areas can be defined or shaped by landownership patterns. For example, one approach could focus on areas dominated by public lands. The committee could design the boundaries of a project to minimize privately owned lands within a given area. For private land based projects, the focus could be directed on areas with larger tracts or parcels of private lands. A third approach could be to select a project area with mixed land ownership patterns. Boundaries would be jogged across ownerships for specific or intended purposes. A fourth option may focus on transitional areas of private lands that surround a major public site or facility such as Camp Ripley, a large Wildlife Management Area or a state forest.
5. **Ecological Significance** – the project areas could have some ecological significance in the landscape. Sources to help identify may include: county biological surveys, Heritage database, National Forest Management Areas, existing SNAs, state parks, WMAs, etc.
6. **Economic/Social Significance** – the project area could be designed to focus on for areas with special economic and/or social significance such as lands and resource areas important to the tribes such as wild rice lakes.

Sustainable forestry projects where the Committee’s coordination or funding support is desired may be initiated by any person or entity. All stakeholders in the region are encouraged to work with the Committee to seek increased collaborative opportunities with other partners in the region especially on landscape stewardship cross boundary types of forest management projects. Stakeholders are encouraged to refer to the Landscape Plan concurrently with the State Forest Action Plan as starting points for initiating new forestry projects. They are also encouraged to use the guidelines set by the Committee (see narrative above). Partners are further encouraged to seek ways to integrate the goals of multiple plans with the implementation of the Landscape Plan through the development and implementation of these projects. The Committee

developed an initial list of potential landscape stewardship projects across the Landscape for consideration over the next ten years. A summary of these projects is provided in Appendix J.

## F. North Central Regional Landscape Committee Priorities in Plan Implementation

The strategic policy framework of desired future conditions, goals and objectives outlined in Section 6 provide a holistic, long-range vision for all stakeholders in the North Central landscape to proactively address critical forest management issues to meet the spirit and intent of the SFRA. The Mid-Level Directions in Sections 7, 8 and 9 provide further guidance down to the next scale in order to provide more direction for promoting sustainable forestry through the frameworks – Vegetation Management, Climate Change, Forest Economic Development, Watersheds and Land Use.

Clearly, this long range strategic vision and frameworks will take a considerable amount of resources to fully implement. To help facilitate the more robust and successful implementation of this Plan, and to secure more resources for partners to more effectively secure resources to support the implementation of this Plan, the Committee developed a rational approach to work planning and budgeting. After the approval of the Landscape Plan, the Committee will take the following steps to communicate with the Council the resources it needs to successfully coordinate the robust implementation of this Plan including:

- **Step 1: Confirm Overall Vision.** Understand and reaffirm the overall vision and direction from the North Central Landscape Plan – Part 2. Desired future conditions, goals, and objectives (See Section 6 of the NC Landscape Plan) and the Mid-Level goals and strategies (Sections 7, 8 and 9 in the NC Landscape Plan).
- **Step 2: Confirm Coordination and Implementation Strategies.** Understand and reaffirm the coordination and implementation strategies from the NC Landscape Plan (See Section 10 of the NC Landscape Plan).
- **Step 3: Develop 10-Year Committee Work Plan.** Committee members prioritized and assigned a general timeframe for each of the objectives in the 10-Year Work Plan under each of the three goal areas (ecological, economic and social). They identified lead and supporting partners on the projects. The results from this group process are next used to guide programming of Committee’s work loads in the 2-year work programs in Step 5 (see handout).
- **Step 4: Develop 2-Year Committee Work Programs.** Develop the Committee work programs in two-year increments starting with FY 2018 and 2019. The highest priority projects designated as needing to be addressed in the short term were selected by the Committee as projects for the FY 2018 and 2019 work program. Committee members identified expected deliverables and targets, lead and supporting partners, points of contact, funding and relevant resources, timeframes, and estimated costs. The work programs provide useful information to support the development of accomplishment reports.
- **Step 5: Develop Committee Budget.** When available through the General Fund appropriations by the State legislature, the MFRC Landscape Program provides regional landscape committees with \$5,000 seed monies each year. The Committee’s budget seeks to leverage those monies with federal, state, local, foundation and other private sources.
- **Step 6: Coordinate with the Council.** As envisioned by the SFRA, the Council is to include in its budget request sufficient resources for each regional committee to carry out its mission as defined in the legislation. The development of the documents in this list provides a clear and rational outline for explaining to the Council resources needed by the NC Landscape Committee. Annual letters to the Council on budgeting needs, work programs, accomplishment reports, and establishing liaisons are communication channels are being developed.



- **Step 7: Establish Specific Accomplishments Reporting.** Partners on the Committee will contribute information on a regular basis needed to develop the accomplishments reports that help describe completion of goals and objectives in the Landscape Plan.

### **10-Year Committee Work Plan**

The 10-Year Committee Work Plan is intended to summarize specific steps that the Committee will take over the next decade to support the robust implementation of strategic portions of the overall vision presented in Part 2. The 10-Year Work Plan provides the Committee and its primary partners with detailed directions for implementation described through a series of nested objectives and action statements.

The 10-Year Committee Work Plan outlined in this section will be used as a foundation for developing the Committee’s Annual Work Programs. This approach to the planning process will allow the Committee to adapt its management efforts throughout the implementation timeframe. Feedback from the monitoring program and ongoing input from Committee members will be incorporated into the Work Plan through the development and implementation of the Annual Work Programs.

### **2-Year Committee Work Programs, Committee Budgets and Accomplishment Reporting**

The 10-year listing of objectives and actions will be used as a foundation for the preparation of 2-Year Work Programs for the Committee. The format for the 2-Year Work Programs is provided Appendix K. As a component of the Committee’s overall coordination and implementation approach, 2-Year Work Programs will be developed to identify which specific actions will be taken during the upcoming year. The Committee will develop a corresponding budget for each 2-Year Work Program and include contributions and volunteer efforts from the Committee members and partners working on the projects. Progress reports on the work programs will be reported in annual reports, which will be presented to the MFRC and made publicly available online.

## G. 10-Year Committee Work Plan

The following table summarizes the Committee’s initial prioritizing of the goals from the Strategic Policy Framework in Section 6. *To be developed.*

<b>Resource Initiatives – Goals – Objectives</b>	<b>FY 2018 - 2019 Short Term Years 1 and 2</b>	<b>FY 2020 – 2021 Mid Term Years 3 and 4</b>	<b>FY 2022 + Long Term Years 5 - 10</b>
<b>Ecological Resources</b> DFC 1: Forest Diversity and Health DFC 2: Native Ecosystems			
<b>Priority Goal 1 – <i>tbd</i></b>			
<b>Priority Goal 2 – <i>tbd</i></b>			
<b>Priority Goal 3 – <i>tbd</i></b>			
<b>Economic Resources</b> DFC 1: Economic Diversity and Vitality DFC 2: Sustainable Forest Management DFC 3: Ecosystem Services DFC 4: Private Forest Management			
<b>Priority Goal 1 – <i>tbd</i></b>			
<b>Priority Goal 2 – <i>tbd</i></b>			
<b>Priority Goal 3 – <i>tbd</i></b>			
<b>Social Resources</b> DFC 1: Awareness and Education DFC 2: Water Quality DFC 3: High Quality of Life			
<b>Priority Goal 1 – <i>tbd</i></b>			
<b>Priority Goal 2 – <i>tbd</i></b>			
<b>Priority Goal 3 – <i>tbd</i></b>			

## **H. Work Planning and Programming by Partners in the North Central Landscape**

To support the successful implementation of this vision, all landowners and resource managers are strongly encouraged to use this Plan as a foundation for developing their own management plans and to guide decision-making processes that affect forest resources in the region. Other natural resources agencies and organizations in the North Central Landscape are encouraged to adopt a similar two-stage approach to administering their implementation efforts. The formats of the Committee’s 10-Year Work Plan and Annual Work Programs are example formats for regional partners who may be interested in creating similar implementation structures.

As work planning documents are developed by resource agencies and organizations, these partners are encouraged to reference specific goals and strategies from Part 2 of this Plan. Partners are also encouraged to share their work programs with the Committee on a periodic basis. Further, partners are encouraged to report accomplishments back to the Committee on a regular basis to support the overall monitoring and evaluation of this Plan.



## Section 11

# Monitoring and Evaluation Framework

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This section serves as an outline for monitoring and evaluating the implementation of this Plan over the next decade. The North Central Landscape Committee will be responsible for coordinating landscape level monitoring efforts. The Committee will periodically review progress made towards the implementation of this Plan, both short and long term, based on information provided by partners in the region and report their findings to the Minnesota Forest Resources Council. These efforts should then become part of a larger state-wide monitoring effort developed by the DNR and supported by the other MFRC regional landscape committees in cooperation with partnering natural resources agencies.

### A. Background

Monitoring and evaluation are fundamental components of landscape-level management and are identified in Minnesota Statute 89A.07 of the Sustainable Forest Resources Act as:

*“The DNR Commissioner shall maintain a program for monitoring broad trends and conditions in the state's forest resources at statewide, landscape, and site levels. To the extent possible, the information generated under the monitoring program must be reported in formats consistent with the landscape regions used to accomplish the planning and coordination activities specified in section 89A.06.”*

The SFRA further states, *“To the extent possible, the program must incorporate data generated by existing resource monitoring programs.”* The SFRA also calls for compliance and effectiveness evaluation of forest management activities.

The Committee based this next generation monitoring and evaluation program on this legislative direction.

### B. Monitoring Results from the First Generation North Central Landscape Plan

The 2003 North Central Landscape Plan included a brief outline for monitoring activities across the region. The Committee agreed that a high quality monitoring system was needed to measure progress at five-year intervals and analyze the rate of change relative to the landscape as well as to measure long-term progress toward desired conditions. The MFRC Landscape Committee recommends that the historical context be used as the benchmark and the current condition as a baseline. Each five-year assessment would use the current condition as a baseline and measure it against the Committee's desired future forest conditions, goals and strategies. Rate of change would be a comparison with the previous five-year baseline to the current five-year baseline.

<u>Measurement</u>	<u>Protocol</u>
Acres of each major forest plant community by species.  Acres of each major forest plant community by growth stage.	<ul style="list-style-type: none"> <li>• Forest Inventory and Analysis data</li> <li>• The following technical papers (Appendix 3,4,5) will be used:</li> <li>• Mapping Range of Natural Variation Ecosystem Classes for the Northern Superior Uplands, Draft Map and Analytical Methods. Mark A. White and George E. Host. August 9, 2000.</li> <li>• Northeast Landscape - Range of Natural Variation Analysis: Methods, Data and Analysis. Mark A. White, George E. Host, Terry N. Brown. January. 25, 2001.</li> <li>• Drift and Lake Plains: A Comparison of Range of Natural Variation and Current Conditions. Terry Brown and Mark White. October 11, 2001</li> </ul>
Acreage goals for each major forest plant community specified in public agency land management plans and in other plans if available.	<ul style="list-style-type: none"> <li>• MFRC Staff and Coordination Work Group review plans and compile acreage goal summary for landscape</li> </ul>
Harvest goals for each major forest plant community specified in public agency plans and in other plans if available.	<ul style="list-style-type: none"> <li>• MFRC Staff and Coordination Work Group review plans and compile acreage goal summary for landscape</li> </ul>
Acres affected by specific silvicultural practices	<ul style="list-style-type: none"> <li>• GEIS Silviculture Technical Paper and 1996 Survey Report (appendix 10,11) should be used as a baseline.</li> <li>• MFRC Staff compile data for landscape</li> </ul>
Number of land managers trained at silvicultural workshops	<ul style="list-style-type: none"> <li>• MFRC Staff and Coordination Work Group survey agencies, organizations and companies and compile data</li> </ul>
Number of conifer seedlings produced by species at Minnesota tree nurseries.	<ul style="list-style-type: none"> <li>• DNR nursery records</li> </ul>

The Minnesota Forest Resource Council will have overall responsibility for implementing the monitoring framework, including:

- Preparing the five-year monitoring report.
- Keeping landowners, agencies, non-government organizations, private consultants, participants in the North Central Committee and other interested parties informed of the results of implementation and monitoring activities in the landscape.

The North Central Committee recognized that models will change and improve in the future, and that landscape goals should be adjusted based on improved models.

Appendix L provides a brief summary of accomplishments completed by the Committee and partners in the region on implementing the goals and strategies in the 2003 North Central Landscape plan from 2003 to 2016. Despite the challenges of having limited staff resources from the MFRC Landscape Program, modest seed funding for coordination projects, and a small group of core volunteers – the accomplishments table reflects a substantial body of work that was accomplished over the past ten years in the implementation of the first generation plan.

With a modest investment of state General Funds into the MFRC and its Landscape Program over the next ten years, at minimum restoring previous allocation levels from the state legislature, coupled with the federal grants that the Committee has secured over the last five years, the Committee strongly believes that significantly more progress can be made toward implementation of this Plan.

There are several budgetary, logistical, and operational reasons for the failure to develop a monitoring program for landscape-level management, including: 1) much of the data needed to support such a monitoring effort is often not collected and organized at a landscape level, 2) data collection systems change in scope making use of the data not feasible, 3) managing agencies have not been required to report data on a landscape basis, and 4) a clear, coordinated approach to monitoring has not yet been envisioned nor funded. This plan revision process provided the Committee with an opportunity to develop an outline to guide the creation of a practical and meaningful monitoring and evaluation process.

Assuming a modest budgetary increase by the state legislature to the MFRC and its Landscape Program and the creation of a coordinated monitoring program with the DNR – including monitoring efforts at the MFRC landscape level – the Committee decided to develop a monitoring and evaluation program to support this second generation Plan. The following narrative is intended to help initiate the development of a more robust, collaborative, and meaningful monitoring and evaluation program.

### **C. Outline for the Second Generation North Central Landscape Plan Monitoring & Evaluation Program**

The Committee recommends that the following two basic questions be addressed to evaluate the implementation and effectiveness of this Plan:

1. Resource Trend Monitoring (long term): Are management efforts moving the North Central Landscape towards the forest resource management goals outlined in the Plan and fulfilling the requirement of the SFRA?
2. Implementation Monitoring (short term): Are management actions being carried out in a manner that is consistent with the Plan goals and strategies?

It is important to emphasize that implementation of this and all MFRC landscape plans is voluntary and that the proposed monitoring program should be viewed as a means to improve and enhance coordination in the management of forest resources on landscape to sub-landscape levels. This process is not intended to subject partners to any type of enforcement or regulatory action. Another important consideration in monitoring forest resources is that longer timeframes are required to be able to document change. Users of this Plan are encouraged to take these factors into consideration.

**Resource Trend Monitoring: Are management actions moving the North Central Landscape towards the goals outlined in the Plan?**Forest Land Cover

As described earlier in Section 5, one of the primary policy directives in the Sustainable Forest Resources Act (SFRA) is to “foster no net loss of forest land”. The National Land Cover Database (NLCD) administered by the Multi-Resolution Land Characteristics (MRLC) Consortium, a group of federal agencies that create and distribute United States land cover data for public use, provides forest land cover in relatively consistent formats and at regular intervals of time (five year intervals, e.g., 2001, 2006, 2011) across the state. It is anticipated that the federal government will continue to support this data collection. Datasets such as the NLCD are fundamental to making useful forest land cover comparisons over time to help evaluate the state’s policy of no net loss of forest land. Using this dataset, the Committee has organized the table below as a simple, meaningful and cost effective way to monitor forest land cover trends across the region as well as for the five ECS subsections. The Committee will report results to the MFRC, DNR, and partners in the region every five years (e.g., 2016, 2021, 2026) as NLCD data as well as other satellite image-based datasets becomes available.

Forest Composition and Age Class

As the second generation efforts of coordination and implementation of this Plan matures over the next five to ten years and beyond, the Committee should further explore in conjunction with the DNR, the use of the U.S. Forest Service’s Forest Inventory and Analysis (FIA) data and other relevant sources to help establish long term trends of forest composition and age class of forest lands in each ECS subsection.

Additional research and reporting work on forest land cover, net volume, net growth, removals, mortality, and other relevant information from FIA should be gathered and evaluated on regular time intervals. The Committee should review this data on five-year intervals at a minimum. This effort should be developed after there is a review of available data sets, the preparation of a clear scope of work and assigning of workloads, and the allocation of funding adequate to support the work.

Private Forest Management Monitoring

Given the importance of private land ownership in the North Central Landscape, tracking accomplishments of activities relating to private forest land management is essential to monitoring progress made on implementing this Plan. Given the budget reductions to the Private Forest Management program, members of the Committee will take steps to assist DNR staff in developing and organizing this information into the PFMM where possible.

Partners working on landscape stewardship projects should support the collection of data regarding services provided to landowners such as forest stewardship plan writing and outreach activities and share that information with DNR Forestry staff. Data to complete the following table should be developed by DNR Forestry through its Private Forest Management Module (PFMM) and provided to the Committee on an annual basis.



The table below illustrates a proto-type format for annual reports for private forest management activities in the North Central Landscape.

						<b>Total NC Landscape</b>
Total Area in NC Landscape (acres)						
Private Land (acres)						
Important Forest Res. Areas (acres)						
<b>Technical Assistance</b>						
Site visits						
Forest stewardship plans (number)						
Forest stewardship plans (acres)						
<b>Incentive Programs</b>						
Cost share assistance						
SFIA						
2c						
<b>Conservation Land Protection</b>						
Conservation easements acquired						
Public land acquisitions						
<b>Managed Private Forest Lands</b>						
Level 1 (acres)						
Level 2 (acres)						
Level 3 (acres)						
Level 4 (acres)						

Note: This table has intentionally been left incomplete since it is intended to be a template for future use as the data becomes available.

**Implementation Monitoring: Are management actions being carried out in a manner that is consistent with the Plan?**

The Committee developed a series of monitoring questions specific to each one of the strategies in Section 6 of this Plan as a starting point to develop this portion of the monitoring program. In addition to the list of questions, the Committee identified potential data sources that could be used to help answer the monitoring questions. This information has been summarized in a table format and is provided in Appendix M. This Plan lays out an ambitious framework for promoting sustainable forestry across the region over the next ten years. After the approval of the Plan, the Committee will need to prioritize the goals and objectives in Section 6 to help identify which are the most important areas to focus efforts on. To support this priority setting process, the Committee should consider applying the “SAM” principle to select the strategies to gather information on. When setting priorities, the Committee should consider the following questions for each objective in the Implementation Monitoring table:

1. Is the strategy: (S) significant?
2. Is the strategy: (A) attainable?
3. Is the strategy: (M) measurable?

**Technical Support Documents**

As noted in Section 1, the MFRC recommended that the regional committees follow a general planning process in developing landscape plans. One of the important steps is to assess and document resources in the region. The MFRC has prepared several technical support documents for both the first and second generation plans. These documents not only helped to inform the planning process but also support the overall monitoring effort. These documents, which are summarized in Section 2, support the observation and documenting of numerous major trends relevant to sustainable forestry including:

- Amount of forest land, timberland, and other land uses.
- Ownership of forest land.
- Composition of forest lands and age class structures.
- Timber volume and quality.

The following reports should be maintained and updated every ten years to support landscape planning efforts in the region:

- Resource Atlas.
- Demographic Data Report.
- Conditions & Trends Report.
- Forest Policy Inventory.

### Site Level Guideline Monitoring Results in the North Central Landscape

The development of comprehensive forest management guidelines is a core mandate of the SFRA. Development and implementation of the guidelines has served as a foundation of the work performed by the MFRC. The guidelines are intended to reduce the potential for negative environmental impacts resulting from timber harvesting and other forest-management activities on all forest lands in the state. The guidelines are used primarily by forest managers, loggers, and forest landowners during forestry activities such as timber harvesting. Minnesota's timber harvesting and forest management guidelines address the management, use, and protection of historic and cultural resources, riparian areas, soil productivity, water quality and wetlands, wildlife habitat, and visual quality.

The SFRA requires monitoring to assess rates of guideline implementation. Implementation monitoring documents the statewide rate at which forest guidelines are applied during management activities. Monitoring is an important aspect of the MFRC Site-level program, providing information for guideline revision and targeted outreach to encourage the increased implementation of the guidelines. With guidance from the MFRC, DNR has focused site level guideline implementation monitoring exclusively on those guidelines which apply to timber harvesting operations. From 2000-2006, the DNR monitored almost 600 individual harvest sites across all ownerships to provide statewide estimates of guideline implementation at time of harvest. Monitoring results over this time period have been compiled into one summary report that was published in 2008. Implementation monitoring was conducted in a similar manner in 2009 and 2011, with reports published in 2010 and 2012, respectively.

Starting in 2014, the monitoring program was modified to provide inference at the watershed scale (compared to the historic statewide approach), enhanced with inclusion of forest disturbance mapping using satellite imagery. The Site Level program switched its emphasis on water quality as related to forest management. Funding is provided by the Clean Water Land and Legacy fund. The overall approach is summarized in the following steps:

1. Conduct field monitoring at the watershed scale to assess local implementation
2. Quantify forest disturbance (harvest, fire, windthrow, land use conversion, etc.) patterns over time by watershed
3. Combine information from steps 1 and 2 to conduct a relative assessment of risk to water quality by watershed.
4. Target education and outreach efforts based on results from the relative risk assessment.

The 2014-15 monitoring report summarized results for monitoring that occurred in summer and fall of 2014 and 2015. For this reporting period, implementation of site-level guidelines were assessed on 172 sites randomly selected from within 6 watershed sample units (10 HUC-8 watersheds) in the forested portions of MN. Site level guideline implementation monitoring for selected sites in major watersheds in the North Central Landscape included the Mississippi River – Headwaters (MH); Mississippi River – Grand Rapids (MGR); Rum River (RR); and Red Lake, Red Lake River, Clearwater, and Wild Rice River (RLCW) watersheds. Monitored sites had timber harvest occurring during summer of 2010 through summer of 2014. The distribution of sites among the primary ownership categories was in approximate proportion to the acres of timber harvest for each based on forest disturbance analysis for the same time window.

Overall implementation of key guidelines for this reporting period showed improvement in most areas compared to previous reports. Several key guidelines show continuous or substantial improvement when assessed at the statewide scale including: 1) RMZ management, 2) filter strip management, 3) retention of leave trees and snags, 4) retention of fine woody debris on biomass harvest sites, 5) avoiding rutting on

wetland crossings, 6) minimizing infrastructure, and 7) coarse woody debris retention. Guidelines that demonstrate lower or no improvement of implementation included: 1) avoidance of wetland crossings, 2) use of erosion control where needed, 3) development of written management plans on NIPF lands, and 4) implementation of some visual quality guidelines. Conducting

In 2016, field crews monitored approximately 95 sites across 12 major watersheds, including many in southeastern Minnesota, a landscape that has not been monitored extensively in the past. In 2017, an additional 90 sites will be monitored across 10 watersheds. As part of that assessment, DNR will also be measuring forest disturbance across the entire state to estimate levels of harvest activity and how it varies regionally. A report summarizing the field monitoring data and the forest disturbance estimates will be published sometime in early 2018.

MFRC and DNR staff are also working to develop a database of monitoring data that is readily available for public access. Site-level information such as harvest size, leave tree retention, RMZ characteristics, and much more, will be compiled and spatially referenced so that reports from defined areas of interest can be quickly summarized. It is anticipated that the database will be completed in 2017.

### **Cooperation and Funding**

Obtaining relevant data from partners that is both useful and scalable at landscape to sub-landscape levels is essential to the effective monitoring of this Plan. Land managers and resource agency staff in the region need to share data and information regarding their activities in ways that can be used to evaluate progress towards the Plan's goals and objectives in order for this landscape-level monitoring program to be successful.

Furthermore, there needs to be adequate budgets and staff resources available to the DNR and MFRC to prepare the monitoring and evaluation documentation. The Committee notes that inadequate resources and commitments for the first generation monitoring program resulted in fewer opportunities to more fully fund and evaluate the implementation of the first generation Plan.

While the Committee recognizes public resources for monitoring are limited, it recommends that the MFRC work closely with the MN DNR and other partners in the region to inform the legislature that adequate funding resources are needed to support the development and maintenance of a meaningful monitoring system.

In conclusion, it is essential that partners and the public be aware that the landscape management process, including monitoring and evaluation, is voluntary, and that the primary purpose of landscape-level monitoring is to support and enhance sustainable forest resource management in the region.

## Section 12

### Recommendations to Agencies and Organizations

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The purpose of this section is to summarize specific recommendations from the Committee to agencies, organizations, private landowners working in the region on sustainable forest management. The intent is to assist people from these entities in finding specific strategies that apply to their organizations or personnel interests. One overarching recommendation from the Committee was to encourage all organizations and agencies, all landowners and citizens, to use this Plan and the corresponding maps and data in as many ways as possible. As a regional level plan, it is intended to provide a broad context on how forest resources can be managed sustainably through collaboration. The following represents an initial list of recommendations:

#### A. Recommendations to the Minnesota Forest Resources Council – Governor and Legislature

1. **Sustainable Timber Harvest and Forest Management for All Ownerships.** Model and analyze sustainable timber harvesting levels and forest management practices for all ownerships in Minnesota. Analyze and assess the needs for stable populations of all plant and wildlife. Support efforts to improve forest inventory across all ownership in the Landscape and the state. Better inventory yields better forest management decisions which support healthier forests, healthier communities and better quality of life.
2. **Forest Conservation Vision.** Update 25 Year Forest Vision report to the Lessard-Sams Outdoor Heritage Council in conjunction with the Minnesota Forest Resources Partnership and the regional committees. Develop a parallel and concurrent vision for Clean Water Legacy funds.
3. **Lake Watersheds Initiative.** Support the protection of 60,000 acres in priority lake based watersheds in the North Central Landscape over the next 15 years.
4. **Stream Watersheds Initiative.** Support the protection of 40,000 acres in priority stream based watersheds in the North Central Landscape over the next 15 years.
5. **Source Water Protection.** Use this document to explain to legislature why protection is better than restoration in regards to water quality, why it is needed up here and why it is such a good investment. Research and document the multiple benefits of protecting forest lands in the North Central Landscape not only for the region but the Twin Cities and St Cloud urban areas. Develop a study that defines the economic value of forest management for surface water users of Mississippi River. Enlist their financial support to ensure the protection of forest lands in the North Central Landscape.
6. **School Trust Lands.** Advocate against the private sale of riparian school trust parcels.
7. **Forest Resources – Revise the Definition and Brand.** Promote expanding the definition of forest resources to include water, habitat, and recreation resources. Consider working with a marketing agency to develop a “brand” that promotes forest management as a base fit to human and wildlife health. Rebrand region – Lakes and Pines.
8. **Strengthen Council – Regional Committee Relationships.** Work with the regional committees to strengthen our work relationships and to better support the Council’s forest policy role.

9. **Increase Funding for the Council and its Programs.** There needs to be adequate funding to ensure that coordination and collaboration can really happen.
10. **Focus on Implementation.** Existing forest management plans, both private and public lands, need to be more fully implemented. Implementation can be more successfully achieved through increased landscape coordination. Develop funding streams to support agencies and people that conduct well planned active forest management.
11. **Sustain the Sustainable Forest Resource Agency.** We need a politically neutral body to shepherd the future of forest management in Minnesota. Keep up the good work!
12. **Complete a new Generic Environmental Impact Statement.** Since 1994 when the Generic Environmental Impact Statement (GEIS) Study on Timber Harvesting and Forest Management in Minnesota was released, and even since 2005 when an assessment of the Timber Harvesting GEIS Implementation was done, a lot has been done that changed Minnesota's forested landscape. Many natural occurrences which could not be predicted along with increased harvest levels, more efficient methods of harvest and changing ideology have greatly impacted our forests. Therefore, to assess these changes and current trends a new GEIS should be completed to ensure we are responsibly practicing conservation.

## B. Recommendations to Federal and State Agencies

1. **Federal Funding.** Develop a federal match to the state conservation easement funding program (Reinvent in Minnesota) for forest lands.
2. **Wood Flow.** Provide a sustainable even-flow of timber to provide predictable supply to industry while providing for forest health; do not deviate to accommodate ups and downs in markets otherwise you exacerbate those up and downs. Provide an alternative way for DNR to manage timber (e.g. contracts/Request for Proposals for vegetation management vs timber sale contracts).
3. **Active Forest Management.** Continue to promote active forest management to reach timber output needs of local mills, promote land stewardship and active management when interfacing with private landowners and target forest land owners that own land around water resources.
4. **Collaboration in Timber Harvest.** Increase or recreate “superteam” meetings that were developed as a part of the first federal grant awarded to DNR Forestry and MFRC landscape committees. Consider creating public land teams and private land teams based on the watershed contexts described in the Watershed Framework in Section 9.
5. **Relationships.** Continue to build multiple MNDNR relationships. Work with the regional committees to increase outreach and education to stakeholders and the general public on benefits of forest management.
6. **Section Forest Resource Management Plans.** Integrate results from the North Central Landscape Plan into the DNR's Section Forest Resource Management Plans (SFRMPs) to save time and money. Build from the ideas and do not rehash the discussions. Attempt to balance conservation of rare/sensitive resources and wildlife habitat needs with demands for forest products and economies.

## C. Recommendations to the Tribal Agencies

1. **MFRC Programs.** Continue to build working relationships with the MFRC and its programs – policy, landscape and site level programs. Support the use and implementation of the site level guidelines when managing forest resources.
2. **Landscape Level Participation.** Continue to participate and contribute to landscape planning and coordination processes supported by the MFRC and the regional committees. Work in collaboration with the regional committees and partnering agencies on the development

of federal, state and county forest management plans. Engage with other resource partners on the regional committees to conserve resource priorities across ownerships. Continue to bring tribal perspective to the landscape planning conversations. Inform partners on how tribal perspectives can be better incorporated.

3. **Training.** Sponsor and convene cultural/heritage resource trainings for resource professionals and service providers (SWCD, consultants, DNR, NRCS, USFC, etc.). Educate regional committee partners, resource professionals and the general public on tribal reserved rights and trust responsibilities
4. **Ecological Guidance.** Use the Vegetation Management Framework in Section 7 of this Plan including the DNR Ecological Native Plant Community Field Guides in management decisions.
5. **Timber Harvests and Cross Boundary Coordination.** Participate in the landscape coordination with state/federal agencies for timber harvest. Increase cross-boundary coordination and collaboration.
6. **Forest Certification.** Seek funding assistance to attain forest certification. Work with regional committees to pursue funding.

## D. Recommendations to Local Units of Government

1. **County Land Departments.** Manage lands with a semblance of natural disturbance patterns based on native plant communities as recommended in Section 7 of this Landscape Plan. Promote collaboration between county/state and private timber sales with partners on the regional committees. Discourage sale of county tax-forfeit land that is suitable for forest management, even though it may be more cost effective to sell. Work with the MFRC and the regional committees to develop funding to support more precise forest inventories. Promote and support forest management decisions that support the long term and sustained management of county forest lands.
2. **Soil and Water Conservation Districts / Local Water Planning.** Prioritize and target specific areas of forest management efforts in lake and stream based watersheds using the Watershed Framework in Section 9. Use the Framework as a starting point for prioritizing forest land protection work. Develop local water plans based on the Watershed Framework and the minor watershed methodology. Adopt the North Central Landscape Plan and landscape stewardship plans as a reference documents for forest management projects and practices rather than recreating or duplicating the plan content.
3. **Planning and Zoning Departments / Planning Commissions / County Boards:**
  - Consider Forests in Local Land Use Decisions. Local officials are encouraged to consider the values and benefits that forests can bring to their communities. Healthy and sustainable forests promote a high quality of life for citizens and can support increased economic opportunities as well. Forests should be included in the land use decision making process. Forest land is a legitimate land use. Encourage the implementation of sustainable forest management practices through the administration of shoreland and floodplain development rules in the zoning ordinances and subdivision regulations. Protect sensitive shoreland areas through forest management. Control ATV and OHV uses by restricting to routes where they do not damage resources.
  - Reference Document. Local officials are strongly encouraged to refer to this Landscape Plan and the Land Use Framework as a reference document when developing their local comprehensive land use plans.
  - Role of Forest Resources in Land Use Planning – Training for Local Officials. Work with the regional committees to increase the knowledge of forest resources, forest management, programs, etc. Forested landscapes protect fish and wildlife habitat that supports tourism, forest industry and the regional and local economies.
4. **Support the Payment in Lieu of Taxes (PILT) program.** PILT payments are important sources of revenue to counties with large amounts of non-taxable federal lands within their borders.

## E. Recommendations to Conservation and Non-governmental Organizations

1. **Collaboration.** Support and enhance the ongoing and sustained partnering of conservation efforts with the MFRC and the regional landscape committees to address major resource management issues. Promote collaborative efforts of land management occurring at multiple levels and work with adjoining landowners, especially state/counties. Coordinate with other partners on protecting forested lands that support the implementation of the landscape plans. . Work with the regional committees to engage in outreach and education efforts to galvanize citizen engagements in resource management issues in projects like the Camp Ripley Sentinel Landscape and the use of TELE (Tools for Engaging Landowners Effectively).
2. **Reference Documents.** Use this Plan and supporting documents as a reference document when developing organization plans and project proposals. Reference the 25-Year Lessard-Sams Outdoor Heritage Council Forest Habitat Implementation Vision in funding proposals.
3. **Private Investment.** Conservation groups should invest more of their resources into the region or communities they work.

## F. Recommendations to the Forest Products Industry

1. **Framework for Increasing Implementation.** Participate in collaborative planning efforts (MFRC) to engage with range of stakeholders including public land managers, private interests and the public. Provide feedback on issues/problems to land managers on a periodic basis. Define what “even-flow” means to you. Recognize importance of long-term sustainability when advocating for specific harvest output goals. Coordinate with federal, state, county, and private landowners to promote forest health and diversity through a range of forest management activities.
2. **Coordination with Loggers and Truckers.** Work with agencies and partners to be address how to offer better financial support to loggers and truckers so that we continue to have the infrastructure necessary for forest management.
3. **Increase Coordination for Timber Harvesting on Private Lands.** Work with the landscape committees and DNR Forestry to increase coordination of timber harvesting on private lands. Work with partners on the federal grant projects like Aitkin County SWCD to increase the delivery of private forest management (PFM) services including timber harvesting with private landowners. Coordinate with partners on where small “private land” harvests are occurring – we may be able to help get more landowners engaged in harvest.
4. **Research and Development.** Support research and development projects by the regional committees and partners of value added products. Support research and development of new or expanding forest products opportunities.
5. **Maintain or Increase Industry Land Base.** Limit divestment of private industrial forest lands – advocating for tax incentive/relief program to maintain. Pursue private industrial land opportunities for more intensive forest management production – allowing state/county/fed lands to manage for wildlife/recreation as well as economic outputs.

## G. Recommendations to Education Groups

1. **School Districts / School Forests / Environmental Learning Centers.** Encourage school districts to utilize the existing environmental learning centers. Work with DNR Forestry to using existing school forests and/or establishing school forests. Seek funding from the Legacy monies to support youth education through active forest management projects on school forests and environmental learning center lands. Promote understanding of the role of forest management in supporting ecosystem health, economic benefits, and supporting social



good. Support environmental education opportunities for youths to encourage early engagement in natural resource values. Incorporate PFM training curriculum into environmental classes.

2. **University and Extension Connections.** Colleges and universities throughout the state are encouraged to connect their students and faculty with the MFRC Policy, Landscape and Site Level programs. Support extension programs that can provide educational opportunities on sustainable forestry policies and practices. Support private landowner education through Extension, especially concerning forest stewardship plans and tax-incentives programs.
3. **Sustainable Forests Education Cooperative / Minnesota Logger Education Program.** Work with regional committees to increase training opportunities for natural resource professionals, loggers, and other vendors and to develop relevant curriculum and materials.

## H. Opportunities for Private Landowners and Citizens

1. **Become Informed.** Ask questions! (DNR/county/feds/NGOs/SWCDs). There is a broad array of opportunities and services available to private landowners so it pays to ask. All landowners are encouraged to become more knowledgeable about forest resources. Learning about best management practices (BMPs) is one easy way to get started. Recognize that forestry is a long-term endeavor and that changes on the land will generally take several years to become realized. Landowners that become more informed about sustainable forestry often discover this brings benefits to their community but their families as well.
2. **Seek Technical Assistance.** The North Central Landscape Committee encourages family forest landowners to seek technical assistance to help plan and manage their forest lands. Landowners are encouraged to commit to having a stewardship plan prepared every 10 years and to implement at least one part of the plan. Often landowners need assistance from several technical service providers given the wide variety of programs and services that available. These programs do periodically change over time. Consulting foresters, industry forests, SWCD and NRCS staff, and staff from the MN DNR and others are available to provide services. Land developers can also benefit from working with the forest resource professionals when planning the development of their lands and finding ways to maintain woodland features in their developments.
3. **Get Involved.** Get engage with your woods. Consider your economic and ecological objectives in your stewardship plan and how they can be reached. Review forest conservation toolbox and decide how much conservation is the right level for you. Seek out educational opportunities. Join Minnesota Forestry Association (MFA) and one of the private woodland committees. Share your forestry success stories with family and friends, neighbors and local leaders. Encourage youth from your community to assist in private woodland projects.