

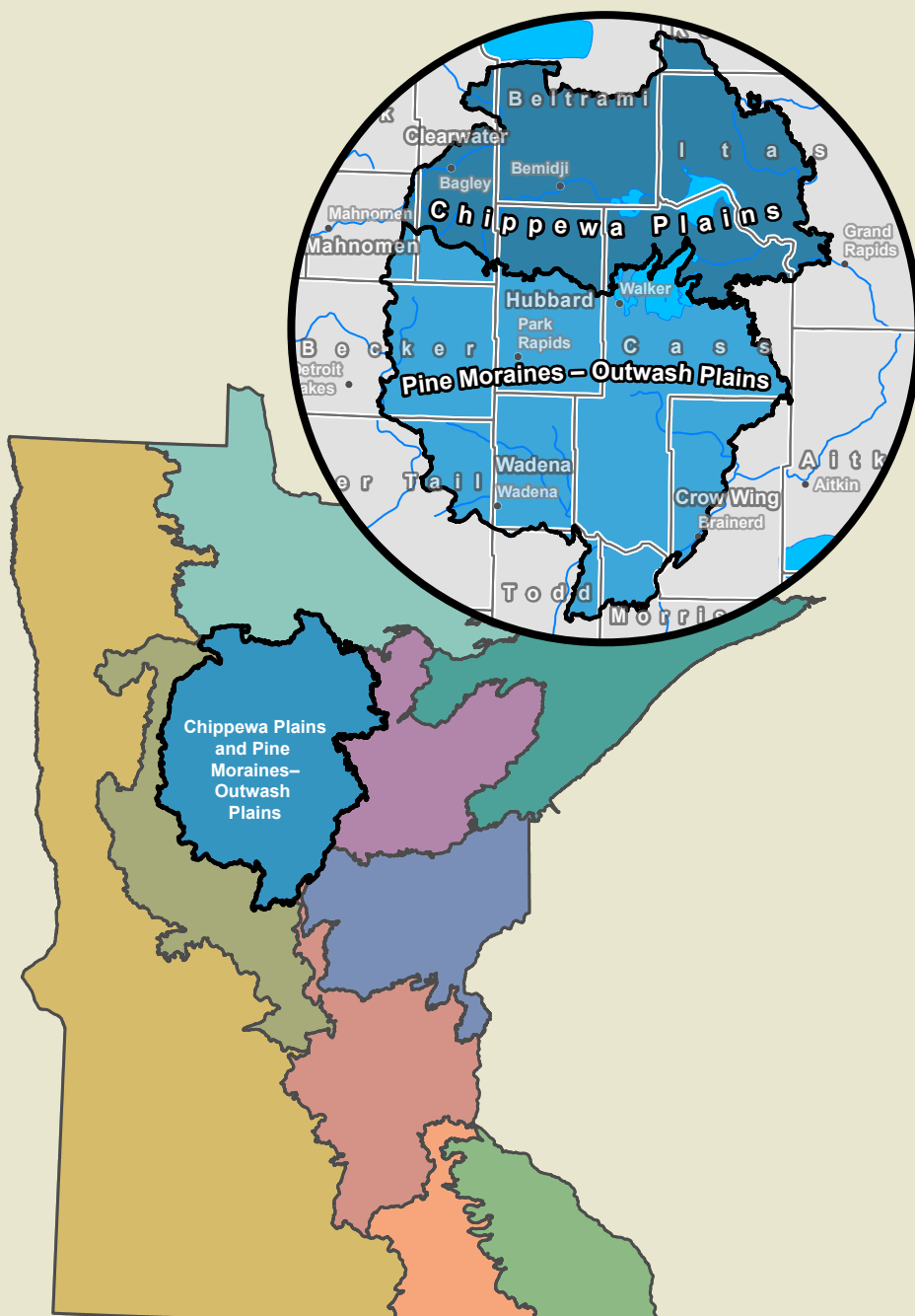
WOODLANDS OF MINNESOTA

Landowner

HANDBOOK

Chippewa Plains
and Pine Moraines–
Outwash Plains





About This Handbook

This handbook is for people who own woodland in Minnesota's Chippewa Plains and Pine Moraines–Outwash Plains subsections that are indicated on the map in blue.

Woodlands of Minnesota is a series of handbooks for woodland owners broken out by the landscape sections represented on the map on the inside back cover.

If you own woods in other parts of the state, see mndnr.gov/woodlands for other publications designed for your area.

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mndnr.gov/woodlands

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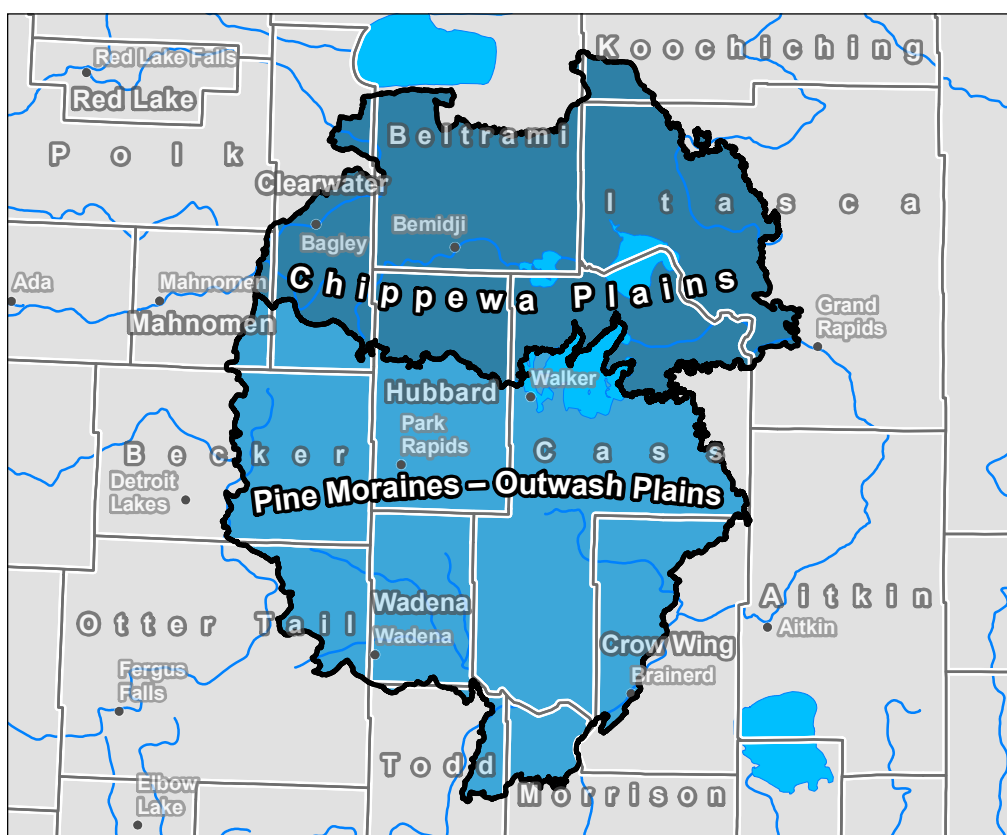
Introduction

There are more than 190,000 private woodland owners in Minnesota who collectively own more than 6 million acres (about one-third) of the state's total forest land.¹ These are individuals, families, cooperatives, or small businesses that own woods for a wide range of reasons such as recreation, hunting, investment, timber, or simply to have a quiet family getaway in the North Woods. You are a part of this landowner community.

Private woodlands provide important benefits including clean air and water, scenic beauty, hunting, angling, birdwatching, and wood, paper, and other products. Minnesota's landowners help enhance these benefits for themselves and others through active involvement in caring for the health of their woods. As a landowner in north-central Minnesota, you have many resources available to help you care for your woods. Whether you are looking for new ideas or just looking for a place to start, this handbook can help you accomplish your goals.

Land Covered in This Handbook

This handbook is specially designed for those who own land in areas of north-central Minnesota known by ecologists as the **Chippewa Plains** and **Pine Moraines–Outwash Plains**. These ecologically rich places are home to thousands



of lakes, vast stretches of northern forest, lush wetlands, diverse wildlife, and the headwaters of the Mississippi River. Together, these areas span all or parts of Aitkin, Becker, Beltrami, Cass, Clearwater, Crow Wing, Hubbard, Itasca, Koochiching, Mahnomen, Morrison, Ottertail, Polk, Todd, and Wadena counties.

How to Use This Handbook

This handbook is both a reference and workbook. It contains information on the past and present condition of land in this region, insight into some of the biggest challenges woodland owners face here, and tips for making and accomplishing goals for your woods.

This handbook includes:

- **Landowner Spotlights**—Meet a few of your north-central Minnesota neighbors! Their stories, experiences, and words of wisdom may inspire ideas for your own woods.
- **Woods Workbook**—The workbook on pages 64–67 guides you through setting goals for your woods and how to get them done. A digital version can be found on mndnr.gov/woodlands.
- **Glossary**—The words in **blue** are defined in the glossary at the end of this book.
- **Handbook Website**—The handbook website contains additional resources, from contact information for your local natural resource professionals to ideas for woodland projects.

mndnr.gov/woodlands

A photograph of a dense forest. The foreground is filled with lush green undergrowth, including ferns and various leafy plants. Several tall, slender tree trunks, likely pines or spruces, rise vertically from the forest floor. The background is a thick canopy of green needles and leaves, with some sunlight filtering through. The overall scene is vibrant and natural.

Part I: North-Central Minnesota's Forests, Past and Present

Chapter 1: The Forest Landscape Around You

If you peered out of an airplane window as it passed over your woodland in the summer, you might be hard-pressed to pick out your own trees from the patchy sea of green below. Your property is one piece of a much larger landscape. A **landscape** consists of all land uses (forest, wetland, agriculture, urban) and ownerships (public, private) within a defined area that can cover millions of acres. Taking a good look at the forests in your surrounding landscape can teach you a lot about what you might expect to find in your own woods.

Describing Your Landscape

If someone asked you where your property is located, how would you answer? Often people use political boundaries to define their area such as “Cass County” or “north of Brainerd.” Sometimes they use nearby natural features as reference points such as “just off of Leech Lake” or “in the Pine River valley.” Based on the soils, climate, water, and plants in this region, ecologists call the northern half of this area the Chippewa Plains Subsection. The southern half they call the Pine Moraines–Outwash Plains Subsection. But before we get into current classifications, let’s take a trip back in time.



From the air, you can see that your woods is part of a larger landscape.

Historic Land Cover and Current Land Use

The Chippewa Plains and Pine Moraines–Outwash Plains areas covered in this handbook encompasses approximately 4.6 million acres. It consists of flat to gently rolling plains covered by glacial sediment deposits called glacial **drift**, **till**, or **moraines**. In some areas these deposits can be up to 600 feet deep. These features are relics of the last ice age when glaciers compressed the landscape. Soils in this region range from sandy to clayey, depending on location. The **outwash plains** formed by melting glaciers are especially sandy and do not retain water well.

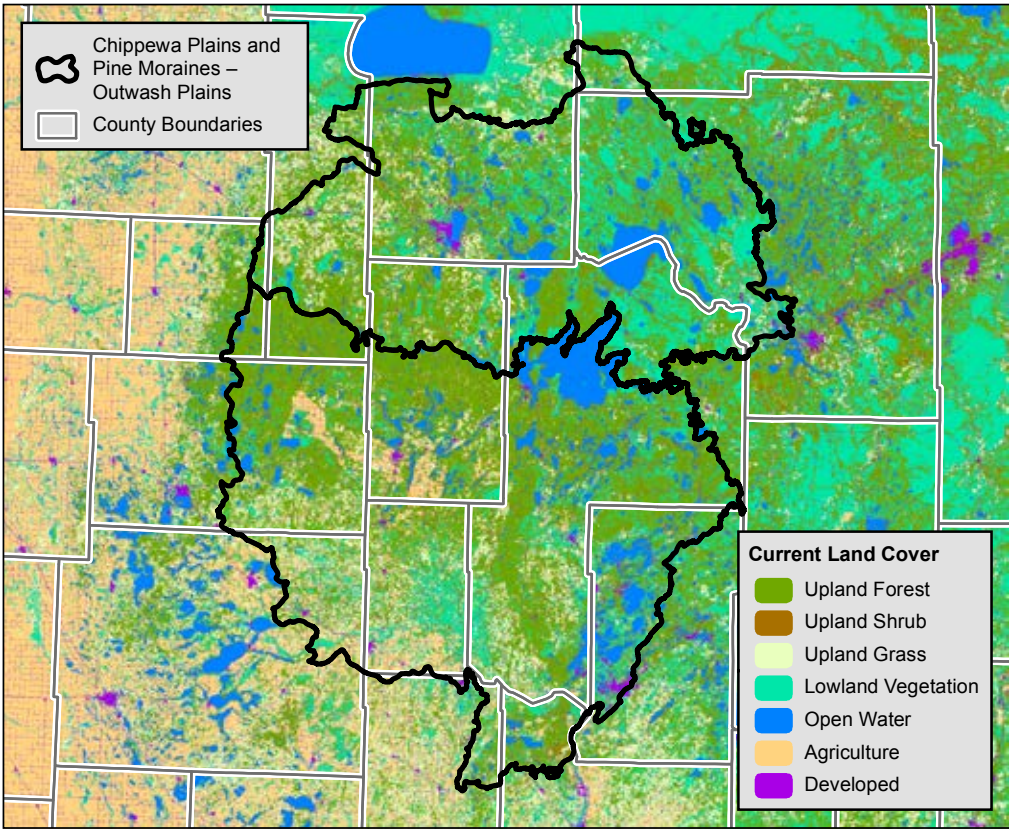
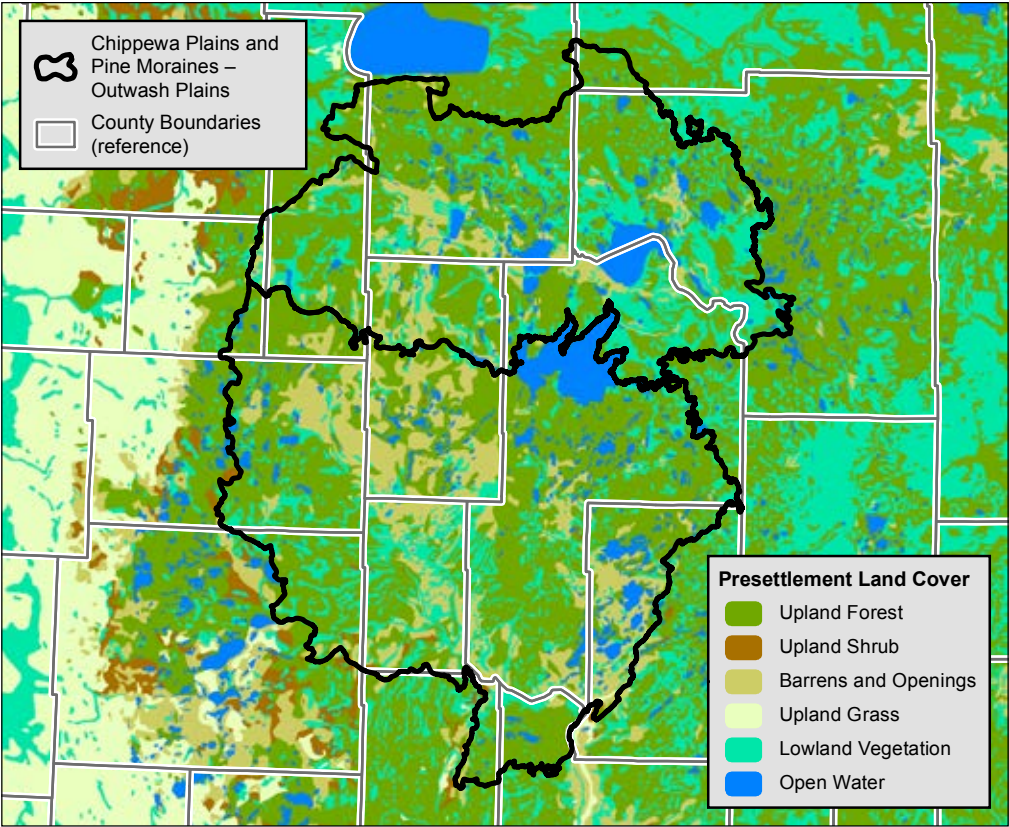
Glaciers also formed most of the region's lakes, including some of the largest in Minnesota: Leech Lake, Lake Winnibigoshish,² and Cass Lake. The area is also home to the headwaters of the Mississippi River and some of its tributaries. Despite the abundance of water, the region receives only 23 to 27 inches of rain per year, of which about 40 percent falls during the 4-month-long growing season.

Before European settlement, a mix of coniferous and deciduous forests dominated this landscape. Much of the area was covered by aspen, birch, and Minnesota's three native pine species: jack, eastern white, and red. Fire frequently disturbed the landscape. In areas that were more naturally protected from fire because of local landforms, wetlands, or large lakes, deciduous species, such as northern red oak, sugar maple, and basswood, were common. Swampy lowland areas were home to black spruce, black ash, tamarack, and northern white-cedar or to nonforested wetland meadows.



John Caughlan

Headwaters of the Mississippi River at Lake Itasca.



The landscape has changed in recent times. Agriculture, especially corn and potatoes, is a major land use in the western part of the region today. Throughout both subsections, approximately 686,000 total acres (about 13 percent) are used for growing crops or pasture.³ However, forestry remains an important driver of the local economy. Aspen has increased in forests, especially in the northern part of the region, and is used in the production of pulp, paper, **biomass**, and other products. Tourism and recreation are major industries in the region as well, with the forests and lakes attracting second-home owners and tens of thousands of visitors every summer.

How We Classify Forests Today

Minnesota is located at a great North American transition zone where grassland, deciduous (hardwood) forest, and coniferous forest converge and intermingle. As such, tree-covered landscapes can vary greatly. For example, sparsely wooded oak savannas are common in south-central Minnesota. Mixed grass and aspen parklands dominate the northwest. Hardwood-covered bluffs cover southeast Minnesota. Dense forests filled with pine, spruce, fir, aspen, and birch characterize the northeast. Finally, mixes of these landscapes can be found throughout the central parts of Minnesota.

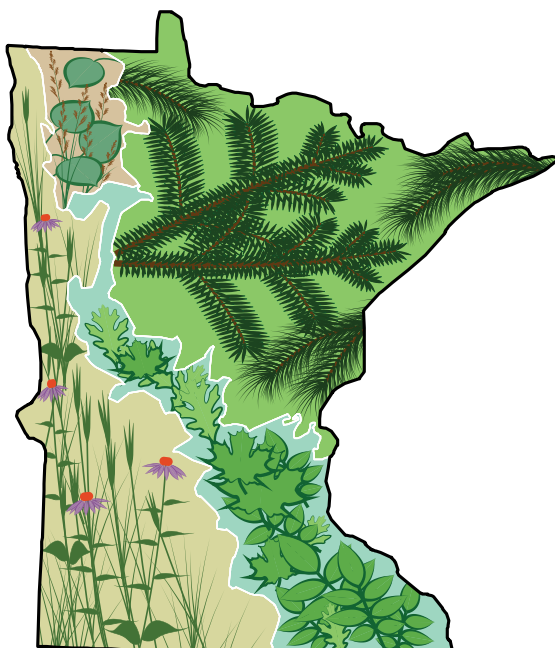
While there are other systems in use today that define Minnesota's landscapes, this handbook refers to Minnesota's Ecological Classification System.

Ecological Classification System

A statewide land mapping project known as the **Ecological Classification System** (ECS) was created by ecologists to help people who manage the state's natural resources (trees, wildlife, waters, etc.) identify patterns in the landscape to better understand the land's potential. The system divides the landscape into progressively smaller areas based on similarities and differences according to climate, geology, natural features, and the types of vegetation present.

The levels of the ECS hierarchy are nested within each other, similar to townships within counties and counties within states. The highest of the

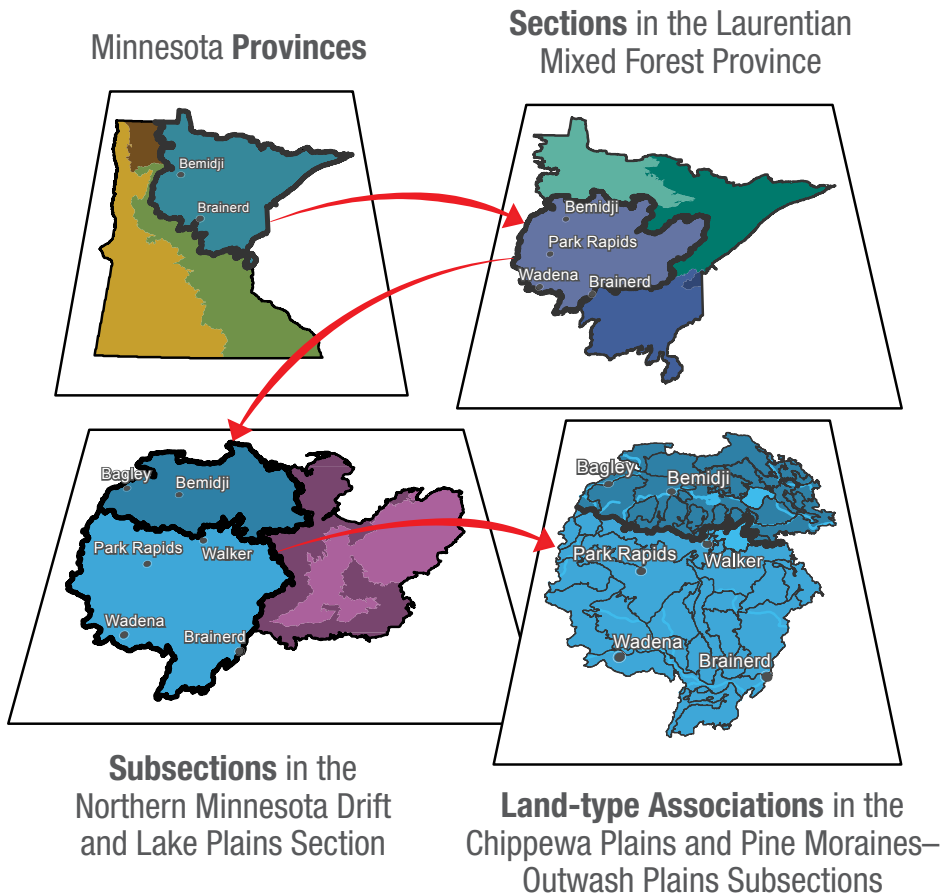
Tallgrass Aspen



Tallgrass Aspen

four mapped ECS levels used in Minnesota is **province**, followed by **section**, **subsection**, and **land-type association**. The **Laurentian Mixed Forest Province** spans all of northeastern Minnesota and parts of Wisconsin, Michigan, New England, and Ontario.

This handbook focuses on two ecological subsections: the Chippewa Plains and Pine Moraines–Outwash Plains, which both contain a combination of deciduous and coniferous forest.



Native Plant Communities

At an even smaller level, ecologists classify land into **native plant communities** based on native vegetation, landforms, and other local conditions such as amount of rainfall and soil richness. This system is used to more precisely describe patterns on the landscape.

The native plant community system describes an area's specific land types or **ecosystems**. A single community might cover a large area, or exist in scattered pockets. Sometimes very different native plant communities exist near each other. For example, notice the differences between the types of trees growing along a river from those growing several hundred feet uphill. Native plant communities are also a useful tool for telling the story of your land's history. Forests are constantly

Know Your Plants

Knowing the native plant communities on your property can help you better understand your land's potential. For example, the presence of certain plants can reveal clues about the soil and climate. This can help you plan which tree species might be most productive or determine which nontimber forest products (such as mushrooms, balsam boughs, etc.) you might find or be able to grow, and what sort of wildlife might be present. To learn more, visit mndnr.gov/woodlands.

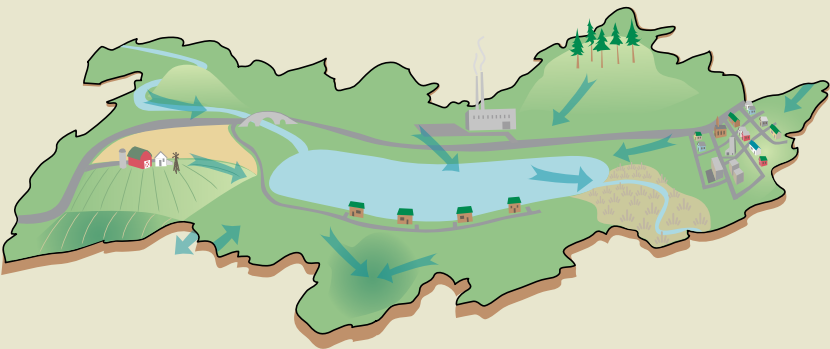
changing under the influence of time and other factors. The trees and other plants that emerge 20 years after a fire will differ from those growing in the same area hundreds of years later. While both ecological subsections (Chippewa Plains and Pine Moraines–Outwash Plains) contain many similar native plant communities, you can also notice variations as you move from north to south or east to west within the region.

The names of forested native plant communities reflect their general location within the state (northern, central, or southern), the moisture or nutrient content of their soils (wet, dry, rich, poor), and the dominant trees that make up the **canopy**. Examples of forested communities that you might find in north-central Minnesota include Central Dry Pine Woodland, Northern Wet-Mesic Hardwood Forest (**mesic** means between wet and dry), or Northern Rich Tamarack Swamp. Eight types of forested communities found in north-central Minnesota are considered “imperiled” statewide by the Department of Natural Resources (DNR), meaning they are rare or threatened within Minnesota.⁴ It is especially important to protect these communities from conversion to other land uses. Several local types of forested native plant communities are highlighted in Chapter 5.

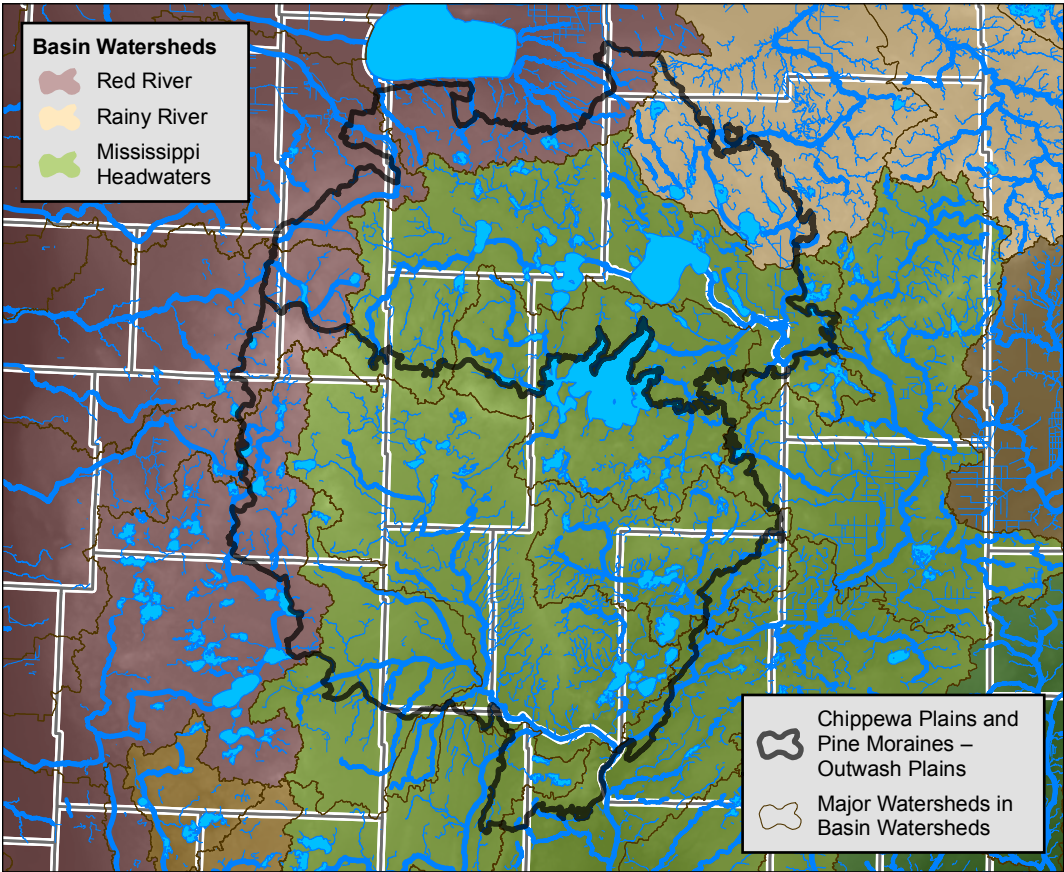


Discover Your Watershed!

A **watershed** is the total area of land surrounding a body of water (such as a lake, river, or stream) that drains water into that body. Watersheds can be small or large. Small watersheds



surrounding creeks and streams join to create larger watersheds surrounding major rivers. North-central Minnesota is located along a great divide in North American water flow. Depending on your land's exact location, your actions can affect the quality of water that will flow either into Hudson Bay by way of the Red or Rainy rivers, or into the Gulf of Mexico by way of the Mississippi River. To learn more, visit mndnr.gov/woodlands.



Challenges in the North Woods

Many changes in the last few hundred years have brought challenges to forests in north-central Minnesota. Here are examples of the biggest challenges that we all must consider when making decisions about caring for and using the forests in this region.

Habitat Loss

North-central Minnesota is home to a multitude of wildlife species, including some that are rare, declining, or threatened. The DNR refers to these as **species of greatest conservation need**. There are 345 species given this classification in Minnesota.⁵ Examples in your area include common loons, red-shouldered hawks, northern goshawks, northern long-eared bats, Canada lynx, American badgers, smooth green snakes, eastern hog-nosed snakes, and a species of caddisfly (*chilostigma itasca*) found in only a few places in Minnesota including a single creek near the headwaters of the Mississippi River.



Northern goshawk

The greatest threat to these species is **habitat** loss or degradation, which affects over 80 percent of these species in this area. Lakeshore

Habitat Spotlight: Jack Pine

Native jack pine forest provides important habitat in your region for many wildlife species such as redback salamanders, whip-poor-wills, ermines, spruce grouse, scarlet tanagers, and northern flying squirrels. In total, nearly 100 species of birds, mammals, reptiles, and amphibians in your region make their home in jack pine habitat.



However, in recent years, an increase in row-crop agriculture and other land development is placing growing pressure on jack pine habitat in the region. According to the USDA Forest Service, the Chippewa Plains and Pine Moraines–Outwash Plains have lost over 85,000 acres of jack pine or jack/red/white pine mixed forest between 2003 and 2013.⁶ A particularly rare type of jack pine habitat found in your region is highlighted in Chapter 5.

development is a major cause of habitat loss and is increasing in the area as summer and year-round lake homes become more popular. Converting native landscapes to agriculture also has a big impact, especially in the southern and western parts of the region.⁷

Declining Water Quality

Nearly 600,000 acres of lakes and rivers cover the Chippewa Plains and Pine Moraines–Outwash Plains. These waters support wildlife as well as major fishing and tourism industries. However, many of these waters are suffering declining quality from a variety of contaminants including sediment, fertilizers, and pesticides. Some of these pollutants come from nearby sources, such as homes with lawns bordering lakes, which can contribute pollutants through erosion or lawn chemicals. Other sources of pollution are less easy to pinpoint within the greater watershed, such as contaminated runoff from agricultural fields, residential developments, or urban centers. The runoff from all of these sources eventually collects in water bodies throughout the region, causing harm to fish and other wildlife and degrading drinking water and recreational opportunities.

Forests play important roles in protecting clean water by absorbing and filtering water and by stabilizing soil and preventing erosion. Therefore, changes in the forest landscape can impact water quality. As land-use changes shrink forest cover, especially along shorelines, contaminated runoff meets less resistance before reaching your local lake.



Leslie Robertson/NASF

Invasive Species

In a part of the country where the landscape is white for much of the year, many people tend to look at the woods in summer and think, “if it’s green, it’s good!” Unfortunately, there are a lot of things growing in Minnesota’s woods that do not belong here, and they can cause some pretty big problems. These harmful plants, insects, other animals, and fungi are called **invasive species**. Chances are good that there are a few living in your woods.

The DNR describes invasive species as “species that are not native to Minnesota *and* cause economic or environmental harm or harm to human health.” Not all **nonnative** species are invasive. For example, we plant many nonnative plants such as crabapple trees that do not cause trouble. The problems start when species escape cultivation and begin taking the place of native species in the wild.

Plants, animals, and fungi that become invasive have many of these characteristics:

- Usually fast growing
- Reproduce quickly, or have easily dispersed seeds or spores
- Thrive in a variety of conditions
- Lack natural predators or diseases that might otherwise keep them in check

Many plants that are now invasive were originally brought to the United States to be sold as ornamental shrubs and flowers. On the other hand, many invasive insects, other animals, and fungal diseases were introduced accidentally through international trade, though some were brought here purposely for various commercial or ecological reasons, only to become problems later.

As a landowner, you can do a lot to help manage invasive species on your land. Tips for controlling invasive species can be found in Chapter 5.

Intruder Alert!

Invasive species are an increasing problem for the North Woods. Here are examples of troublemakers to look for on your land.

European Buckthorn

European buckthorn is a tree that often grows as a weedy shrub in North America. In Minnesota both common and glossy buckthorn are highly invasive. Originally, both species were brought to the United States to be sold as ornamental hedges. However, buckthorn easily escaped cultivation and popped up on disturbed patches of land and in the woods, forming dense thickets and shading out native plants. Birds spread



the plant by eating its small black berries and excreting the seeds. Although nurseries stopped selling buckthorn many decades ago, the plant has become established across much of the United States and Canada.

If ignored, buckthorn can take over your woods. Buckthorn greens up earlier and stays green longer than most native plants. With a longer growing season, buckthorn not only grows faster than native plants, it also creates an unnatural layer of shade that stifles many native species growing underneath. Deer tend to avoid eating buckthorn, and it has almost no natural predators or diseases in Minnesota. These combined factors mean there is very little to slow the plant down, except action on your part. Buckthorn can be controlled by hand-pulling small plants to remove roots and cutting larger plants followed by stump removal or chemical treatment. More information can be found in Chapter 5 and on mndnr.gov/woodlands.

Emerald Ash Borer

Emerald ash borer, or EAB, is a small, brilliant green beetle from Asia that is about 1 centimeter long—shorter than the diameter of a penny. The insect itself can be hard to see, but the damage it causes is easily observed: dead ash trees. Adult beetles lay their eggs on the bark of ash trees. The young larvae hatch, bore through the bark, and meander undetected below the bark's surface, eating the living tissue that the tree uses to transport water and nutrients. This eventually kills the tree. The adult beetle emerges in the late spring and summer through a small hole in the bark that looks like a sideways "D." It then flies to a nearby ash tree and repeats the process.



Damage caused by EAB larvae under the bark of a green ash tree.

As of early 2015, EAB has not been found in north-central Minnesota. However, it has been found in the Twin Cities and in southeastern Minnesota, as well as neighboring states to the east and south including northern Wisconsin (along Lake Superior). North-central Minnesota has a lot to lose if the beetle spreads to these areas. All three of Minnesota's native ash trees—black, green, and white—are at risk from EAB attack. North-central Minnesota has large amounts of black ash, which often grow in wet, swampy areas where few other trees can grow. In many large areas, black ash is nearly the only tree species, making it an easy target for EAB. Since black ash helps control the ebb and flow of water in these wetlands, their loss could lead to flooding and other problems. EAB can spread quickly when firewood is moved across state lines or from one part of Minnesota to another. This is one reason why you should always burn local firewood.



A Changing Climate

Scientists predict that as observed rates of global temperature increase, Minnesota is likely to see significant changes in climate over the next several

decades. These changes include warmer year-round temperatures—with winter warming faster than other seasons—and potential changes to rainfall patterns, which will likely lead to drier summers, wetter springs and winters, and a greater number of severe storms. Some of these changes are already being seen in your region of north-central Minnesota, where historical climate records show that average low winter temperatures have increased by as much as 8 or 9 degrees Fahrenheit since 1901, making it one of the fastest winter-warming areas of northern Minnesota.⁸ What could these changes mean for forests in your area?

The variety of ecosystems we see in Minnesota—grassland, deciduous forest, coniferous forest—have come about due to differences in temperature and precipitation from north to south or east to west within the state. Many of the tree species in north-central Minnesota are at the northern, southern, or western edges of their range. This means that even small shifts in average temperature and precipitation could mean big changes to the type of forests you are used to seeing. For example, under higher temperatures, northern tree species such as balsam fir, tamarack, quaking aspen, and paper birch are likely to experience more stress and be replaced by mixed deciduous forest species such as oak, hickory, elm, and red maple.⁹

Warmer Winters, More Bugs

Minnesota's bitterly cold winters may sometimes have you longing for warmer Januaries. But our forests rely on these frigid temperatures to keep insect populations in check. Eastern larch beetle is a native insect that attacks tamarack, an iconic North Woods tree species that extends across 1.1 million acres of northern Minnesota.¹⁰ Warmer temperatures stress tamarack and allow eastern larch beetles to produce more offspring in summer and survive in greater numbers over winter. As a result, more than 20 percent of Minnesota's tamarack forests have been killed in the last 15 years. This type of large-scale tamarack death from eastern larch beetle is unprecedented in Minnesota and elsewhere on the continent.



This aerial photo shows a large swath of dead tamaracks.



As the climate changes, more red maple may appear in northern forests.

As native trees struggle to adapt or migrate in response to the changing local climate, invasive species that thrive in the new conditions may gain further ground. Increased temperatures may cause moisture stress in trees, making them more susceptible to invasive and native insects and diseases, which may be more abundant if warmer winters prevent the usual levels of pest dieback. Changing rainfall patterns and warmer summer temperatures may also create more frequent wildfire-inducing conditions, while an increase in storm severity could lead to more erosion and blowdowns.

While all of this may sound daunting, understanding the changes that may happen on your property over the next few decades can help you proactively choose tree species and strategies that are best suited to the future landscape. Carefully monitoring changes in your woods, such as the presence of new, possibly invasive species and tree death, can help you catch problems early. Maintaining diversity in the native species and ages of your trees can help make your woods more able to adapt to change. Occasionally thinning your trees may help decrease competition and increase vigor of the remaining trees. Favoring species that are predicted to do well in the new conditions may help your woods compete with potential invaders and keep native forest on the landscape. These actions, taken by you and other landowners, could help set the stage for healthy, productive, resilient forests in the face of a changing climate.¹¹



Climate Change Response Framework

Since 2009, a collaboration of the USDA Forest Service and other partners known as the Northern Institute of Applied Climate Science has been working with foresters and landowners across the northeastern United States to understand and adapt to the impending changes that the shifting climate will bring to forests. In Minnesota, several pilot projects are underway with large and small private landowners to test these strategies and determine the range of available options to help both people and forests adapt to change. Learn more about these projects at mndnr.gov/woodlands.



Moose is one species likely to be affected by climate change.

Chapter 2: Why Your Woods Matter

Privately owned forests are an important source of wood and all the products made with wood. Your forest may also be a great source of berries, nuts, mushrooms, or balsam boughs for wreaths. Or you may value your forest as a place to hunt, watch wildlife, or find serenity.

In this chapter, start thinking about specific goals you may have, and what you'd like to see on your property in 10, 20, or 50 years.

Benefits of Forests to You and Your Community

Wood and Pulp

Forests provide a variety of products on which we depend. One of the most important products that we get from forests is wood, which we use for everything from books to buildings, newspaper to toilet paper. Private forest lands are an important source of wood in Minnesota. Harvest levels vary from year to year, but in 2014 an estimated 29 percent of all the timber harvested in the state came from private family owned or tribal woodlands.

Advancements in technology are constantly increasing the number of ways we can use wood. For example, there is a paper mill in Cloquet, Minnesota, that, depending on market conditions, has the capacity to produce both papermaking pulp and a specialized wood pulp that is sold to make clothing, textiles, cellophane, and other materials.¹²

The main tree used to make these materials is aspen—the most common tree species in your region. Aspen and other fast-growing trees can also be used as a source of biomass to produce local, renewable energy. There are several large facilities in Minnesota, including several pulp and paper mills, that burn wood to produce electricity. For example, Minnesota Power has a plant in Grand Rapids that converts branches and low-grade wood left over from traditional timber harvests and mill byproducts such as sawdust into electricity for its customers. The innovative ways that Minnesota entrepreneurs are using this renewable wood resource are incredibly diverse and continually evolving.



“[We’ve had] probably 30 or 40 harvests. Some are big, some are little. The biggest was a 71-acre cut. The littlest one ... you [can] see logs piled along the road from a tree that blew down where my dock was going in (chuckles).”

— David Kettleson,
Cross Lake



A northern Minnesota lumber mill employee assesses the quality of freshly made boards.

Wood: A Local Industry

Forest-based industries are important contributors to the economy in north-central Minnesota. These businesses provide over \$770 million in regional economic output and more than 2,600 local jobs in logging, forest consulting, and a variety of wood product manufacturing industries.¹³ One of these employers is Potlatch Corporation, which operates Minnesota's largest sawmill and currently employs around 100 people in the Bemidji area. The company buys pine, spruce, and fir logs from hundreds of landowners to produce construction lumber that is distributed throughout the Midwest. Having a healthy forest economy in your region means more local jobs, higher demand for your wood, and greater support for maintaining healthy forests. What is more, the trees you grow and manage today could end up building the homes of your family and neighbors tomorrow.



Pallets of lumber waiting to be shipped to builders.

Nonwood Products

In addition to wood, forests can provide many other products from the decorative to the delicious. Spring foragers might find tasty morel mushrooms or ramps (wild onions) poking out from under the damp leaf litter. Summer berries and other fruits include blueberries, blackberries, raspberries, strawberries, gooseberries, and chokecherries, just to name a few. Wild hazelnuts are a fall favorite of wildlife and some people too, as they can be roasted and eaten like commercial filberts. As winter approaches, balsam boughs can be collected and turned into holiday décor for your home or sold to the wreath-making industry. And as winter fades and the tree sap begins to flow once more, maple trees can be tapped for making sweet, sticky maple syrup.



Forest Ecosystem Services

Forests provide a great many **ecosystem services**, which are “free” services provided by nature that we often take for granted. You are familiar with some of them: clean air, clean water, healthy soils, erosion control, and wildlife habitat. Forests also help control weather patterns by regulating temperature and the water cycle. Importantly, forests store large amounts of carbon in roots, trunks, limbs, and soils. In fact, about half of the weight of a tree is carbon. Healthy, growing forests absorb carbon from the atmosphere in the form of **carbon dioxide**, a **greenhouse gas** that traps sunlight and warms our planet. Because excess carbon dioxide is building up in the atmosphere as a result of human activities, global temperatures are increasing. Maintaining healthy forests helps store more carbon in wood and soils, which can help slow down current climatic changes.

Ecosystem services are either irreplaceable or would require expensive man-made infrastructure to replace. It is hard to put a price on the value of these services to society, but some economists are working on doing exactly that—seeking ways to estimate the economic worth of the carbon stored in forests or the value of undiscovered species and genetic information, for example. Creating and growing markets for these less tangible forest benefits might be an important step toward conserving forests in the future.¹⁴





Spotlight: Doug Swanson—Pequot Lakes, Minn.

Pine Moraines—Outwash Plains

Forest Forager

Anyone who comes upon Doug Swanson's maple syrup shed for the first time might be a bit confused about how to get inside. The structure, which Doug built himself, is made almost entirely out of recycled doors!



Inside the unusual building, Doug keeps a rusty 255-gallon fuel barrel that he has converted into a wood stove, an old 40-gallon commercial stainless steel frying pan, stacks of clean frosting buckets he acquired from bakeries, and a variety of other odds and ends that he uses to make the syrup. "It's a backwoods operation," he says with a smile.

Doug didn't know he'd be making syrup someday when he and his wife Rhoda bought the 120-acre woodland in 1976, just that the place suited them well: "It had trees on it ... it was relatively wild." But about six years ago he helped a co-worker collect sap during a particularly heavy-flow year and "became a little bit fascinated with it." He decided to tap a few of his own trees, getting a couple quarts of syrup in

that first effort. "It was wonderful and I thought, 'I should try doing this.'" Now he taps about 100 trees each spring, setting his taps in early April and collecting and boiling sap beginning in mid-April. During heavy flows, he might collect 100 gallons each day, leading to long days of boiling in the door-covered sugar shack and feeding the old fuel barrel boiler with firewood from his land and scraps of dimension lumber from a nearby truss-making facility. "You get a little swept up in it. You have to have the time," he says, noting that he never stores the sap for longer than three days to prevent spoilage. Doug boils the sap in batches to avoid overcooking it, boiling it down first in his large frying pan before moving the concentrated sap to the shed's range stove to finish it. The process creates a lot of steam. "The paramount thing is, don't

do this indoors,” he cautions, “unless you want to repaint the house.”

The finished product seems to be worth the effort. “Some of it is amazingly good. I’ve been complimented with it being the best syrup

people have had,” he says. Despite its high quality, Doug doesn’t sell his syrup.

“I don’t want the job. Too many things become jobs if you let them,” he says.

“I do it for the flavor, and I do it for the fun, and I do it to give it away. People are usually very happy to get it.” Doug also enjoys

the natural setting that sapping trees provides: “It allows me to be out in the woods for extended periods of time. In the spring, if you’re here when the snow starts to melt off and the early spring flowers start coming up, mingled in the snow patches ... it’s energizing.” He has also experimented with other types of sugar production including beekeeping

and, for the first time this year, making birch syrup—though perhaps not as successfully. “I made 10-plus pints of totally unconsumable stuff! It’s horrible!” he groans. “But I have to try it again.”

“It allows me to be out in the woods for extended periods of time. In the spring, if you’re here when the snow starts to melt off and the early spring flowers start coming up, mingled in the snow patches ... it’s energizing.”

According to Doug, making maple syrup is something anyone can do as long as they have a few maple trees. “Ideally you would have a wonderful forest of sugar maple. It’s not necessary. You can make syrup from all of the maples,” he says, noting that he has red maple in his woods, not sugar maple.

“You can do it really, really simply with used, clean milk jugs and CPVC pipe ... It’s quite inexpensive just to explore it, and then you can decide if you want to spend more money and more time doing it,” he suggests. “Start very small. Try to tap three or four or five trees, and shoot at getting maybe a half a gallon of syrup,” he advises. “And then you’ll be hooked.”♦



A maple syrup sundae is a great treat.



A man wearing a yellow hard hat, safety glasses, an orange safety vest over a blue shirt, and khaki pants stands in a forest. He is looking up at a tree trunk. The forest is dense with green foliage and trees. The text "Part II: Planning for the Future of Forests" is overlaid on the lower part of the image.

Part II: Planning for the Future of Forests

Chapter 3: Goals for the Landscape, Caring for Your Woods

Your woods are part of a larger landscape. Understanding more about that landscape can help you make decisions about your own property. This chapter introduces you to these landscape goals and helps you consider top priorities for your land.

Private landowners like you own over 50 percent of the forested land in the Chippewa Plains and Pine Moraines–Outwash Plains.¹⁵ Therefore, your decisions and the decisions of all woodland owners in the region have a big impact on the health and beauty of the North Woods.

“Letting nature take its course” on your woodland is a decision that impacts the forest landscape. Current forces—including suppression of natural wildfire, changes in wildlife populations and forest size, changing climate patterns, and invasive insects, diseases, and plants—have already disrupted nature’s “course.” So taking no action against these forces may result in less healthy and diverse forests than nature would have produced hundreds of years ago.¹⁶ However, as a woodland owner, you can restore some of the natural balance through **woodland management**—actively shaping and directing your woodland to keep it healthy, productive, and resilient. This chapter introduces you to some of the benefits that can come from actively managing your woodland.



“[Don’t] think that you can buy a piece of woodland and it’s going to improve itself. There’s work in improving it.”

— Karen Kettleison,
Cross Lake



Amanda Kueper

The Big Picture—Thinking From a Landscape Perspective

Knowing how your woods fit into the larger landscape can provide a useful perspective. For example:¹⁷

- The wildlife on your property is influenced by habitat conditions beyond your property lines.
- The movement of wildlife can be helped or hindered by how your land connects with surrounding forest and other habitat.
- Your property may be home to unique plants, animals, forest habitat, cultural resources, or other features that are rare in the broader landscape.
- Water quality in other parts of the watershed is influenced by how you manage your streambanks, hillsides, and wetlands.
- The visual quality of the area is impacted by your management choices.
- Allowing access to your road may reduce the need for additional roads in the area, thus reducing disturbance to forests.
- Surrounding trails may provide opportunities for you to link to a broader trail network.

The actions you take on your land can help support broader goals for forests in your region. Likewise, you may see opportunities to enhance your own objectives by tying them in with landscape features found beyond your property lines.



An American bald eagle perches on an aspen.

Goals for The Landscape

Before determining your goals for your back-forty, it's a good idea to understand the landscape management goals shared by natural resource professionals, land managers, and local community members. The goals for the Chippewa Plains and Pine Moraines–Outwash Plains were developed over the years through large-scale forest planning efforts. They show a long-term vision of what future forests in this area could look like and provide for wildlife, north-central Minnesota's economy, and society as a whole.

- **Maintain continuous forest cover.** Forest **fragmentation**—the reduction of forest land into small, isolated patches disrupted by other land uses—is a leading cause of forest habitat loss and degradation. Maintaining large blocks of forest that are not interrupted by development, such as agriculture or residential areas, can result in higher quality habitat and recreational opportunities than possible with smaller patches of forest.
- **Encourage diverse, native forests.** Creating diverse, native forests involves increasing species once more abundant in the region and decreasing others that have dominated since European settlement, as well as maintaining a balance of young and old forest on the landscape.

Biodiversity Counts

When developing goals for the landscape, biodiversity counts. The Minnesota Biological Survey is an ongoing effort by the state to collect detailed information on rare plants and animals, native plant communities, and local landscapes. The surveying began in 1987 and has been completed for most counties at the time of this printing. The results of this work have taught us a lot about the locations and abundance of Minnesota's flora and fauna. Visit mndnr.gov/woodlands to learn more about the survey results in your county.



Leslie Robertson/NASF

- **Manage for wildlife and habitat.** There are at least 530 wildlife species in your region.¹⁸ Natural resource professionals are trying to ensure that each of these species can maintain a healthy population while reducing adverse effects that some species may have on forests. Special steps are often taken to protect the region's rare and threatened species.
- **Foster productive forests.** We rely on our state's forests as an important source of wood products. Managing forests in ways that increase their production of quality timber helps ensure a steady supply of wood products and a healthy forest-based economy.
- **Protect forest health.** Forest health underpins many of the goals above such as maintaining diverse and productive forests. Keeping forests healthy means protecting them from invasive pests, planning for the effects of climate change, and monitoring the effects of large-scale disturbances caused by fire, windstorms, insects, and diseases.
- **Protect water quality.** Forests and water are intimately linked, especially within the water-rich north-central region of Minnesota. Forests play a key role in the water cycle by regulating the flow of water across the land. They also filter drinking water and prevent erosion from polluting aquatic habitats. Protecting forests near wetlands, seasonal ponds, natural shoreline, and streams is key to protecting local water quality.
- **Preserve cultural resources.** Forests are special places for many Minnesotans, providing peace, beauty, recreation, and the opportunity to visit important historical artifacts and unique natural features. Natural resource professionals in Minnesota strive to manage forests in ways that preserve these cultural resources and reduce negative visual impacts on the landscape.



Ruffed grouse prefer this brushy aspen habitat.

What Are Your Goals?

You may have other goals for your woodland, such as making a sound investment, maintaining privacy, or passing your land onto the next generation. When setting your goals, consider the broader landscape goals made by natural resource professionals. Doing so will help you succeed long term because you are using a basic framework for what tends to work best in your region. In other words, landscape goals provide the foundation. It is up to you to build the rest.

Setting Goals for Your Woodland Using the “Woods Workbook”

The workbook at the back of this book and on mndnr.gov/woodlands is designed to help you record your observations and woodland goals. Use this workbook as a field tool—don’t be afraid to take it outside and get it dirty!

Speaking of dirt, the best way to get to know your woods is to get out and explore them. Perhaps you already do this regularly, but in case you are not familiar with what lies in your back-forty, you may have some questions. For example, what kinds of trees make up the canopy and what species are growing underneath? How old are your trees? What does the **understory** look like: is it brushy or open? Are there any invasive species growing in your woods? The Woods Workbook will help guide you through these and other important questions.

Once you have a feel for the lay of your woodland, it is time to consider your main reasons for owning it. Perhaps the land has been in your family for generations and you inherited it. Maybe you purchased it recently as an investment or as a place to hunt deer every autumn. It could be a part of your home you enjoy for the solitude and visual beauty it provides. Or maybe your woodland is simply a part of your property that you have not thought much about. The Woods Workbook will help you think about your reasons for owning woodland and the benefits you want from that land.



“It’s going out and seeing what’s happening, and seeing the growth, and seeing the seasons come alive. The tamarack are just starting to bud out now, for instance. Back three weeks ago the maples were just starting to bloom.”

— David Kattleson,
Cross Lake

Choosing a Path

Once you have identified your top goals for your woodland, you can begin to develop a strategy for achieving those goals. You may not be able to accomplish all of your goals on one piece of woodland, but having a central focus can help you prioritize your efforts. Following are examples of three common themes that many woodland owners use to guide their decisions.

Theme 1: Wildlife habitat

Your main goal for your woodland may be to make it a good place for wildlife. Perhaps you are interested in attracting game species such as deer and grouse. Or maybe you are an avid birder and wish to make your land a desirable stopover location for migrating songbirds and waterfowl. You might value providing habitat for rare species. Whatever your interests, there are steps that you can take to make your woods a more wildlife-friendly place.



“I leave my snag trees for the woodpeckers and the wildlife, and I leave brush piles for the partridge that go in there and roost, or nest, or get away from a fox that’s chasing them.”

—Bill Skeesick, Jr.,
Motley

Your land needs some key features to make it attractive to wildlife: food, water, shelter, and space. Trees and shrubs that produce nuts and soft fruits are an important source of wildlife food for many species. Acorns are especially popular among deer, squirrels, and some birds. Small native trees and shrubs, such as dogwood, serviceberry, blueberry, sand cherry, northern bush honeysuckle, and chokecherry, produce soft fruits that are eaten by many creatures including songbirds, wood ducks, foxes, and black bears. Certain animals, such as grouse, prefer buds and flowers of aspen. Some landowners also choose to develop **wildlife openings** to attract wildlife.

There is more information on how to create wildlife openings and choose vegetation for wildlife in Chapter 5. Wildlife can generally find their own water sources, given suitable habitat.

Dead trees—or **snags**—provide shelter and food for a variety of wildlife species. Brush piles and understory trees and shrubs can provide protected areas for birds and small mammals. Maintaining



White-breasted nuthatch

large, connected woodland patches provides space and attracts wildlife that cannot live near forest edges, and maintaining wooded **corridors** between smaller patches of woods provides shelter for wildlife passing between them. Finally, preserving any wetlands, bogs, or swamps on your property provides shelter, food, and water for many types of creatures.

Different wildlife species have different needs, so any action you take will inevitably favor certain species over others. Be sure that you are clear about what kinds of wildlife you wish to attract before making any changes to your land.

Know Your Critters

Visit mndnr.gov/woodlands to learn more about the animals living in your area, how to look for them, and how to provide suitable habitat.

Theme 2: Recreation

Perhaps you want to use your woods as a place to hunt, hike, watch wildlife, snowmobile, or do some other form of recreation. If recreation is your theme, make sure that your management strategy includes increasing access to key places on your property. Where trees have become too crowded, strategically thinning your woods can help you travel through it and improve the health and quality of the remaining trees. Also, removing invasive plants can improve your recreational experience and the health of your woodland. Building trails creates accessibility. How you design your trails will depend on their purpose, who will use them, and your land's features. Your land's shape, size, slope, and ecology will determine the best route for the trail, points of interest to highlight or protect, and steps you need to take to prevent erosion and spreading invasive species.¹⁹ Chapter 5 provides more information on how to do this.

Learning how to identify your woodland's native and invasive trees and plants helps you learn more about your land, and is a fun activity in any season. To learn more, visit mndnr.gov/woodlands.



“I’ve got about eight miles of trails in there, so getting around is really easy, even in the summer time. ... I can walk my property all year long because I have trails.”

—Tom Smith,
Motley



PlayCleanGo

While important for recreation, trails also provide pathways for invasive species to infiltrate your woods. To help prevent this, clean dirt, bugs, and plant material from shoes, clothes, equipment, vehicles, and pets before and after trail use.

playcleango.org



**STOP INVASIVE SPECIES
IN YOUR TRACKS.**

Theme 3: Income

Your woodland is an investment that, if properly cared for, can provide economic returns for generations to come. There are a variety of ways to generate income from your woods. Perhaps the most obvious opportunity is through harvesting timber. To make sure you get the most out of your woodland's timber-producing capability, you want to do **woodland stand improvement** activities. Woodland stand improvement helps your forest grow faster and become healthier, meaning you will be able to profit from harvest sooner and more frequently. Depending on the needs of your land and your specific goals, these improvements may involve tree planting, thinning out lower quality or overcrowded trees, pruning trees, and protecting trees from damage. Chapter 5 provides tips on how to do this.



“We ended up logging two times and I was able to pay for a good share of the property and replant with the profits.”

—Tom Smith,
Motley

Your woods may also provide “nontimber” forest products, and some have established markets such as balsam fir boughs (branches). After the second hard frost of the year, you can harvest balsam boughs from mature balsam fir trees and sell them for making holiday wreaths—a \$20 million industry in Minnesota.²⁰ You could also collect seeds or cones and sell them to the Department of Natural Resources, the USDA Forest Service, or private nurseries for growing seedlings. The University of Minnesota Extension's *Minnesota Harvester Handbook* provides many more examples.



Leslie Robertson/NASF

Finally, you might be able to defray your land ownership costs by enrolling in a woodland cost-share, tax-relief, or incentive payment program. Because forests provide many public benefits, there are public funds available to help you pay for some of the costs incurred from improving your woods. These programs are discussed in Chapter 6.

Combination Approach: Multiple Benefits

Often, management themes overlap, and you want to incorporate elements of most or all of them into your approach. You might have different goals for different areas of your woods, or perhaps your goals do not fit into one of these categories. Examples might include planting a shelterbelt around your farm or improving the water quality in your woodland creek. Every management activity has pros and cons, but certain activities—such as clearing invasive species, thinning the understory, and planting diverse native tree and understory species—can support multiple strategies because they benefit everything from forest health to timber production to wildlife.



“My forest is a renewable resource, and I like the idea that I can have trees growing naturally, or I can plant trees, and they produce an income on a periodic basis. I don’t see that as my major benefit, but I love to be able to see things grow. It’s a living entity and something that I can pass on to my kids, grandkids.”

—John Wallin,
Pequot Lakes



The purpose of this chapter was to get you thinking about how you use your woods and what you want them to be like in the future. If you need more information (rare plants and animals, trees to harvest, property taxes), Chapter 4 will help answer those questions.



Chapter 4: Choosing a Strategy

Chess players know that good strategy is the key to winning the game. Like chess, managing a woodland requires foresight. You need to plan ahead and carefully choose how you use your resources. While you can't predict the future and may need to adjust your plans, having an organized, long-term strategic approach increases your chances of success.

Once you have determined goals and a management theme for your woodland, achieving those goals depends on your interests and available resources. Options can range from a simple walk through your woods with a forester to enrolling your land in a long-term conservation program. This chapter covers some helpful first steps. As you become more interested in investing in your woods, see Chapter 6.

Who to Know: Key Players

Your key players are people you can contact to help you reach your goals. There are many agencies and organizations in Minnesota that can help.

Professional Foresters: These people can help you plan your strategy through property visits and project implementation.

- *Minnesota Department of Natural Resources (DNR)*—The DNR is a state agency that helps take care of Minnesota's natural resources. DNR foresters protect and manage 4.2 million acres of public forest land, and are also available to assist Minnesota's private landowners with woodland decisions and projects. Specifically, the DNR's Cooperative Forest Management Program is



Leslie Robertson, NASF

a centralized hub of information that can direct you to many other resources and people including other agencies and private sector consultants. Local DNR Forestry offices often have long-standing relationships with a network of private foresters and loggers. If you decide to have a plan written for your property or a timber harvest performed, contact your local DNR Forestry office at mndnr.gov/areas/forestry.

- *Soil and Water Conservation Districts (SWCDs)*—SWCDs are local government agencies that help private landowners manage their natural resources. Some SWCDs have foresters who can visit your woods and provide advice. There are 90 SWCDs in Minnesota, one for each county (a few counties have two). maswcd.org

- *Private Consulting and Industry Foresters*—There are private, independent consulting foresters and foresters who are employed by timber harvesting companies. The Minnesota Association of Consulting Foresters can help you find a trained, experienced consulting forester in your area. <http://web.paulbunyan.net/norfor/>

Information and Education: These organizations provide printed materials, online resources, classes, workshops, field days, and other professional advice. They can sometimes help you access funding, which is discussed in Chapter 6.

- *University of Minnesota Extension*—The University of Minnesota delivers practical research-based education programs and information to landowners. Extension also manages the MyMinnesotaWoods website and other free electronic communications for landowners. myminnesotawoods.umn.edu

- *Minnesota Forestry Association (MFA)*—MFA is a statewide organization for private woodland owners that offers a variety of educational opportunities and other services. MFA administers the “Call Before You Cut” program, which encourages landowners to call a hotline before harvesting their timber. Those who call receive a free packet of information that includes lists of foresters and certified loggers, and a variety of other resources. minnesotaforestry.org

- *Minnesota Logger Education Program (MLEP)*—MLEP provides sustainable forestry education to loggers. Loggers must meet certain educational and business requirements to become members. MLEP also certifies loggers who meet certain performance standards as Minnesota Master Loggers, which allows timber harvested by these loggers from private land to be marketed as certified wood. mlep.org

Other sources of information include the federally administered Natural Resources Conservation Service and Farm Service Agency, and the state-administered Board of Water and Soil Resources. Financial assistance is often available through these agencies.

Thinking of harvesting timber from your land?

Call Before You Cut

You will be sent a packet of information
with no cost or obligation to you.

218-326-6486

What to Do: Create Your Strategy

There are a few basic steps you should take as you develop your woodland management strategy. Keep in mind that these may involve working with a natural resource professional.



“There’s so many fine details on some of my projects that I’ve worked out with my forester. ... You have to gain experience from people prior to you if you want to have this turn out the way you are thinking it should turn out.”

—Bill Skeesick, Jr.,
Motley

1. Get advice. Schedule a time for a professional forester to visit your property and walk through your woods with you. They can help you learn more about your woods’ potential for wildlife management, timber harvest, recreation, and so on. A forester may also identify invasive species growing in your woods, areas in need of thinning or restoration, and areas that contain important natural features. This process can help you choose specific projects you want to do in your woods.

2. Have a management plan prepared. The DNR’s Forest Stewardship Program helps landowners finalize goals and prepare a professional, voluntary management plan for their woodland. A **management plan** (also known as a **Woodland Stewardship Plan** when written by a certified plan writer), is a nonbinding, written document that lists your land’s potential, what you want to accomplish, and specific actions you can take to accomplish those goals

within a given timeframe. Woodland Stewardship plans are discussed in Chapter 6. However, at this stage you may be interested in something simpler. Ask your forester about having a brief or streamlined management plan prepared for your land, using the ideas that you have recorded in your Woods Workbook.



A professional forester checks in with a Minnesota Master Logger on a timber harvest.

3. Decide how the work will get done. A “project” may include activities such as tree planting, woodland stand improvement, invasive species removal, wildlife habitat improvement, development of recreational trails, or timber harvesting. When planning how the work will get done, consider your available time and budget. Doing the work yourself is one option. This saves money, but requires more time investment. Many landowners enjoy doing their own management activities, as it provides an opportunity to be out in their woods (and is often great exercise!).

If you can't do the projects yourself, you can hire a contractor. Several organizations maintain directories of forestry professionals and logging contractors in Minnesota.

- The Minnesota Logger Education Program has a free online directory of its trained members including a list of Minnesota Master Loggers. mlep.org
- The Minnesota Association of Consulting Foresters has a similar directory of professional foresters, along with descriptions of their experience and service areas. <http://web.paulbunyan.net/norfor/>
- Your local DNR Forestry office also has lists of contractors for your surrounding area. mndnr.gov/areas/forestry
- You might also consider asking your neighboring landowners if they have had woodland work done and what their experiences were like.



“If you’re going to hire a vendor, try to get references from somebody. If you’re a new landowner, you need to talk to your forester. Normally that forester should be able to tell you who’s done work in that area.”

—Bill Skeesick, Jr.,
Motley



Part II covered some of the goals for the forested landscape of which your land is part, how your own goals intersect with these landscape goals, and how to develop a strategy for doing the work necessary to reach your woodland goals. Part III starts you down the path of becoming a more active woodland manager by giving you the tools you need to begin your first project and pointing you in the right direction for getting more involved in the future.



Working Woodlands

Spotlight: Jack Gustafson—Laporte, Minn.

Chippewa Plains

“We were looking for a property, and to be honest with you ... just the setting of this place. I mean, look at it!” Jack Gustafson says, gesturing to the pond below that hummed with the spring sounds of frogs, birds, and insects. Just coming here and listening to the frogs croak is reason enough to own the 120-acre woodland near Laporte, Minnesota, but he and his family enjoy a variety of activities in their woods including deer hunting, raspberry picking, and splitting firewood. “I never have an excuse that I have nothin’ to do. I always go out and cut firewood, or scout for deer signs, or just walk around and look at change, look at the results of my tree cutting.”

Jack has had six timber harvests performed over his 30-year ownership of the property, and has worked with four different loggers. His main goal is to manage the forest for better wildlife habitat. His most recent project included working with a small-scale logger to do three minor clear-cuts along the forest that bordered his clover fields to create a “softer edge” and browse for the deer once the aspen resprout from their roots. His main reason for contracting the work was that he lacked the equipment to perform the



harvests himself. Jack felt he had positive relationships with the loggers he worked with, though he admitted to knowing the reputations of local loggers from his pre-retirement days working for the USDA Forest Service. For landowners who do not know any loggers personally, he suggested looking at the Minnesota Forestry Association’s list of consulting foresters or contacting a DNR forester. He also advised: “Talk around and ask for a reference. Ask [loggers] ... who they have cut [timber for] in the past,



and then talk to that person who has had the relationship with them.”

In addition to contracting work, Jack has done a variety of woodland management projects on his own including post-harvest clean-up of remaining debris and lower quality trees. He also harvests firewood frequently, which provides 95 percent of the heat for his home in the wintertime. “And

that’s very satisfying; not only from the heat you get out of it, but I’m able to utilize trees that die on my place or residual that’s leftover from timber sales or windthrow,” he notes. “Another thing too, it’s darn good exercise!” He notes that doing the work himself saves money, but he also notes the potential dangers, citing a close-call he had once while felling trees that “makes you *really* believe in chainsaw chaps!” At the end of the day, it’s the simple pleasures that bring Jack out into his woods: “Nothing more satisfying than going out on a nice sunny winter day and working in just a sweater. Maybe that’s old fashioned thinking ... the satisfaction of a job well done.”♦

Spotlight: Bill Skeesick, Jr.—Motley, Minn. Pine Moraines—Outwash Plains

When Bill Skeesick bought his 110 acres near Motley in the late 1990s, he saw a future forest. At the time, less than half of the land was wooded, much of it lying in fallow agricultural land. “As soon as I bought this, I knew that I wasn’t a farmer for crops. I wanted the aesthetics of the land, the trees, and the wildlife,” he says. Today, the entire property is planted in trees, thanks to Bill’s work over the last 15 years. “There’s a pleasure that I get personally from watching a little tree grow,” he says.

Bill and his family have planted many of these little trees themselves. A recent project involved filling in a small clearing in his woods just off of the highway. Bill ordered “improved”





trees from the Minnesota State Forest Nursery located in Hubbard County—trees bred for greater wood quality, volume, and heartiness to Minnesota’s climate. Bill is vigilant about defending his young trees, and takes a variety of steps to ensure planting success. He advises landowners to prepare the planting site by removing large rocks and any unwanted trees that would compete for moisture and nutrients. While planting, he stresses the importance of proper spacing and depth. After planting, pest management becomes key. Bill has battled sawfly infestations, pocket gophers gnawing on his seedling roots, and deer browsing on young trees. To deter deer, he caps the top bud with a folded piece of paper and a few staples—a traditional method. However, he’ll sometimes add an extra cap or two to the sides of the trees for added protection, and he removes caps once the trees are large enough and in the spring to prevent ant infestation. “I wouldn’t have gone through the time planning, paying for, and planting them, if I wanted to sacrifice any trees,” he said, comparing them to “soldiers in the field.”

“There’s a pleasure that I get personally from watching a little tree grow, ... ”

Bill feels that doing projects himself gives him more control and flexibility, as well as enjoyment. “It’s fun to be out there and get dirt on your hands. There’s something about when you’re riding in that tree planter and the plow lathe is turning that soil up ... and you’re putting the trees in there; it makes you feel you’re connected with the earth I guess.” However, Bill has contracted tree planting work as well, including a 14,000-tree planting of jack and red pine in 2005. “I didn’t want to have to do that

much work myself,” he said of the undertaking. However, Bill did supervise the work done on his property, saying he believed in being a “visible” landowner. For new woodland managers, being present during contract work can provide valuable learning opportunities. He

notes: “If you don’t have experience, you might want to hire it out that first year and watch how it’s done. Be out there ... ask questions. ‘How come you’re putting the planters this deep in the ground?’ ‘How fast should I go?’ ‘What is the ideal time of day?’ You need to watch. Once you get the experience and you feel comfortable you can handle it, then go for it.”

Bill also advises consulting with a forester while planning projects and “don’t go too big too fast,” especially if you plan on taking care of the trees yourself. Finally, he advises attentiveness as a woodland owner: “Watch, watch, watch. Keep an eye on your trees.” ♦



Part III: Putting It All Together—Managing Your Woods

Chapter 5: Woodland Projects

A wide variety of resources can help you develop a strategy to manage your woodland, including having a management plan prepared by a professional forester. This chapter provides you a few ideas to develop and execute your first project.

Tools and Budget

First, you need to prepare your toolbox. This involves more than just sharpening your chain saw! The most powerful tool at your disposal is knowledge. Visit mndnr.gov/woodlands for fact sheets, publications, workshops, learning opportunities, organizations, and people who can help. Before starting any project, do your homework!

Other tools you may wish to gather include aerial photographs of your property, soils information, mechanical equipment, names and contact information of resource professionals or other landowners who can help, and a management or **project plan**. Online planning tools such as the American Forest Foundation's "My Land Plan" can also help.

You also need to determine your budget, which will influence the size and scope of the project you choose. Several options for financial assistance that may help stretch your management dollars are discussed in Chapter 6. Record your budget in your Woods Workbook.

Safety First!

Working in the woods can involve some inherently dangerous activities such as operating chain saws or other mechanical equipment, using herbicides, handling noxious plants such as wild parsnip and poison ivy, and working around deer ticks and other biting insects. Arm yourself with the proper equipment (e.g., hard hat, eye protection, gloves, long sleeves, chainsaw chaps, insect repellent) and the right knowledge before trying any of these activities. Some organizations offer short courses on chainsaw safety and herbicide application. Visit mndnr.gov/woodlands for resources on planning a safe day in the woods.



Choosing a Work Project

Choose a project that fits your budget, timeline, and long-term goals. Projects range from simple tree pruning to in-depth lakeshore restoration. Here are a few examples that correspond to the wildlife, recreation, income, and combination themes described in Chapter 3. Each of these projects may be tailored to meet multiple goals.

Option 1, wildlife habitat focus: Creating a wildlife opening

If you want to attract wildlife to your property, you might consider creating a **wildlife opening** as your first woodland project. Unlike traditional **food plots**, which usually consist of planted nonnative grasses or crops, wildlife openings use native vegetation and are therefore more suitable to meeting the needs of native wildlife.

Wildlife openings are small clearings in your woodland—ranging from a half-acre to five acres, but usually one acre or smaller in size—that mimic the type of openings created by natural disturbances such as fires or wind. Disturbance is nature’s way of renewing a forest, and many creatures depend on the type of habitat provided by a forest disturbance. Methods for creating and maintaining your wildlife opening could include hand-cutting trees and shrubs, brush mowing, and controlled burning with the help of a professional. Maintaining your opening is best done outside of the primary nesting season for birds, which is mid-May through early August. A natural resource professional can help you decide which method(s) work best and the best location for the opening. You do not need to remove all of the trees and shrubs in your opening. It benefits wildlife to leave—or plant, if absent—nut- and fruit-bearing species, a few snags, fallen logs, and brush piles for shelter. The opening should be



acres of wildlife openings,
biggest one is 3 acres.”

—David Kettleson,
Cross Lake



about three times as long as it is wide, irregular in shape, and placed on a south- or southeast-facing slope to take advantage of the sun.

When choosing the location of your wildlife opening, it may not be necessary to clear new areas if you have existing openings that can be improved by planting or regenerating native species. Pre-existing openings may include yards, old pastures, edges between forest and agricultural fields, and open areas near lakeshore. You might also consider improving an existing food plot. Using pre-existing openings can prevent unnecessary fragmentation of your woods.

Native Plant Community Spotlight: Central Dry-Mesic Pine-Hardwood Forest

Before modern wildfire control, fires were common in this moderately dry native plant community. Mild to severe fires occurred every 23 years or so. The particular tree species in this area change over time after a severe fire. Young forests consist largely of aspen, which give way to a mix of red pine, jack pine, and red oak. Eventually, red pine will dominate the canopy in middle-aged forests, and then be replaced by white pine in old forests. Throughout the understory you might find large-leaved aster, beaked hazelnut, Canada mayflower, round-leaved dogwood, chokecherry, and serviceberries.

When in a younger stage, grouse are attracted to this native plant community because of the abundance of aspen, which begin to disappear 60 to 70 years or so after a fire or harvest. Cutting mature aspen causes it to sprout from the roots, generating a profusion of tender young shoots and a protective thicket for grouse. Other animals such as deer and songbirds can benefit from this type of management as well. You might consider periodically harvesting aspen along the perimeter of your wildlife opening to create and maintain this type of habitat.



Option 2, recreation focus: Controlling invasive plants

Nonnative species can be a big problem for forests when they displace native species. Invasive plants can crowd the understory of your woods or proliferate along your trails, making recreational access difficult. The first and least costly step you can take to combat any invasive species—plant, insect, or disease—is to prevent them. Here are some steps you can take.²¹

- Identify invasive species and recognize clues about their presence.

- Avoid spreading seeds, insects, and microbes (found in wood or soil) to new areas by cleaning boots, tires, pets, and equipment between uses.
- Minimize disturbance to native vegetation where possible, and maintain healthy communities of native species.
- Monitor high-risk areas such as roads, trails, and disturbed ground.
- Detect new outbreaks of invasive species early and eradicate them quickly.

If you have confirmed that there are invasive plants in your woods, taking steps to control these pests makes for a good first woodland management project. Catching an infestation early can be critical to successful eradication. The best time to tackle removing an invasive plant is when it's present, but not yet well-established in your woods. Once an invasive plant becomes well-established, eradication is more difficult, but you can still manage the problem and give your native plants a chance to compete with the invader.

Woody invasive plants in your region include common buckthorn, several species of Eurasian bush honeysuckle, and weedy invaders such as leafy spurge, common tansy, several species of nonnative thistle, and spotted knapweed. Watch for garlic mustard, which is a prolific understory plant with clusters of small four-petaled white flowers and a garlicky scent to its leaves. While it is present, it's not yet prevalent in your region. Garlic mustard has already invaded other parts of Minnesota and the United States. If you spot garlic mustard, act quickly to remove it. If it becomes established in your woods, it will become highly problematic. Visit mndnr.gov/woodlands to help you identify these and other invaders that might be present in your region, as well as get tips for distinguishing invasive from native species.



Buckthorn, if left unmanaged, can take over nearly any wooded area.

A variety of methods are used to control invasive plants.

- **Hand-pulling:** Small seedlings can be pulled up by hand in the spring when the soil is moist, taking care to remove the entire root so the plant does not resprout.

Arrest the Pest: 888-545-6684

The Minnesota Department of Agriculture has a hotline for reporting newly detected invasive species. If you can, provide digital photographs and GPS coordinates of the infested site.

- **Herbicide:** The stems of large woody plants can be cut at the base and treated with the appropriate herbicide to prevent resprouting. As an alternative to cutting, herbicide can be sprayed on the bark around the lower portion of the plant's stem. You can also spray the leaves of invasive woody plants, preferably after native plants have lost their leaves and gone dormant. Infestations of weedy plants may be controlled with spot herbicide treatments. As always, be sure you're treating the correct plant and take care to protect native plants. Before applying any herbicides, it is best to talk to your forester to make sure you select the most effective treatment and the best product for your site. Finally, wear protective clothing and follow instructions on the product label when applying

herbicides, as not all products are appropriate for all situations.

- **Fire:** **Prescribed burning** can be effective at killing seedlings and resprouted plants. Burns need to be repeated every few years to keep new invasions from taking hold. Just as with the use of herbicides, it is best to talk to a professional before tackling a prescribed burn. You will also need to get a burning permit. mndnr.gov/forestry/fire
- **Mowing or grazing:** Some invasive plants can be deterred by repeatedly mowing the plants before they go to seed. Alternatively, livestock such as cows, sheep, or goats can be used to graze heavily infested areas of certain invasive species.
- **Insects:** In a few cases, scientists have identified insects that selectively attack particular invasive plants. **Biological controls**, such as some insects, can target invasive species while sparing native species. For example, two types of weevil are used to control spotted knapweed, an aggressive invader of open or disturbed areas. The weevils attack either the seedhead or the roots of the knapweed, weakening or killing those plants.²²



Adding dye to your herbicide helps keep track of which plants you have treated.



Fire can be a great management tool if you get a permit and take appropriate precautions.

Remember that seeds in the soil can germinate for several years after you remove mature plants. You must be persistent in removing new plants until the seedbed is exhausted or the infestation will return. After you remove an invasive species, you may need to plant native species to fill the void, otherwise new invaders may quickly return to the disturbed area. Native trees and shrubs that could replace buckthorn and honeysuckle include high-bush cranberry, nannyberry, pagoda dogwood, American hazelnut, common elderberry, and native bush honeysuckle. Native **forbs** in your region are many, and include bloodroot, wild ginger, Canada tick trefoil, black-eyed Susan, and whorled milkweed. More information about choosing native plants is on mndnr.gov/woodlands and mndnr.gov/plants.

Unfortunately, new invasive plants are constantly popping up in areas where they have not been spotted before, and the most troublesome invaders in your region may have changed since the time of this writing. Keep an eye on the handbook website for up-to-date information about which forest invaders you need to look out for in your woods.

Native Plant Community Spotlight: Central Dry Pine Woodland

This unique, fire-dependent community is considered “critically imperiled” due to its rarity both within the state and globally. This community is found almost exclusively within the Chippewa Plains and Pine Moraines–Outwash Plains subsections. Soils are fairly dry, nutrient-poor, and sandy. These harsh growing conditions, combined with frequent disturbance from fire, favor an abundance of jack pine in the canopy. Other canopy species include red and white pine, red and bur oak, and quaking aspen. Below the canopy you will find Pennsylvania sedge, wild rose, American hazel, bearberry, wintergreen, yarrow, poverty grass, and Virginia ground cherry.



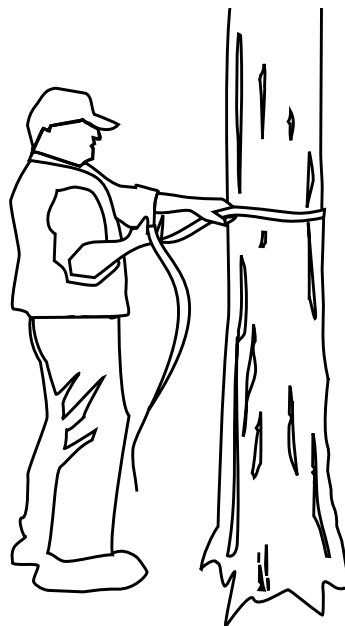
Historically, frequent ground fires occurred in this plant community every 22 years or so. If fire or other disturbances are restricted, the jack pines will begin to die around age 35 and the forest begins to fill with hazel. Over time, hazel can become so thick that it becomes very hard to reestablish trees. To preserve this unique native plant community, frequent disturbances such as prescribed burns or timber harvest (at fairly young ages) should be done, along with monitoring the understory and woodland edges for invasive plants. If you find invasive plants such as thistles, common tansy, Kentucky bluegrass, or other weedy invaders, taking fast action to control them can help protect this biologically unique north-central Minnesota ecosystem.

Option 3, income focus: Harvesting firewood

If you enjoy keeping the hearth crackling throughout the long Minnesota winter, a woodland stand improvement harvest will give you abundant firewood from your own property.

Harvesting firewood on your property saves money. To maintain a forest that will stay healthy, produce income, and look good, choose your firewood trees strategically. Mark trees that are:²³

- *On the small side*—Trees that measure 6 to 8 inches in diameter at 4½ feet from the ground (or 19 to 25 inches in circumference) are good choices for firewood harvests.
- *Dying or dead*—Choose trees that have been infested by disease or insects, as they will likely not survive to be part of your future forest. You may also choose to harvest dead trees, but remember that you may wish to leave some of these for wildlife habitat.
- *Low timber quality*—Choose trees that are crooked, damaged, or have trunks that fork close to the ground. Choose species that are less desired by timber markets. These trees will not fetch high prices if you choose to harvest your future forest.
- *Crowded high-quality trees*—If the trees in your woodland are too crowded, they compete for resources. Thinning some of the trees that surround your best quality trees allows those remaining trees to thrive and grow more quickly. To identify overcrowded trees, look up at the crowns (the tops) of the trees. Make sure your best trees have plenty of room for their crowns to grow.



Don't Move Firewood!



You may be tempted to transport firewood from your land to another location for storage or use. Resist the urge! Remember, moving firewood from one area to another can quickly move invasive forest pests such as oak wilt, gypsy moth, emerald ash borer, and other organisms that kill trees. This is true even if the wood is burned shortly after being moved. For many of these pests, we don't have an effective way to remove them once they are established in an area. Preventing further spread is the most effective means of control. Note that some Minnesota counties have quarantines that prohibit moving firewood and violations can result in hefty fines.

Logs harvested from dead or dying trees may contain insects or fungi that can harm remaining trees and some insects are attracted to recently harvested logs from healthy trees. To prevent these organisms from spreading, it is best to harvest and process your firewood in cold weather. Split, stack, and cure the wood on site for two years before moving it to another area.

If you choose to harvest trees yourself, having a project plan prepared by a professional forester can help you identify where, how many, and which species of trees to harvest.

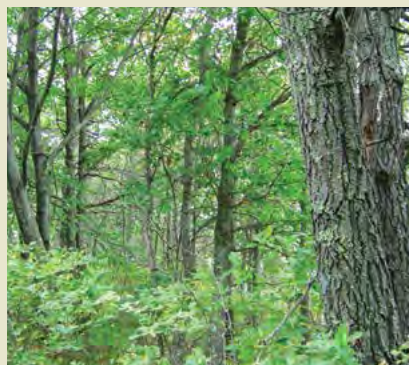


“There’s something satisfying about cutting, splitting, and stacking wood. You get to look at the results of your work.”

—Jack Gustafson,
Laporte

Native Plant Community Spotlight: Central Dry-Mesic Oak Aspen Forest

Northern red oak was historically the dominant canopy tree of this fairly dry hardwood native plant community, mixed at various stages with other hardwoods such as quaking aspen, paper birch, red maple, and bur oak, and occasionally with conifers such as white pine. Fire and wind caused disturbance frequently enough to prevent shade-tolerant species such as red maple, basswood, and sugar maple from replacing the oak in the understory. However, since the modern-day suppression of fire, some of these communities have slowly transitioned to maple. Noteworthy understory plants include low-bush blueberry, blackberries, dogwoods, downy arrowwood, columbine, large-flowered trillium, and an abundance of beaked hazel.



Oaks need full sunlight to reach maturity. If you want to keep oak in your woods, you can tailor your firewood harvesting strategy to achieve this goal. Creating medium to large gaps in your woods (up to an acre) allows oak to grow back, whereas small gaps (the size of single trees or small clusters) may favor maple. Either strategy will help create better wildlife habitat, help your woods be more resistant to environmental stress, and create diverse ages among your trees, similar to the effects of fires in the past.

Option 4, combination focus: Lakeshore restoration

Forests play a critical role in maintaining the health and beauty of north-central Minnesota's many lakes. If you own lakeshore property and are interested in a "combination approach" to your woodland management strategy, a lakeshore restoration project may be a good fit. Maintaining healthy lakeshore provides habitat for birds, fish, and other wildlife. It also improves recreational opportunities by maintaining good water quality and can potentially increase the value of your land by improving visual quality.

There are several steps you might take to improve the quality of your shoreline.

- *Soil bank stabilization*—If the shore is eroded or sensitive to erosion, you need to stabilize the soil to keep it from muddying the water. Planting native trees, other woody vegetation, or deep-rooted perennial forbs and grasses is one way to secure the bank. Visit mndnr.gov/woodlands for tips on selecting native plants in your county.
- *Invasive plant control*—Aggressive invasive species, such as reed canary grass and purple loosestrife, plague the shores of lakes and other water bodies in your area. Controlling invasive plants helps native plants compete for space.
- *Creation of wildlife habitat structures*.—If the area has few snags and downed logs, you might consider installing some habitat structures for wildlife such as tree boxes for wood ducks or floating nest platforms for loons and other waterfowl.



Native shoreline vegetation can help reduce runoff, create important wildlife habitat, and add visual appeal to your property.

Specific recommendations for a lakeshore restoration project vary depending on the condition of your shore, the local ecology, your goals, and regulations governing your shoreline. The DNR's online Restore Your Shore tool on mndnr.gov/restoreyourshore is an excellent resource to assess the current condition of your lakeshore and find tips to increase ecosystem health along your water's edge. For grant funding and general planning assistance, check with your local county soil and water conservation district, watershed district, lake association, or with a DNR fisheries habitat specialist for more information.



Once you have chosen your project, record it in your Woods Workbook. Write your expected timeline and the contact information of any professionals with whom you are working. Next, consider breaking your project into concrete steps and record these as well. As you progress, keep track of observed changes and accomplishments. You might also consider taking “before” and “after” photographs of your woods. Be proud of your work! Becoming an active woodland manager benefits you, your family, society, and nature—so you will have earned some bragging rights.

Native Plant Community Spotlight: Lakeshore

Lakeshore is prevalent in north-central Minnesota. Shores may be sandy or muddy and could contain a variety of terrestrial and aquatic plants depending on the season and current water level. Just above the normal water level are shrubs and forbs such as sandbar willow, spotted touch-me-not, and swamp milkweed. Below the normal water level you may find broad-leaved cattail, an assortment of sedges and rushes, and floating plants like water lilies and pondweeds.



Edmund Zionis

A variety of ecosystems, from upland forest to lowland swamp, surround these lakes. While proper management along the shore can protect it from wave damage, how land is managed near shorelines also plays a key role in erosion control. Forests help filter runoff and hold soil in place, whereas agriculture and lawns can add soil, fertilizer, and pesticides to the runoff that flows into lakes. It is important to consider the impacts that all land use and management activities have on your lake, even beyond the shores.

Chapter 6: Next Steps



“They [the DNR] have this Stewardship Program where they go through the property and they explain what you have ... and what you can do to improve the property. I did that right away, and for new people buying property that is the number one suggestion I would have—is to contact a forester and talk to them, and have them come through the property and go through that Stewardship Program.”

—Jack Gustafson,
Laporte

If you want to take the next step to actively manage your woodland, there are programs and resources that can help you develop an in-depth property plan, use sustainable practices, save money, and protect your land long-term.

Getting a Woodland Stewardship Plan

The DNR’s Forest Stewardship Program helps woodland owners create and use voluntary management plans for their property. A Woodland Stewardship Plan that is written by a certified plan writer and registered with the DNR qualifies landowners to apply for one of Minnesota’s cost-saving woodland tax-relief or incentive programs. To qualify for one of these programs, a landowner must have at least 20 qualifying acres of land, which includes at least 10 acres that are currently wooded or will be converted to woodland or woody vegetation. Those with registered Woodland Stewardship Plans may also qualify for other benefits including access to cost-share funding to support some of the forestry recommendations outlined in their plans.

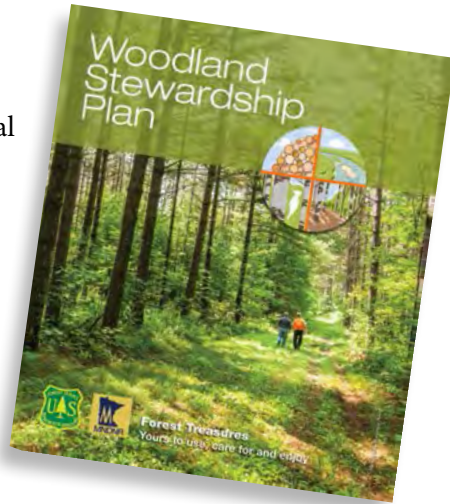


Many entities provide plan-writing services: the DNR, private consulting foresters, industry foresters, some county soil and water conservation districts, and certain environmental organizations. Costs for plan-writing services vary by provider.

To get a Woodland Stewardship Plan, visit <http://sfec.cfans.umn.edu/StewardshipPlan>. This website, which is updated by the University of Minnesota's Sustainable Forestry Cooperative, lists certified plan writers.

To write your plan, a forester visits your property, walks through your woods with you, discusses your goals, and makes notes about your woodland's current status and its potential.

You may wish to have your Woods Workbook on hand as a reference for your goals and interests. The forester then prepares a written plan specifically for your land, usually including things such as forest diversity and health observations, timber quality and species, rare species and historical sites, specific project suggestions, aerial photographs and maps of your property, and information about the surrounding landscape. Recommendations made in these plans are voluntary. However, if you enroll your plan in a tax-relief or incentive payment program, you are expected to follow these recommendations.



Management Plan Options for Landowners With Less Than 20 Acres

Managing smaller woodlots is becoming more important every year as more large wooded plots become subdivided into smaller ownerships. All woodland owners, regardless of acreage, can contact a DNR forester or other professional to schedule a woods walk and get a streamlined management plan or a plan for a specific project. A streamlined management plan provides a list of work projects. A project plan focuses on a single project such as tree planting, harvest, or invasive species control. It describes the current and desired future conditions of the project area and specific steps for completing the project. Another option is to team up with your neighbors and have an in-depth Woodland Stewardship Plan written for multiple properties. Owners with less than 20 qualifying acres are not eligible to enroll in a tax-relief or incentive payment program. For more information, ask your forester.



Voluntary Guidelines

The *Minnesota Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers, and Resource Managers* contains research-based guidelines for activities such as woodland stand improvement, timber harvest, site preparation, pesticide use, reforestation, managing for recreation, managing with fire, and building roads. A digital copy of the guidelines is available free on mndnr.gov/woodlands.

Minnesota Forest Management Guidelines: Quick Reference Field Guide

A condensed version of the guidelines that focuses on timber harvesting is available in a durable, pocket-sized format. The field guide presents key guidelines for woodland, water, and soil protection in a concise, user-friendly format that includes picture examples, general rules of thumb, and a comprehensive resource directory. A free paper copy of the field guide is available from the Minnesota Forest Resources Council.²⁴



Financial Assistance

Because private woodland management provides many benefits to nature and society, public financial assistance is available. These options include tax-relief programs, incentive payments, and cost-sharing for your woodland projects. A few of these programs are listed below. You can also visit mndnr.gov/woodlands for fact sheets and other resources. These programs are always changing, so be sure to visit the website or ask your local forester for the most up-to-date information.

Cost-share programs:

Federal

- *Conservation Reserve Program (CRP)*—Administered through the Farm Service Agency, CRP provides annual compensation payments to farmers who remove environmentally sensitive land from agricultural production and plant perennial species such as trees that improve soil and water quality and wildlife habitat. Contracts last 10–15 years.
- *Environmental Quality Incentive Program (EQIP)*—EQIP is a program of the Natural Resources Conservation Service (NRCS) that provides reimbursement to landowners who implement certain conservation practices. Technical assistance is also provided. Requirements include a “practice” or project plan that has a schedule of planned activities. Contracts last up to 10 years.

State

- *DNR Division of Forestry*—Cost-share funding may be available for woodland management activities performed by landowners who have a Woodland Stewardship Plan registered with the DNR.

County

- *Soil and Water Conservation Districts (SWCDs)*—Cost-share funding may be available through your local SWCD, which in addition to receiving cost-share funds from the state of Minnesota’s Board of Soil and Water Resources, can sometimes access funding sources such as those generated by Minnesota’s Legacy Amendment.



“I would tell a landowner to strongly consider enrolling their land in a Minnesota forest incentive program. You can get up to a 35 percent reduction in your property taxes and have that classified as 2c [Managed Forest Land], or you can get ... seven dollars per acre of cash payment per year [through the Sustainable Forest Incentives Act]. It’s a pretty nifty program. I’ve been enrolled in [the Sustainable Forest Incentives Act] since the beginning, and it’s helped me pay for my property taxes.”

—Jack Gustafson,
Laporte

Tax and Incentive programs:

Federal

- *Reforestation tax credit*—If you treat your woods like an investment or a business, you may be eligible for certain federal tax incentives. For example, the IRS allows landowners to deduct eligible reforestation costs from their income—up to \$10,000 per year, with the option to amortize (write off) additional expenses over a 7-year period.

State

- *Sustainable Forest Incentive Act (SFIA)*—The SFIA was passed in 2001. Landowners receive a fixed annual payment per acre of land enrolled in the program. As of this printing, the payment per acre is \$7. Requirements include a minimum enrollment of 20 qualifying acres, an 8-year minimum commitment, and a registered Woodland Stewardship Plan that was written in the last 10 years by a DNR-approved plan writer.
- *2c Managed Forest Land*—Created in 2008, 2c is a property tax designation that offers woodland owners a reduced rate of 65 percent on actively managed woodland. Requirements include a minimum enrollment of 20 qualifying acres and a Woodland Stewardship Plan that was written in the last 10 years, is registered with the DNR, and includes a schedule of planned activities.
- *Green Acres (2a Productive Agricultural Land) and Rural Preserve (2b Nonproductive Agricultural Land)*—These programs provide reduced taxes on woodland that produces agricultural products (maple syrup, biomass) or is adjacent to a landowner's farmland.



“I need to get a conservation easement on [my land] so it's not chopped up. I want the land to be kept in one chunk, not subdivided.”

—Jack Gustafson,
Laporte

Conservation Easements

Some landowners want to make sure their land will never be developed or converted to another use by selling or donating a **conservation easement**. Conservation easements serve a variety of conservation purposes and are generally intended to protect important features of a property. They are voluntary, legal agreements by the landowner to give up some of the rights associated with their property, such as the right to develop, divide, mine, or farm the land to protect the important land, water, habitat, and other conservation features. Conservation easements vary, depending on the host organization and the landowner's specifications. Perpetual conservation easements are intended to last forever. Term

easements are for a specified length of time. Since the agreements are tied to the land and not the owner, the property will be kept in a largely natural state no matter who owns it in the future. Easements are visited regularly (usually annually) by the organization holding the easement to monitor the conditions of the property.

Public agencies and some nonprofit organizations whose purposes include conservation preservation can hold conservation easements. Interested landowners can either sell or donate an easement to one of these organizations.

Here are some examples of organizations that have conservation easement programs. Visit mndnr.gov/woodlands for more information.

- *Agricultural Conservation Easement Program (ACEP)*—Administered by the Natural Resources Conservation Service (NRCS), ACEP protects agricultural and nonindustrial private woodlands from development through agricultural conservation easements. The easements can be temporary (30 years) or permanent. The program also offers wetland conservation easements that are purchased and then maintained by NRCS. Easement plans are required.
- *Forest Legacy Program (FLP) and Minnesota Forests for the Future (MFF)*—The FLP and MFF programs are administered by the DNR to protect important private working forests and prevent the conversion of forests to non-forest uses. Working forests provide an array of public benefits including habitat, clean water, recreational opportunities, timber, and other forest products. The FLP is a national program administered in partnership with the USDA Forest Service while the MFF is strictly a Minnesota easement program. Both programs are intended to conserve and protect private forests that provide economic, recreational, and economic benefits to the state and its citizens. Conservation easements are permanent and easement rights are either purchased or donated.
- *Reinvest in Minnesota (RIM)*—RIM is administered by the state Board of Water and Soil Resources and local soil and water conservation districts. The program focuses on restoring wetlands and sensitive agricultural lands such as those along rivers. An easement plan is mandatory. The landowner is responsible for maintaining any conservation projects in the plan, but the program can provide financial assistance. Conservation easement rights are purchased and most easements are permanent, but some may be temporary (20 years or more).
- *Nonprofit organizations*—Some nonprofit organizations purchase or accept donated conservation easements on land that fits certain criteria. Examples include Minnesota Land Trust, Ducks Unlimited/Wetlands America Trust, and The Nature Conservancy.



Transferring Land to the Next Generation

If you want to keep your woodland in the family and make sure it remains intact, consider creating a family limited liability company (FLLC or LLC) for your land. An LLC is a business entity that can hold land and be used to manage the land while shielding the owners from certain personal liability issues. Placing woodland in an LLC also helps landowners transfer their property to the next generation while minimizing the risk that the property will be forcefully sold upon demand of one of the heirs—known as “avoidance of partition” in legal terms. Rather, the land is titled in the name of the company, which is divided into units of membership similar to the way a corporation is divided into shares. Using this model, you as the owner can gift portions of the value of the land in the form of company units to your heirs over time. You retain decision-making power over the land as a majority partner until such time that you see fit to pass on responsibility. Passing land on in this way—as annual gifts below a certain maximum value—can help landowners potentially decrease the estate taxes associated with high-value property.²⁵

Importantly, LLCs offer opportunities to engage the next generation in caring for and managing the land within your lifetime, and may provide a good platform to pass on your goals and values for the land as well as the property itself. While LLCs are easy to create, you may need to take many steps to ensure that the LLC functions as you intend. Further, inheritance and tax law can be complicated and may change frequently. For these reasons, it is important to work with a certified public accountant or attorney who is familiar with the specific needs of Minnesota woodland owners. Again, visit mndnr.gov/woodlands for details.



Now that you know more about investing in and protecting your land, continue to Chapter 7 to connect with other landowners and become more involved in your local landowner community.



Chapter 7: Your Landowner Community

Many activities are more fun when you are part of a community. Anglers, stamp collectors, sports fans, book lovers, birders, and ballroom dancers all have their own communities. Woodland management is no different. There are more than 190,000 private woodland owners like you in Minnesota. This chapter outlines some programs and organizations that can connect you with other woodland owners and local natural resource professionals.

Minnesota Forestry Association (MFA)

MFA is a private, member-funded woodland owner organization and Minnesota's oldest conservation organization, founded in 1876. Their mission states that "The MFA works on behalf of family forest owners through education and advocacy to promote stewardship of woodlands." MFA was instrumental in advocating for passage of the 2c Managed Forest Land tax program in 2008. The organization offers educational opportunities such as field days on member properties. minnesotaforestry.org

Women's Woodland Network

The Women's Woodland Network is a landowner organization that focuses on engaging women, a historically underserved population in the woodland owner community, in woodland management. The organization hosts gatherings and courses designed to provide a comfortable environment for Minnesota's women woodland owners to learn management skills and connect with professionals and other landowners. mnwwn.org

University of Minnesota Extension Woodland Owner Programs

University of Minnesota Extension has long served as a resource for Minnesota's landowners. Extension offers a wide variety of educational opportunities for landowners ranging from conferences and workshops to citizen science and volunteer programs. myminnesotawoods.org

- *Minnesota Family Woodland Conferences*—These two-day conferences, held in multiple locations around the state, provide workshops, field tours, and presentations from experts on a variety of topics designed to support landowners in their woodland management goals.
- *Forest Pest First Detector*—This program provides an opportunity for forest health-savvy citizens to receive specific training on Minnesota's most threatening forest invasive species and to become leaders in their communities in early detection of these woodland pests.



“Get to know your neighbors ... it's very important. We've established a relationship with the neighbors up there. If you run into any problems at all, they're there to help you.”

—Tom Smith,
Motley

Urban and Community Forestry Organizations

If you want to help protect the trees that grow in urban and community areas, consider these organizations.



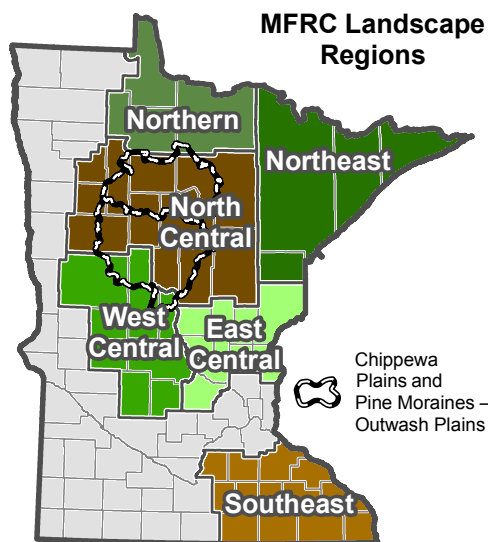
“Take advantage of all the resources that are available to you, like the Natural Resource Conservation Service, DNR, collaborate with other landowners ... I met [my neighbor], and I was kind of thinking maybe I should give him a call and say ‘Hey why don’t you come over and take a look at my place, and I’ll look at what you’re doing,’ so we can learn from each other—because that’s so darned important.”

—Jack Gustafson,
Laporte

- *Minnesota Shade Tree Advisory Committee (MnSTAC)*—MnSTAC is a nationally recognized organization that was created in 1974 at the recommendation of Governor Wendell Anderson. The committee works with policymakers and community leaders to identify legislative priorities and lead initiatives to protect urban and community trees and forests. mnstac.org
- *Tree City USA*—Tree City USA is a national program of the Arbor Day Foundation that recognizes communities with tree management plans and programs, and encourages action and public education around sustainable community forests. Nearly 100 cities in Minnesota participate in the program, including Bemidji, Park Rapids, and Wadena. To see if your city has a Tree City USA designation, visit arborday.org/treecityusa.
- *Tree Care Advisors*—Tree Care Advisors are a group of citizen volunteers trained in basic tree care skills by the University of Minnesota’s Department of Forest Resources. The program connects trained volunteers with volunteer opportunities. Many advisors become strong advocates for how their community cares for its trees. The Tree Care Advisor website has a searchable directory of volunteer advisors who can answer questions and assist in local tree management and outreach projects. mntca.org/tree-care-advisor

Minnesota Forest Resources Council (MFRC) Landscape Committees

The MFRC is a state-appointed Council established by Minnesota statute that exists “to promote long-term sustainable management of Minnesota’s forests.” The Council consists of 17 members who represent different forest-related interests in the state, from timber, to conservation, to the needs of private woodland owners. A small staff manages several different programs to support the Council,



including a program focused on landscape-level management. The Landscape Program provides support and guidance to six regional landscape committees that span the forested areas of the state.

The landscape committees are made up of volunteers from the public and private sectors, including natural resource professionals, landowners, and other interested community members. These committees partner with local natural resource groups to implement forestry projects based on the broader landscape plans that the MFRC has designed for the regions. Landowners bring important on-the-ground perspectives to these committees. Most of your region is covered by the North-central Committee. The West-central Committee covers the southwest part of your region. Most committees meet quarterly and meetings are open to the public.

Minnesota Tree Farm

Minnesota Tree Farm is a chapter of the American Tree Farm System, a program of the American Forest Foundation. The program recognizes woodland owners who adhere to a set of sustainable forestry principles including protecting forests from disease and grazing, protecting soil and water quality, growing productive forests, and maintaining biodiversity and wildlife habitat. Applicants must have at least 10 acres of woodland and a management plan for their property. Membership is free and includes benefits such as free technical advice from volunteer foresters during inspections and opportunities to network with other landowners and educators through workshops, field days, seminars, and an annual national convention.



“They say you don’t own this land, you’re just taking care of it while you’re here. This land is going to be here for generations to come, but I’m not gonna be. But these trees will grow.”

— Bill Skeesick, Jr.,
Motley

Landowner Cooperatives

Woodland owner cooperatives provide services to members such as education, equipment-sharing, and access to markets. One example is the Northwoods Forestry Cooperative, whose motto is “To promote sound woodland management and assist members in wood products marketing.”



Throughout this handbook, you have read the perspectives and experiences of some of your fellow landowners. Getting involved in one or more of these landowner organizations will help you meet, learn, and share your knowledge and experiences with your woodland neighbors. You may also meet local natural resource professionals such as foresters, loggers, and scientists who may help you throughout your woodland-owning journey.



Landowner Leaders

Spotlight: John Wallin—Pequot Lakes, Minn.

Pine Moraines—Outwash Plains

Community has always been important to John Wallin, a Nisswa native. Locals refer to John's neck-of-the-woods as "Wallinville," an area populated by the descendants of John's grandparents who raised 10 children, many of whom purchased land and settled down in the area. "We grew up with aunts, uncles, cousins, other family, and other neighbors. And what was nice is that we helped each other—cutting and putting up hay and wood, and putting up ice. We worked as a team." John has applied this teamwork philosophy to all aspects of his life. He believes strongly in community involvement and has delved into a wide array of community services over the

years, from volunteer firefighter chief to Cub Scout leader to involvement in a variety of county boards and organizations, including serving as chair for the Crow Wing County Planning Commission for over seven years. As a now-retired educator, he spent 17 years of his career as a special needs instructor at the very high school from which he graduated.

John's community involvement also extends to his landowning philosophies. Heeding his father's advice that land is "the best investment you can make," he and his wife Carolee have acquired more than 400 acres of mostly wooded property over the last 45 years. John and Carolee have opened their land to





many others, allowing family, friends, and neighbors to snowmobile, hunt, hike, horseback ride, and bird-watch along their 5½ miles of trails. John has also become involved in a number of landowner organizations over the years including the American Forest Foundation's Tree Farm program, the Central Minnesota Small Woodland Owner Association, which he joined over 20 years ago, and the Minnesota Forestry Association, where he was the local Brainerd chapter president for 10 years and the unofficial photographer. I tend to take lots of photos," he says with a grin. More recently, John has begun attending meetings for the Minnesota Forest Resources Council's North Central Landscape Committee. He also sits on the Minnesota Forest Stewardship Committee as a private woodland owner representative, and he has joined his local Northwoods Forestry Cooperative.

John cites many benefits to his involvement in these various groups. For example, the Central Minnesota Small

Woodland Owner Association organizes field days on landowner properties—including John's in 2010—and connects private landowners to forestry professionals when landowners wish to harvest. "They're a good supportive network," he says. "It's a valuable resource even before you have any logging done, or if you want to have some planting done." John attends workshops and tries to share what he has learned with other landowners in the groups. He benefits from learning from others, noting: "You meet people who oftentimes have expertise in different areas" and "You're around other people who have similar interests and similar goals in mind." Finally, as someone who cares deeply about community, John sees value in the camaraderie and support that he finds through involvement in landowner organizations: "If you become involved, you branch your friendships out, you build relationships with other people that oftentimes can support you ... And I think that's really important." ♦

Woods Workbook

You can fill out this workbook online at mndnr.gov/woodlands.

1. About your property

Begin by answering a few background questions. Visit mndnr.gov/woodlands for information about your watershed and ecology of your land.

How many acres do I have? _____

Is my property in multiple parcels? If so, how many? _____

What county or counties is my property located in? _____

What **Ecological Classification System** subsection is my land in?

☐ Chippewa Plains ☐ Pine Moraines–Outwash Plains ☐ Other: _____

What major watershed is my land in? _____

What minor watershed is my land in? _____

2. Evaluate your property

Take a leisurely walk through your woods. What do you notice? Consider these questions and take notes.

- What kinds of trees are there? Are they old or young?
- How dense is the tree cover in my woods? Has there recently been a harvest? Are there openings from trees that have died or blown over?
- Are there “islands” of woods surrounded by open land or is all of my woodland connected?
- What is the understory like? Is it thick with shrubs and brush or is it open?
- What wildlife is there?
- Are there any invasive species? Which species? Where are they located?
- Are there any ponds, wetlands, swamps, springs, or streams within my woodland or nearby?
- What is the terrain like? Is it hilly or flat?

Consider repeating this exercise with each new season. You may notice different plants and animals in different seasons.

3. Identify what interests you about your woodland

First, note topics, then set goals. Here is a list of topics that may interest you as a woodland owner. Check any that apply to you. This isn't an exhaustive list, so add any additional topics that are important to you.

Topics

- ☐ Game wildlife
- ☐ Nongame wildlife
- ☐ Rare plants and animals
- ☐ Recreation
- ☐ Timber harvest
- ☐ Tree planting
- ☐ Cost-share
- ☐ Tax incentive programs
- ☐ Invasive species/forest health
- ☐ Protecting important habitats
- ☐ Wetlands
- ☐ Shoreline management
- ☐ Water quality
- ☐ Prescribed burning
- ☐ Investment
- ☐ Intergenerational land transfer
- ☐ Carbon capture
- ☐ Nontimber forest products (mushrooms, maple syrup, etc.)
- ☐ _____
- ☐ _____
- ☐ _____

4. Identify your top three topics

5. Write your goals

Write a short goal statement about each of your top three topics.
Example: If “game wildlife” is one of your top three topics, then your goal might be to “Make sure my property contains wildlife openings to support more wild turkeys.”

Goal 1:

Goal 2:

Goal 3:

Other goals:

6. Describe a work project

First, choose a goal you want to tackle. Your goal may involve setting up a work project. If you don't know what kind of work needs to be done to reach your goal, ask a forester. It's also a good idea to get a project plan from a forester.

Example: If your goal is to "Ensure my property contains wildlife openings to support more wild turkeys," then your project may be to "Locate existing openings and enhance them by removing trees and planting native species of plants that turkeys eat."

Describe a work project that will help you achieve your woodland goal: _____

7. Identify action steps

If possible, break down your project into smaller action steps. Take as many steps as you need. Use extra sheets if necessary.

Example: Step 1—Locate existing openings by examining aerial photos. Step 2—Schedule walk with forester to visit openings I want to enhance. Step 3—Ask my forester to recommend times to mow or burn. Step 4—Conduct mowing or burning. Step 5—Plant shrubs and trees that are good for wildlife (ask my forester for recommendations).

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

8. Pull it together

For each work project, use this template to list individual action steps, set a time to do each step, estimate budget needs, and record notes and observations about how things are going along the way.

Work Project (describe)					Year	
Steps (describe)	Date/ Season ¹	Tools needed ²	Partners/ Contacts ³	Budget estimates		Notes
				My contribution	Financial assistance	
1						
2						
3						
4						
5						

¹ Date/season considerations.
For action steps within a project, consider the season, the order of action steps, and amount of time you need to complete each step.
Example: Most harvests occur in winter when the ground is frozen to minimize damage to the soil.
In what order will you tackle your work projects?
Example: Control invasive species at trail entrance—2015; Enhance wildlife openings—2016; Incorporate as an LLC—2017; etc.

² Tools needed might include aerial photos, chain saws, management plan, project plan, shovels, shrubs, etc. You may want to note where you might get these tools.

³ List names and phone numbers of people who could advise on or help with each step such as your local forester, a neighbor, etc.

Remember to take before and after photos!

Glossary

biological control – The use of natural enemies (e.g., insects, pathogens) to control nonnative pests.

biomass – Living and recently dead material that can be used as fuel or for industrial production. Woody biomass includes logging residue (nonmerchantable tops and limbs left over from a commercial timber harvest, non-merchantable small-diameter trees and stems, dead standing trees, and downed logs), primary and secondary mill residue, dedicated energy crops, urban forest-clearing material, land-clearing material, and brushland material.

canopy – The ceiling of a forest created by branches and leaves from several trees. Forests with dense canopies allow less sunlight to reach the ground than do forests with open canopies.

carbon dioxide – A colorless, odorless gas that is produced when a carbon-based fuel is burned; a *greenhouse gas*.

Chippewa Plains – A *subsection* of the *Ecological Classification System* in north-central Minnesota defined at the southern boundary by Leech Lake, the northern boundary by the southern shore of Glacial Lake Agassiz, and on the eastern and western boundaries by glacial moraines. The subsection encompasses the majority of Cass, Hubbard, and Wadena counties, and parts of Becker, Clearwater, Crow Wing, Mahnomen, Morrison, Otter Tail, and Todd counties.

conservation easement – Voluntary land protection agreements that restrict development while ensuring biological diversity, sustainable timber management, and in some cases, public access.

corridors – Areas of protective vegetation, such as trees, shrubs, or tall grass, connecting larger patches of habitat and providing shelter for wildlife traveling between these patches.

drift – Material such as boulders, gravel, sand, silt, or clay removed from one area by glaciers and deposited in another. Drift includes material deposited directly by glacial ice, such as *till*, as well as material deposited indirectly by water, such as outwash or lake sediments.

Ecological Classification System – A method to identify, describe, and map units of land with different capabilities to support natural resources. This is done by integrating climatic, geologic, hydrologic, topographic, soil, and vegetation data.

ecosystem – The complex of a community of organisms and their environment that functions as an ecological unit.

ecosystem service – The benefits that people obtain from ecosystems. Ecosystems provide hundreds of services, including soil formation, nutrient cycling, decomposition of wastes, regulating climate, purifying air and water, and recreational experiences.

food plots – Small areas planted to annual or perennial agricultural crops to provide a supplemental food source for wildlife. They have less value to native wildlife than *wildlife openings*.

forb – An herbaceous, flowering plant that is not a grass, sedge, or rush.

fragmentation – The splitting or isolating of patches of similar habitat.

greenhouse gas – A broad term for any gas present in Earth's atmosphere that contributes to planetary warming by trapping heat from the sun's energy; examples include *carbon dioxide*, water vapor, and methane.

habitat – The place or environment where a plant or animal naturally or normally lives and grows and can access needed food, water, cover, and space.

invasive species – A nonnative species that invades lands or waters, particularly natural communities, causing ecological or economic problems.

land-type association – Units within *subsections* that are defined using glacial landforms, bedrock types, topographic roughness, lake and stream distributions, wetland patterns, depth to groundwater table, soil parent material, and pre-European settlement vegetation. Minnesota has 291 land-type associations.

landscape – All land uses (such as forests, agriculture, urban) and ownerships (public, private) within a defined area that can cover thousands or millions of acres.

Laurentian Mixed Forest – A province of the Ecological Classification System characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps that traverses northern Minnesota, Wisconsin, Michigan, southern Ontario, and the less mountainous portions of New England. In Minnesota, the province covers a little more than 23 million acres of the northeastern part of the state.

management plan – A nonbinding, written document, usually written by a professional forester, that lists your land's potential, what you want to accomplish, and specific actions you can take to accomplish those goals within a given timeframe. Also called a *Woodland Stewardship Plan*.

mesic – Referring to intermediate soil moisture, in which moisture is not limiting to plant growth during the growing season and soils are not saturated except following rain or spring snowmelt.

moraine – Till deposited at the terminus or edge of a glacier, appearing on the modern landscape as ranges of high hills and usually composed of unsorted materials.

native plant community – A group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native species form recognizable units, such as an oak forest, prairie, or marsh that tend to reoccur over space and time.

nonnative species – Species that have been introduced, or moved, by human activities to a location where they do not naturally occur. A nonnative species is not necessarily harmful unless it becomes invasive.

Northern Minnesota Drift and Lake

Plains – A section of the Ecological Classification System that covers the center of northern Minnesota and is characterized by deep (200–600 feet; 60–180 meters) glacial deposits in outwash plains, lake plains, till plains, outwash channels, moraines, and drumlin fields.

outwash plain – A large flat area of sorted and often stratified sediment (sand, gravel) that is deposited by glacial-meltwater streams.

Pine Moraines–Outwash Plains –

A subsection of the *Ecological Classification System* that is defined by glacial moraines on its boundaries. The subsection encompasses parts of Mahnomen, Clearwater, Beltrami, Hubbard, Cass, and Itasca counties.

prescribed burning – The controlled application of fire to naturally occurring vegetative fuels, under specified environmental conditions and following appropriate precautionary measures, to achieve specific objectives such as controlling brush, producing high-quality browse, or reducing fuel hazards.

project plan – A set of planned activities for improving your woodland. Project plans written by professionals include descriptions of current conditions and recommended steps toward achieving future desired conditions.

province – Units of land defined using major climate zones and native vegetation such as prairie, deciduous forest, boreal forest, and tallgrass aspen parkland. There are four provinces in Minnesota.

section – Units within *provinces* that are defined by origin of glacial deposits, regional elevation, distribution of plants, and regional climate. Minnesota has 10 sections, five of which are within the *Laurentian Mixed Forest Province*.

snag – A dead, decaying tree that provides habitat for wildlife.

species in greatest conservation need – Animals whose populations are rare, declining, or vulnerable to decline, and are below levels desirable to ensure long-term health and stability.

subsection – Units within *sections* that are defined using glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of plants, especially trees. Minnesota has 26 subsections, 14 of which occur in the *Laurentian Mixed Forest Province*. This handbook covers two subsections – the *Chippewa Plains* and *Pine Moraines–Outwash Plains*.

till – Unsorted material deposited directly by a glacier. Till consists of clay, sand, gravel, or boulders mixed in any proportion.

understory – The vegetative layer of trees and shrubs between the forest *canopy* and the ground cover.

watershed – An area that contains all the land and water features that drain excess surface water to a specific location on the landscape such as a river.

wildlife opening – A small area cleared in the forest to mimic openings that naturally occur from disturbances such as wind and fire. They create less disturbance to the soil, support native plants, require less labor and expense, provide less opportunity for invasive plants to become introduced, and have greater plant diversity and structure than traditional *food plots*.

woodland management – The process of giving the woodland proper care so it remains healthy and vigorous and provides the products and amenities desired by the landowner. Technical definition: The application of technical forestry principles and practices and business techniques (such as accounting and benefit-cost analysis) to the management of a woodland. Also called “forest management.”

woodland stand improvement – A practice in which the quality of a residual forest stand is improved by removing less desirable trees, vines, and occasionally large shrubs to achieve the desired stocking of the best-quality trees. Loggers and foresters will often refer to these activities as “forest stand improvement” or “timber stand improvement.”

Woodland Stewardship Plan – A *management plan* that is written by a certified plan writer and registered with the DNR.

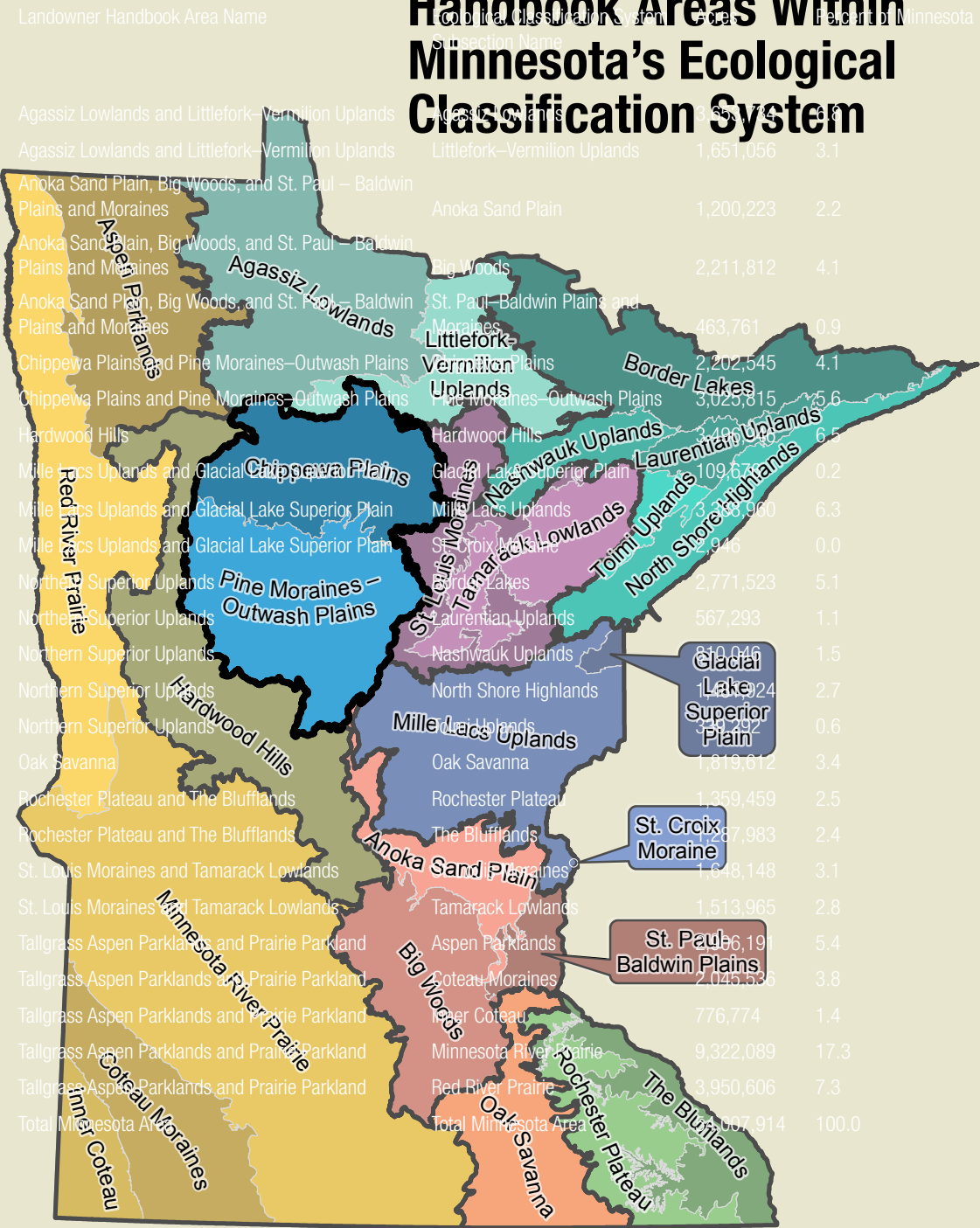
Endnotes

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County	Total County Acres	Acres Within Area	Percent of Area	Portion Within Area
Aitkin	1,275,804	13	0.0	Western border
Becker	925,073	457,856	8.8	East half
Beltrami	1,954,962	631,351	12.1	South half
Cass	1,544,170	1,423,959	27.2	Nearly all of the county
Clearwater	659,017	376,811	7.2	South half and small portion of north half on east edge
Crow Wing	739,801	286,946	5.5	Northwest corner
Hubbard	639,536	639,536	12.2	Entire county
Itasca	1,872,385	592,594	11.3	Northwestern arm
Koochiching	2,018,168	47,752	0.9	Small part of southwest corner
Mahnomen	373,535	56,304	1.1	East edge
Morrison	737,783	105,335	2.0	Northwest arm
Otter Tail	1,423,973	198,342	3.8	Northeast corner
Polk	1,279,481	524	0.0	Small portion of southeast corner
Todd	626,774	65,547	1.3	North border and north half of east border
Wadena	347,609	345,490	6.6	Nearly all of the county
Totals	N/A	5,228,360	100 0	N/A

Subsections and Landowner Handbook Areas Within Minnesota's Ecological Classification System



If you own woodland in north-central Minnesota, your decisions can impact the future of this unique forest landscape.

This handbook is a foundation for taking care of your woods and connecting your property to the larger landscape. It helps you identify what you have, plan for what you'd like to see in the future, understand what you can do to keep your woods healthy, and consider strategies for accomplishing these actions. From learning about plant communities to connecting with local foresters, this book shows you how to get a management plan written just for your “back-forty” so that your dreams can become a reality.

Your choices will leave a mark on future woodlands. What will your landowning legacy be?

mndnr.gov/woodlands

This handbook series is a collaborative project of the Minnesota Department of Natural Resources—Division of Forestry and the Minnesota Forest Resources Council.



Minnesota
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