AGASSIZ LOWLANDS AND LITTLEFORK–VERMILION UPLANDS

WOODLANDS OF MINNESOTA
LANDOWNER
HANDBOOK

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

About the Woodlands of Minnesota Series

Woodlands of Minnesota is a series of handbooks for woodland owners in different areas of the state.

This handbook is for people who own woods in the Agassiz Lowlands and Littlefork–Vermilion Uplands, labeled as 1 on the map.

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

Areas Covered by Handbook Series

1. Agassiz Lowlands and Littlefork–Vermilion Uplands
2. Northern Superior Uplands
3. Chippewa Plains and Pine Moraines–Outwash Plains
4. St. Louis Moraines and Tamarack Lowlands
5. Hardwood Hills
6. Mille Lacs Uplands and Glacial Lake Superior Plains
7. Anoka Sand Plain, Big Woods, and St. Paul–Baldwin Plains and Moraines
8. Oak Savanna
9. Rochester Plateau and Blufflands
10. Tallgrass Aspen Parklands and Prairie Parkland

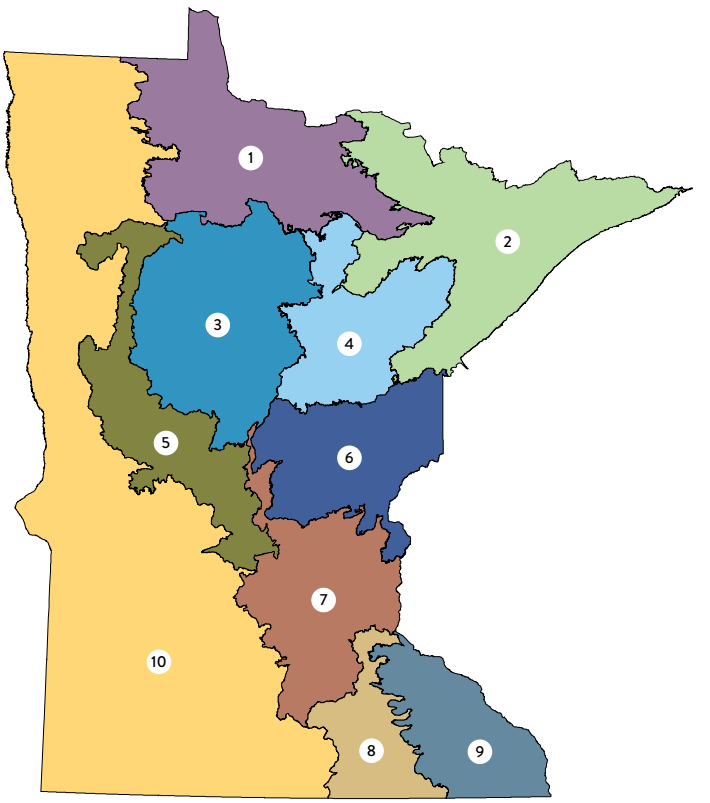


Table of Contents

Introduction

Nearly 191,000 private woodland owners in Minnesota collectively own more than 6 million acres (about one-third) of the state's total forest land. These are individuals, families, cooperatives, or small businesses who 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 such as clean air and water, scenic beauty, hunting, angling, birdwatching, and the raw materials to make paper and other wood 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 northern Minnesota, many resources are available to help you take care of 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.

How to Use This Handbook

This handbook is both a reference and a 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 northern Minnesota neighbors! Their stories, experiences, and words of wisdom may inspire ideas for your own woods.

Woods Workbook—The workbook on pages 88-93 guides you through setting goals for your woods and how to get them done. A digital version can be found on **mndnr.gov/woodlands**

Vocabulary—The bold italic words are defined at the end of each section ("part").

Handbook Website—The handbook website contains additional resources, including contact information for your local natural resource professionals and ideas for woodland projects. **mndnr.gov/woodlands**

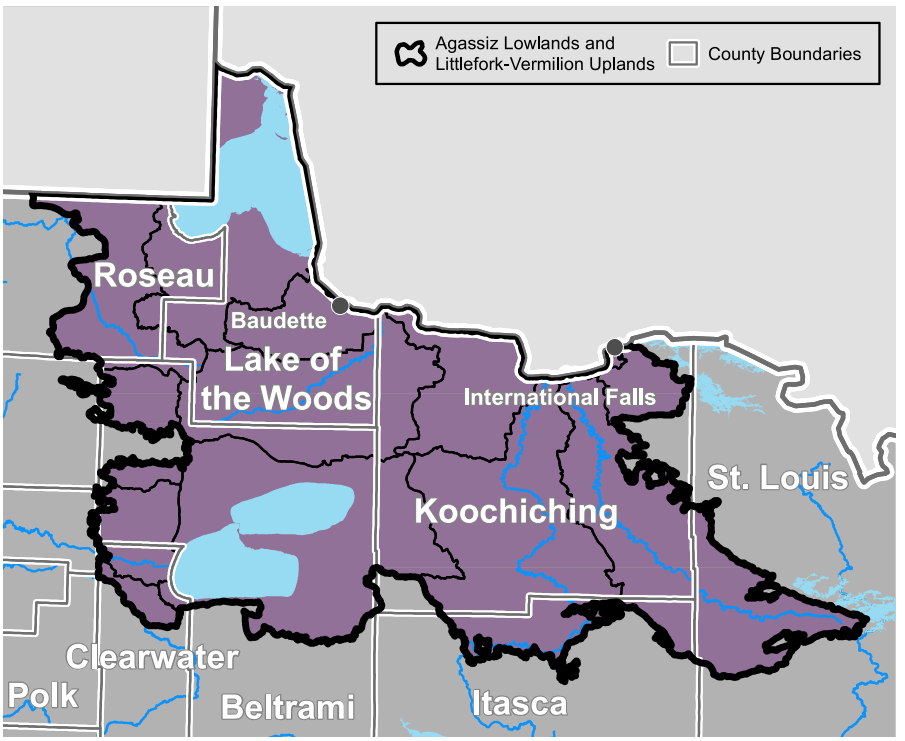
Land Covered in This Handbook

This handbook is specifically designed for those who own forest land in the area of northern Minnesota known by ecologists as the Agassiz Lowlands and Littlefork–Vermilion Uplands. These ecologically rich places are home to thousands of lakes, vast stretches of northern forest, lush wetlands, diverse wildlife, and an important wintering area for boreal birds.

Agassiz Lowlands and Littlefork–Vermilion Uplands subsections span 5,304,361 acres in all or parts of Beltrami, Clearwater, Itasca, Koochiching, Lake of the Woods, Marshall, Pennington, Roseau, and St. Louis counties.

- **Beltrami:** 63%, or 1,232,920 of 1,954,962 total acres, is located in these subsections and makes up 23% of the subsections
- **Clearwater:** 18%, or 119,858 of 659,017 total acres, is located in these subsections and makes up 2% of the subsections
- **Itasca:** 12%, or 216,622 of 1,872,385 total acres, is located in these subsections and makes up 4% of the subsections
- **Koochiching:** 90%, or 1,821,911 of 2,018,168 total acres, is located in these subsections and makes up 34% of the subsections
- **Lake of the Woods:** 100% of 1,138,741 acres are located in these subsections and makes up 21% of the subsections.
- **Marshall:** 1%, or 7,704 of 1,161,082 total acres, is located in these subsections and makes up 0% of the subsections
- **Pennington:** 1%, or 2,765 of 395,641 total acres, is located in these subsections and makes up 0% of the subsections
- **Roseau:** 43%, or 460,407 of 1,074,191 total acres, is located in these subsections and makes up 9% of the subsections
- **St. Louis:** 7%, or 303,575 of 4,312,245 total acres, is located in these subsections and makes up 6% of the subsections

AGASSIZ LOWLANDS AND LITTLEFORK–VERMILION UPLANDS



PART 1
NORTHERN 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 woods 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, tribal) 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 "Koochiching County" or "south of International Falls." Sometimes they use nearby natural features as reference points such as "just off Lake of the Woods" or "in the Big Fork River valley." Based on the soils, climate, water, and plants in this region, ecologists call this area the ***Agassiz Lowlands*** and ***Littlefork–Vermilion Uplands*** subsections. But before we get into current classifications, let's take a trip back in time.

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

Historic Land Cover and Current Land Use

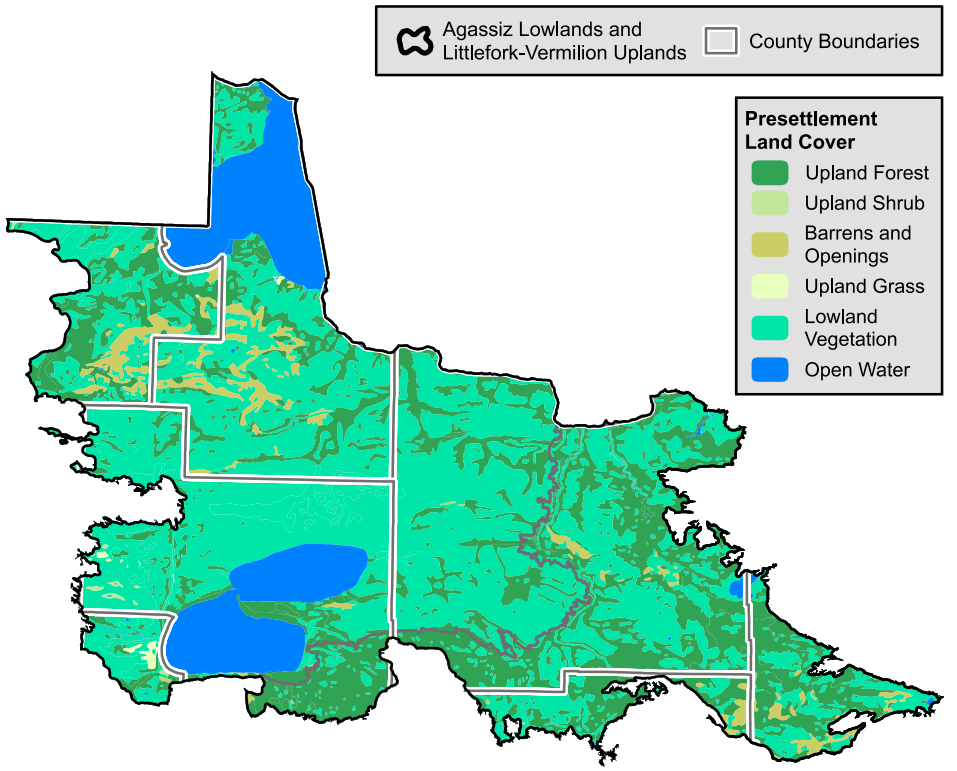
Agassiz Lowlands and Littlefork–Vermilion Uplands subsections are flat and poorly drained. About half of the area consists of clayey deposits from ***Glacial Lake Agassiz***. Primarily ***bogs***, swamps, ***fens***, and other peatland vegetation cover the lake deposits. On the eastern edge, the peatlands are acidic, deep, and old (more than 4,000 years) and support extensive areas of acid peatland communities such as black spruce bogs and poor swamp forests. At the western edge, the peatlands are richer in minerals, shallower, and younger (about 1,000 years). Tamarack swamps, rich fens, and other rich peatland communities tend to be common here. Some areas, especially on the eastern and southeastern borders, have uplands formed of glacial ***till*** that was eroded and flattened by wave action from Glacial Lake Agassiz. ***Mesic*** (between wet and dry) and wet forests of aspen, paper birch, spruce, balsam fir, white cedar, and black ash are typical in these areas. Uplands formed of sandy shoreline deposits that mark recessional stages of Glacial Lake Agassiz are present. These low, sandy uplands are less extensive than either the peatlands or glacial till deposits, and are characterized by fire-dependent forests of jack pine or red pine. Unique peatland plant communities harbor rare or unusual species, including orchids and carnivorous plants. The majority of the land is now classified as lowland conifer forest, upland deciduous forest, and aquatic environments (swamp and wetlands).

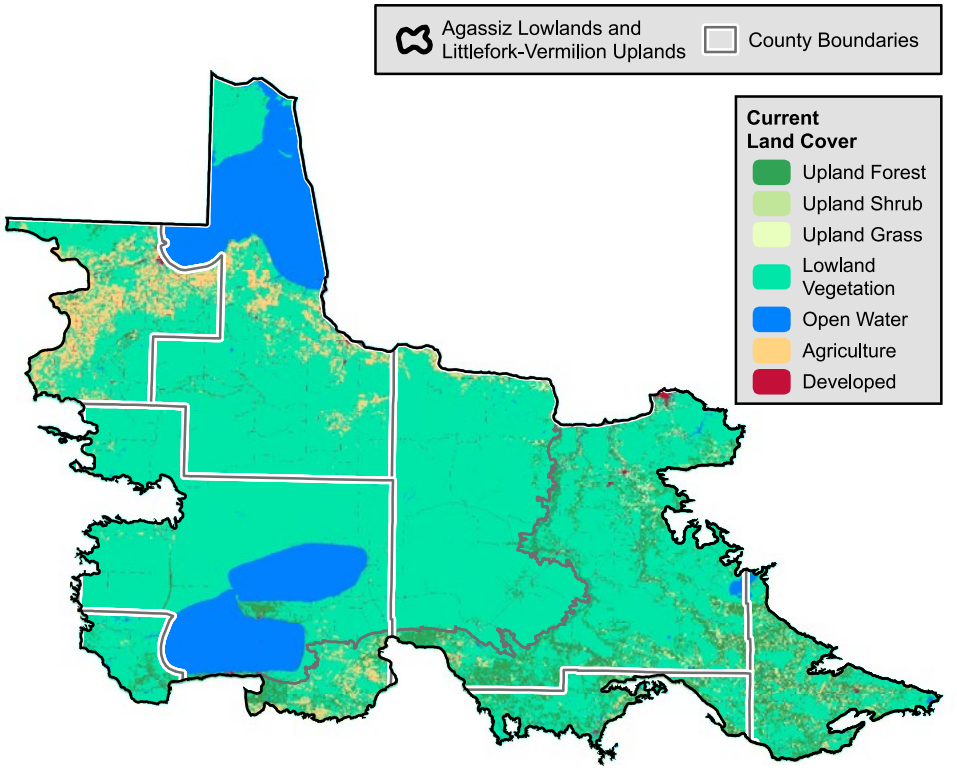
Before European settlement, the western half was mostly peatland consisting of sedge fen, black spruce-sphagnum bog, and white cedar-black ash swamp. The eastern half consisted of aspen-birch forest that would eventually become dominated by white pine, white spruce, and balsam fir. Fire occurred in the peatlands. Insect infestations, such as spruce budworm, probably lead to these fires. Water levels fluctuation, caused by short-term climatic changes and by beaver dams, probably contributed to tree mortality. Windthrow was common on poorly drained mineral soils.

This region receives 21 to 25 inches of precipitation each year, of which 40 to 50 percent fall during the 98- to 111-day growing season. Average annual snowfall varies from 60 to 75 inches.

The major land uses are forestry and recreation, including birding, hunting, and fishing. Black spruce, jack pine, and quaking aspen are the most common species used for making pulp and sawlogs. Large lakes, including Upper Red, Lower Red, and Lake of the Woods, are associated with recreation and tourism.

LAND COVER: PAST AND PRESENT



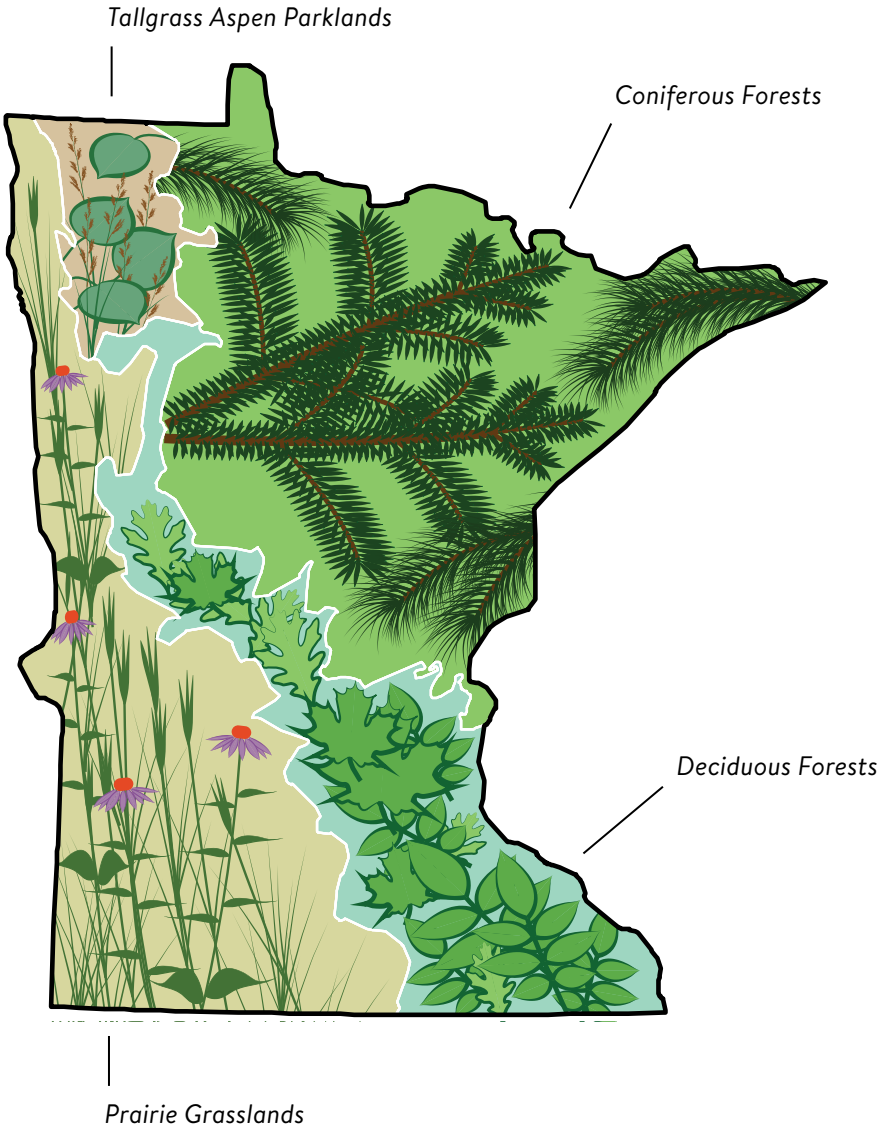


How We Classify Forests Today

Minnesota is located at a great North American transition zone. Here 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. Bluffs blanketed by deciduous trees 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 several systems in use today that define Minnesota's landscapes, this handbook refers to the ***Ecological Classification System***.

MINNESOTA BIOMES



Ecological Classification System

Ecologist created the Ecological Classification System (ECS) 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.

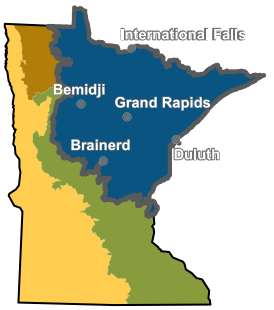
The levels of the ECS hierarchy are nested within each other, similar to townships within counties and counties within states. The highest of the four ECS levels used in Minnesota is ***province*** (level 1), followed by ***section*** (level 2), ***subsection*** (level 3), and ***land-type association*** (level 4). Note that these ecological boundaries extend across state lines. For instance, 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: Agassiz Lowlands and Littlefork–Vermilion Uplands.

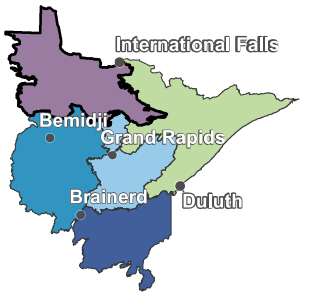
A map listing all 26 subsections within Minnesota can be found on page 87.

ECOLOGICAL CLASSIFICATION SYSTEM HIERARCHY

Level 1: Minnesota Provinces



Level 2: Sections in the Laurentian Mixed Forest



Level 3: Agassiz Lowlands and Littlefork–Vermilion Uplands Subsections

Level 4: Land-Type Associations in the Agassiz Lowlands and Littlefork–Vermilion Uplands Subsections

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 describe patterns on the landscape more precisely.

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, trees and plants growing along a river may vary widely 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 changing under the influence of time between disturbances and other factors. The trees and other plants that emerge 20 years after a fire or windstorm will differ from those growing in the same area hundreds of years later. While these ecological subsections (Agassiz Lowlands and Littlefork–Vermilion Uplands) contain many similar communities, there is variation as you move from north to south or east to west within the region.

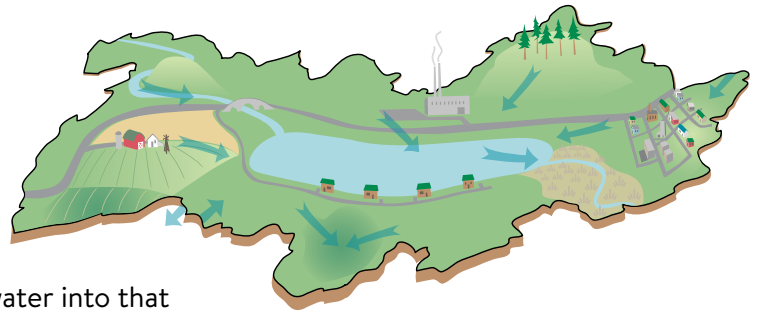
The names of forested native plant communities reflect their general location within the state (northern, central, or southern), the moisture or nutrient content of their soils (wet, dry, rich, poor), and the dominant trees that make up the ***canopy***. Examples of forested communities that you might find in northern Minnesota include Poor Black Spruce Swamp, Northern Mesic Mixed Forest, or Northern Rich Tamarack Swamp. The DNR considers 5 out of 30 forested communities found in northern Minnesota to be "imperiled," meaning they are rare or threatened within Minnesota. It is especially important to protect these imperiled communities from conversion to other land uses. Several local types of forested native plant communities are highlighted in Chapter 5.

Photo credit: Richard Gardner, Bugwood.org

Know Your Plants

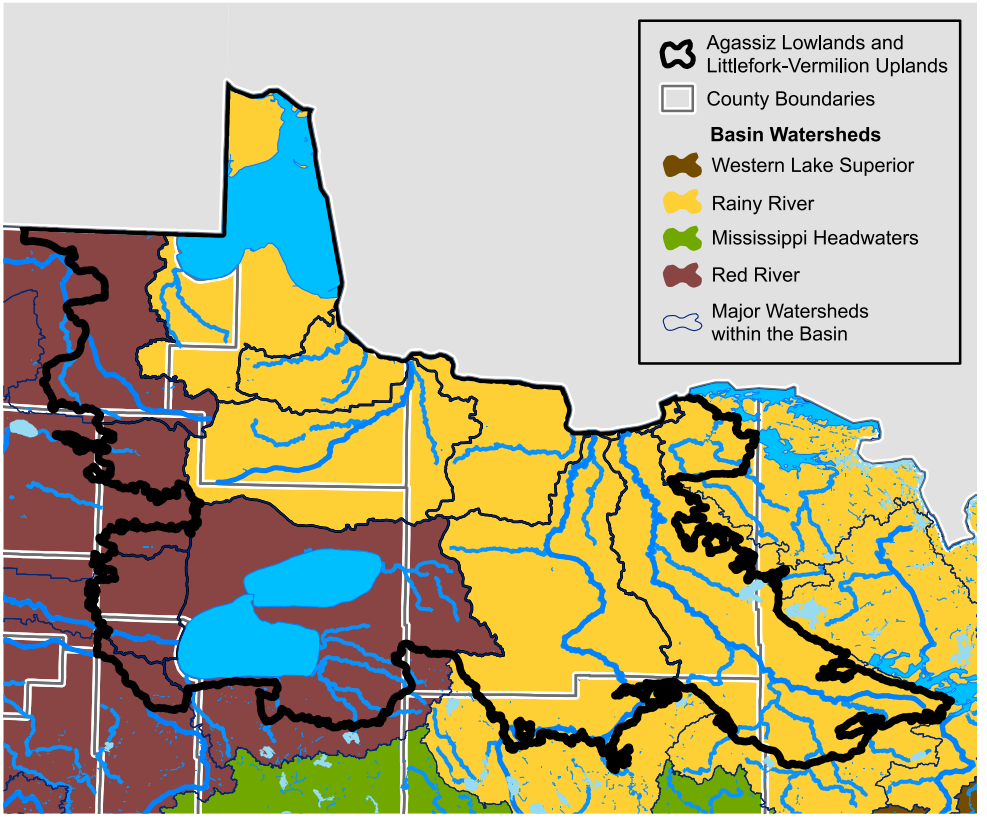
Knowing the native plant communities on your property can help you better understand your land's potential. For example, the presence of certain plants growing on the ground can reveal clues about the soil and climate. This can help you plan which tree species are best suited for your woods, predict where you might find nontimber forest products (such as leeks, balsam boughs, and maples to tap), and which wildlife species might be present. To learn more, visit **mndnr.gov/woodlands**

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. The Rainy River and Red River are the major watersheds in this region. Depending on your land's exact location, your actions can affect the quality of water that will flow into the Hudson Bay or Lake Winnipeg in Canada. To learn more, visit **mndnr.gov/woodlands**

WATERSHEDS IN AGASSIZ LOWLANDS AND LITTLEFORK–VERMILION UPLANDS SUBSECTIONS



LeConte's sparrow is a species of birds found in fens.
Photo credit: John Dykstra

Challenges in the North Woods

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

Habitat Loss

Northern Minnesota is home to a multitude of wildlife species, including some that are rare, declining, or threatened. The DNR refers to these as ***species in greatest conservation need***. About 350 species are given this classification in Minnesota. Examples from the Agassiz Lowlands and Littlefork–Vermilion Uplands include Canada lynx, northern bog lemmings, spruce grouse, short-eared owls, sharp-tailed grouse, black-backed woodpeckers, yellow rails, boreal owls, boreal chickadees, Connecticut warbler, red-necked grebes, bog coppers, and lake sturgeon.

The greatest threat to these species is ***habitat*** loss or degradation, which affects about 86 percent of the species of greatest conservation need within the two subsections. One cause of habitat degradation is the lasting impact of the extensive ditch networks that early European settlers built in an effort to drain the region's bogs for agriculture. This effort largely failed to make the area suitable for agriculture, but did impact the flow of water in some of the sensitive habitats these species depend.

HABITAT SPOTLIGHT

Brushland

Brushlands in your region provide critical habitat for wildlife dependent on open landscapes. These habitats consist of herbaceous vegetation with scattered clumps of shrubs and trees, and include old fields, sedge meadows, swamps, bogs, and upland shrubs. These brushland habitats are threatened by ***fragmentation***, drainage, succession into forests, and conversion to cropland and tree plantations. As they decline in quantity and quality, so do the wildlife populations that inhabit them such as northern harrier, short-eared owls, yellow rails, loggerhead shrikes, golden-winged warblers, and moose. Brushlands are also home to an especially charismatic, native bird—the sharp-tailed grouse. 'Sharptails' have experienced a long-term population decline and have been designated a species in greatest conservation need due to the threat of habitat loss and degradation. Each spring, males gather on dancing grounds called 'leks' to display and attract females, which then nest in the surrounding brushland habitats. Leks are very open and free of woody vegetation, and used each year unless they or the surrounding nesting and brood-rearing habitat becomes unsuitable. To maintain, enhance, and connect the open character of brushlands, management techniques include prescribed burning, tree removal, mowing, shearing, biomass harvest, and forest management that uses shorter harvest rotation ages. Contact an Area Wildlife Office to reserve a sharptail lek viewing blind where you can observe the mating dance on a crisp spring morning. It is an unforgettable experience!

Keeping forests on the landscape is one of the best ways to protect drinking water.

Declining Water Quality

Nearly 1,220,000 acres of lakes and rivers cover the Agassiz Lowlands and Littlefork–Vermilion Uplands. These waters support important fishing and tourism industries and form a vital migratory corridor for birds traveling between their nesting and wintering grounds. Despite the economic, social, and ecological importance of these waterbodies, many 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 non-functioning septic tanks or lawns bordering lakes, which can contribute pollutants through erosion or lawn chemical runoff. 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. Pollutants in the runoff from all of these sources eventually collect in water bodies throughout the region, which harm fish and other wildlife, degrades drinking water, and damages recreational opportunities.

Acting like natural water filters, forests play important roles in keeping water clean. Trees and leaves slow the movement of rain to the ground. When water moves more slowly, it picks up less sediment when it hits the soil. Additionally, forest soils contain large pore spaces that trap sediment and pollutants. As a result, rainwater that leaves a forest to recharge groundwater or flows into lakes and rivers is clean, especially for this region's cold-water lakes and streams. Keeping forests on the landscape is one of the best ways to protect drinking water. Forests along shorelines are particularly important, as they serve as the last barrier to filter contaminated runoff before it reaches a lake.

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 living and growing in Minnesota's woods that do not belong here, and they can cause some pretty big problems. These harmful plants, insects, 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 crabapples, 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:

- 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 their populations in check.

Many plants that are now invasive were originally brought to the United States to be sold as ornamental shrubs and flowers. Other invasive insects, animals, and fungal diseases were introduced accidentally through international trade or brought here purposely for various commercial or ecological reasons. Once an invasive species becomes established, they can spread by natural methods such as by birds or the wind. However, the way invasive species travel the farthest is through humans transporting them unknowingly.

As a landowner, you can do a lot to help manage invasive species on your land. Check the Minnesota DNR website for a current list of invasive species and how to identify them. Tips for controlling invasive species can be found in Chapter 5.

Buckthorn can quickly invade a forest and replace native plants.

INTRUDER ALERT!

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

Wild Parsnip
Wild parsnip is a shade-intolerant invasive plant introduced to the U.S. from Eurasia as a root vegetable. It escaped cultivation to become a problematic invasive plant that degrades wet and dry habitats throughout Minnesota. This short-lived perennial spends one or more years as a low-growing rosette before producing a 4-foot-tall stalk with clusters of yellow flowers when conditions are favorable. The plant dies after flowering but its numerous seeds remain viable in the soil for four years.

Wild parsnip is listed on Minnesota's Noxious Plant Control List, meaning sale of the plant is illegal and efforts must be made to prevent the reproduction and spread. Care should be taken with wild parsnip because skin contact with the sap in the presence of sunlight can cause severe rashes and blistering. Wild parsnip takes time to establish in new areas, but once the seed bank is built up, it spreads rapidly and is difficult to control. The best way to control wild parsnip is early detection and eradication before the seed bank can build. Plants are successfully controlled by cutting just below ground level with a sharp shovel before seeds set and removing the cut plant. Small plants can be carefully hand pulled, but wear gloves and long sleeves. Targeted herbicide application can be effective, but several years of treatment may be needed until the seedbank is exhausted.

Photo credit: Jerald E. Dewey, USDA Forest Service, Bugwood.org

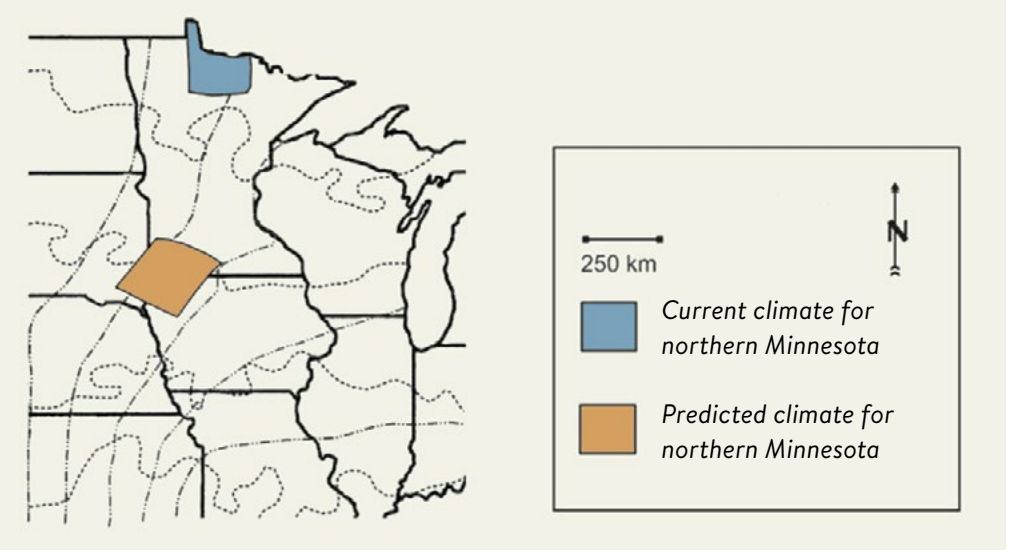
Larch Casebearer
Larch casebearer is a non-native moth whose larvae feed on tamarack needles, causing significant defoliation. This invasive species reached the Lake States in the 1950s after being introduced to Massachusetts on nursery stock from Europe in the late 1800s. Tamarack can withstand repeated defoliation because it is capable of producing two crops of needles during a single growing season and sheds them each fall. After several years of severe defoliation, however, tree growth is greatly reduced and the stressed trees are more susceptible to other insects and diseases. The combination of these stressors can lead to tree death, often first noticed in young tamarack growing in openings or along forest edges, which the insect favors.

Prolonged cold, wet springs with frosts after the larvae have come out of hibernation can cause considerable mortality. Several native Minnesota species attack it. However, these natural controls are not usually able to prevent outbreaks alone. In the 1960s, an imported parasitic wasps limited outbreaks and kept casebearer populations at tolerable levels. Today, defoliation is on the rise, suggesting ***biological control*** measures are failing.

A Changing Climate

Climate scientists predict that as global temperature continues to increase, it will significantly affect Minnesota's climate within the next several decades. Minnesota will experience warmer year-round temperatures—with winter warming faster than other seasons—and changes to rainfall patterns, with more precipitation in the form of big downpours. In fact, northern Minnesota is already experiencing these changes. Historical climate records show that average low winter temperatures have increased by almost 8 degrees Fahrenheit since 1895, making it one of the fastest winter-warming areas of both Minnesota and the lower 48 states. Annual precipitation has increased in this region by an average of 1.5 inches over the course of the historical record—which is approximately a 6 percent increase.

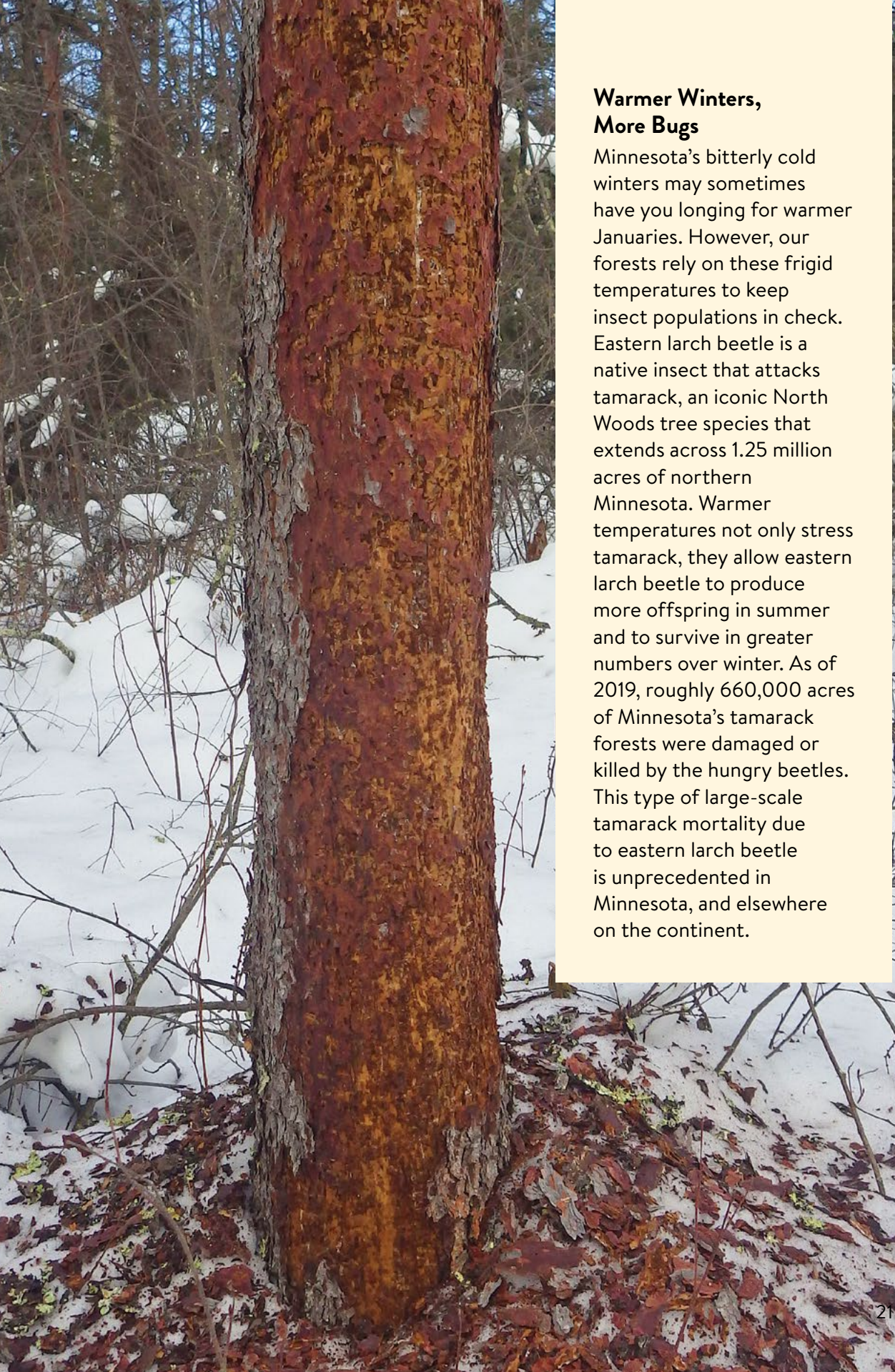
FUTURE CLIMATE PREDICTION



Source: S. Galatowitsch et al. / Biological Conservation 142 (2009) 2012-2022

When selecting trees for your woods, consider the future climate. By 2060, it is predicated that the climate of northern Minnesota will most resemble that of present-day southwest Minnesota and northwest Iowa.

The variety of ecosystems we see in Minnesota—grassland, deciduous forest, coniferous forest—developed over centuries as a result of the differences in temperature and precipitation from north to south or east to west within the state. However, even small shifts in average temperature and precipitation, in a relatively short time, could cause big changes to the type and health of forests you are used to seeing. Models predict that balsam fir, balsam poplar, black spruce, paper birch, quaking aspen, tamarack, and white spruce are likely to decrease in abundance in your area. Trees likely to increase in abundance include American basswood, black cherry, eastern white pine, northern pin oak, red maple, sugar maple, and white oak.



Warmer Winters, More Bugs

Minnesota's bitterly cold winters may sometimes have you longing for warmer Januaries. However, 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 1.25 million acres of northern Minnesota. Warmer temperatures not only stress tamarack, they allow eastern larch beetle to produce more offspring in summer and to survive in greater numbers over winter. As of 2019, roughly 660,000 acres of Minnesota's tamarack forests were damaged or killed by the hungry beetles. This type of large-scale tamarack mortality due to eastern larch beetle is unprecedented in Minnesota, and elsewhere on the continent.

Damage caused by larger, ongoing outbreaks of eastern larch beetle.
Photo credit: Fraser McKee

More wildfires and runoff. Changing rainfall patterns and warmer summer temperatures may create more frequent wildfire-inducing conditions. Increases in the size and intensity of rain events could lead to more erosion, disease, and tipped-over trees.

Warmer winters kill fewer pests. As native trees struggle to adapt or migrate in response to the changing local climate, invasive and native species that thrive in the changed conditions may gain further ground. Trees in flood-prone areas are more susceptible to insects and diseases, which may increase in abundance if warmer conditions allow forest pests to survive through the winter.

Help your woods adapt to climate change. While all of this may sound daunting, understanding how climate change may affect your woods can help you proactively choose tree species and strategies best suited to the future landscape.

1. Carefully monitor changes in your woods and look for new species that may be invasive so you can catch problems early.
2. Maintain diversity in the native species and ages of your trees to help your woods adapt to change.
3. Occasionally thin your trees to decrease competition and increase vigor of the remaining trees.
4. Encourage trees and plants that will do well in future predicted climate conditions. This will help your woods compete with potential invaders and keep healthy forests on the landscape.
5. Help your woods regrow more quickly after a natural disturbance or harvest by planting or seeding any tree species that cannot sprout from their roots.

When you and other landowners take these actions, you help set the stage for healthy, productive, and resilient forests in the face of a changing climate.

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) have 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, where private landowners test strategies to determine best options to help people and forests adapt to change. Learn more about these projects at **mndnr.gov/woodlands**

Chapter 2: Why Your Woods Matter

Privately owned woodlands are an important source of wood and all the products made with trees. Your woods may also be a great source of berries, nuts, mushrooms, maple syrup, and sawlogs. Or you may value your woods as a place to hunt, watch wildlife, or find serenity.

In this chapter, start thinking about specific goals and what you want 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 we depend on. Wood and pulp are often the most important products we get from forests and we use them to make books, buildings, newspapers, toilet tissue, and many other products. Private woodlands are an important source of wood in Minnesota. Harvest levels vary from year to year, but in 2016 an estimated 35 percent of all timber harvested in Minnesota came from private family owned woodlands.

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

Advancements in technology are expanding the number of ways we can use wood. Sappi Mill in Cloquet has modernized its wood pulp process so it can switch production between Kraft paper pulp and dissolvable wood pulp that is used to make clothing, textiles, and cellophane. Aspen, a common tree species in your region, is the main pulp-producing tree.

Some businesses, municipalities, and schools in Minnesota burn ***biomass*** to produce local, renewable energy. For example, Minnesota Power in Duluth creates steam and electricity for the nearby paper mill and electricity using wood, tops, and limbs left over from traditional timber harvests and mill byproducts such as small wood residue. The innovative ways Minnesota entrepreneurs can use this renewable wood resource is incredibly diverse and continually evolving.

Wood: A Local Industry

Forest-based industries are important contributors to far northern Minnesota's economy. These businesses provide more than 4,100 local jobs in logging, forest consulting, and a variety of wood product manufacturing industries. One major manufacturing employer that relies heavily on Minnesota wood is the Boise Paper mill, a division of Packaging Corporation of America. This mill has been operating on the banks of the Rainy River in International Falls since 1908 and currently employs approximately 580 local people, making it the largest employer in Koochiching County. The company purchases more than 600,000 cords of a variety of tree species, including aspen, birch, spruce, pine, and fir logs from public and private land each year to produce printing paper and other office products. 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 on your land may ultimately be converted into the wood-based products we use every day—all while supporting local jobs.

Nonwood Products

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, raspberries, juneberries, gooseberries, and chokecherries, just to name a few. Wild hazelnuts are a fall favorite of wildlife and people too, and they can be roasted and eaten like commercial filberts. As winter fades and the tree sap begins to flow, maples can be tapped for making sweet, sticky maple syrup.

Bogs store more carbon than most other forest ecosystems.

Forest Ecosystem Services

Forests provide a great many ***ecosystem services*** we often take for granted such as clean air and water, healthy soils, erosion control, and wildlife habitat. Forests also help control weather patterns by regulating temperatures 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. As excess carbon dioxide builds in the atmosphere as a result of human activities and global temperature increase, maintaining healthy, young forests helps store more carbon in wood and soils, slowing the effects of climate change.

These “free” ecosystem services cannot be replaced without a lot of expensive infrastructure. Economists are working on ways to estimate the economic worth of the carbon stored in forests. Creating and growing markets for less tangible forest benefits might be an important step toward managing forests in the future.

Support for working forests helps keep them from being converted to other land use so they can provide environmental services and maintain habitats for wildlife and plants. They also provide renewable wood for products.

Jennifer Feist and Alan Presley—Gheen, Minn.

LITTLEFORK–VERMILION UPLANDS

"We call it 'choffee'," Alan says with a grin, cradling the warm mug of coffee brewed with chaga mushroom, a fungus that grows on mature birch trees. "It might be the next big thing at Starbucks," Jennifer adds wryly. At -24 degrees Fahrenheit in Gheen, Minnesota, it's a good morning for choffee.

Chaga is a slow-growing, parasitic fungus with a woody, charcoal-like appearance. Over a period of several years, the fungus absorbs nutrients from its host, eventually killing the birch tree. "It just sucks all the life out of a good tree," Alan says. Bad news for the birch, but good news for chaga harvesters. According to Jennifer and Alan, in some cultures chaga is believed to be a good source of antioxidants and other beneficial plant nutrients, which has lent the mushroom its popularity as a traditional remedy for various ailments. "We drink it just because it's supposed to be good for you and it's right here in our woods."

Jennifer and Alan seek out the mushrooms on older birch trees in moist areas of their woods, where the birch is mixed with balsam fir and white cedar. “You probably find it the best where it transitions from swamp into upland, right at that edge for about 100 yards seems to be the best picking for it,” Alan notes. They use a hammer and chisel to cleanly cleave the dark, dense growth away from the birch tree. “You’ll have to take a ladder in the woods with you,” Jennifer cautions, noting the mushrooms often grow out of reach, high upon the trunk. Once harvested, the mushroom can be air-dried and broken into smaller pieces for use. Some people grind the mushroom into a course powder, but Jennifer and Alan just steep a chunk in their coffee pot every morning. They have also prepared the chaga plain, as a tea. “Take a ping-pong ball-sized piece, put it in a pan of water on the stove, bring it to boil, shut it off, and put the lid on. Wait 15 minutes,” Jennifer says. “It’s really good with maple sap in it.” She adds that she once tried to use homemade birch syrup—a thin syrup with a heavy molasses flavor—to sweeten her chaga tea. “It just tasted more like birch,” she laughs.

Jennifer and Alan mostly use their harvested chaga themselves, or share it with neighbors they feel might need it. However, they have sold a little at their local farmer’s market, where the woody grounds can fetch around $40 per pound. “Some people look at you like you’re a witch doctor,” Alan chuckles, “and that’s okay.” The Food and Drug Administration recognizes chaga as a food, so Jennifer and Alan figure their ‘choffee’ habit can’t hurt. “It’s here and it’s free, and so why not?” says Jennifer. “I mean, some people buy supplements. We just get ours from the woods.”

Part 1 Vocabulary

Agassiz Lowlands
A ***subsection*** of the ***Ecological Classification System*** consisting of a large, very flat, poorly drained area that is mostly peatland, including forested peatland dominated by black spruce and tamarack and ***fens*** dominated by sedges. The sandy uplands ridges are dominated by aspen-birch and jack pine.

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

Biomass
Living and recently dead plant and woody material that can be used as fuel or for industrial production.

Bogs
Develop where peat builds up over time and the peat surface becomes elevated, isolating it from mineral-rich runoff or groundwater. All nutrients come solely from precipitation and wind-blown dust. Surface water is very acidic.

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.

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
A community of organisms and their environment that functions as an ecological unit.

Ecosystem service
The benefits that people obtain from ***ecosystems***. Ecosystem services include soil formation, nutrient cycling, decomposition of wastes, regulating climate, purifying air and water, and recreational experiences, among many others.

Fen
A type of peat vegetation with groundwater that percolates through mineral soil, flowing continuously at or near the surface and in contact with plant roots. They have a higher mineral concentration and are less acidic than ***bogs***.

Fragmentation
The splitting or isolating of ***patches*** of similar habitat.

Glacial Lake Agassiz
A large glacial lake which once covered central North America that was fed by glacial meltwater at the end of the last glacial period.

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.

Landscape
All land uses (such as forests, agriculture, urban) and ownerships (public, private, tribal) within a defined area. Landscapes typically cover thousands or millions of acres.

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

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. Covers 23 million acres of the northeastern part of Minnesota.

Littlefork–Vermilion Uplands
A ***subsection*** of the ***Ecological Classification System*** consisting of level to gently rolling topography throughout, with many meandering rivers and streams. Before European settlement, much of the areas was forested by aspen-birch, with lowlands occupied by sedge ***fens***, black spruce-sphagnum ***bogs***, and white cedar-black ash swamps.

Mesic
An environment or habitat that contains a moderate or well-balanced amount of moisture. Moisture does not limit plant growth during the growing season and soils are not saturated except following rain or spring snowmelt.

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, which 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.

Province
The largest units of land within the ***Ecological Classification System***. Provinces are defined by major climate zones, native vegetation, and biomes such as prairies, deciduous forests, or boreal forests. Minnesota has four provinces.

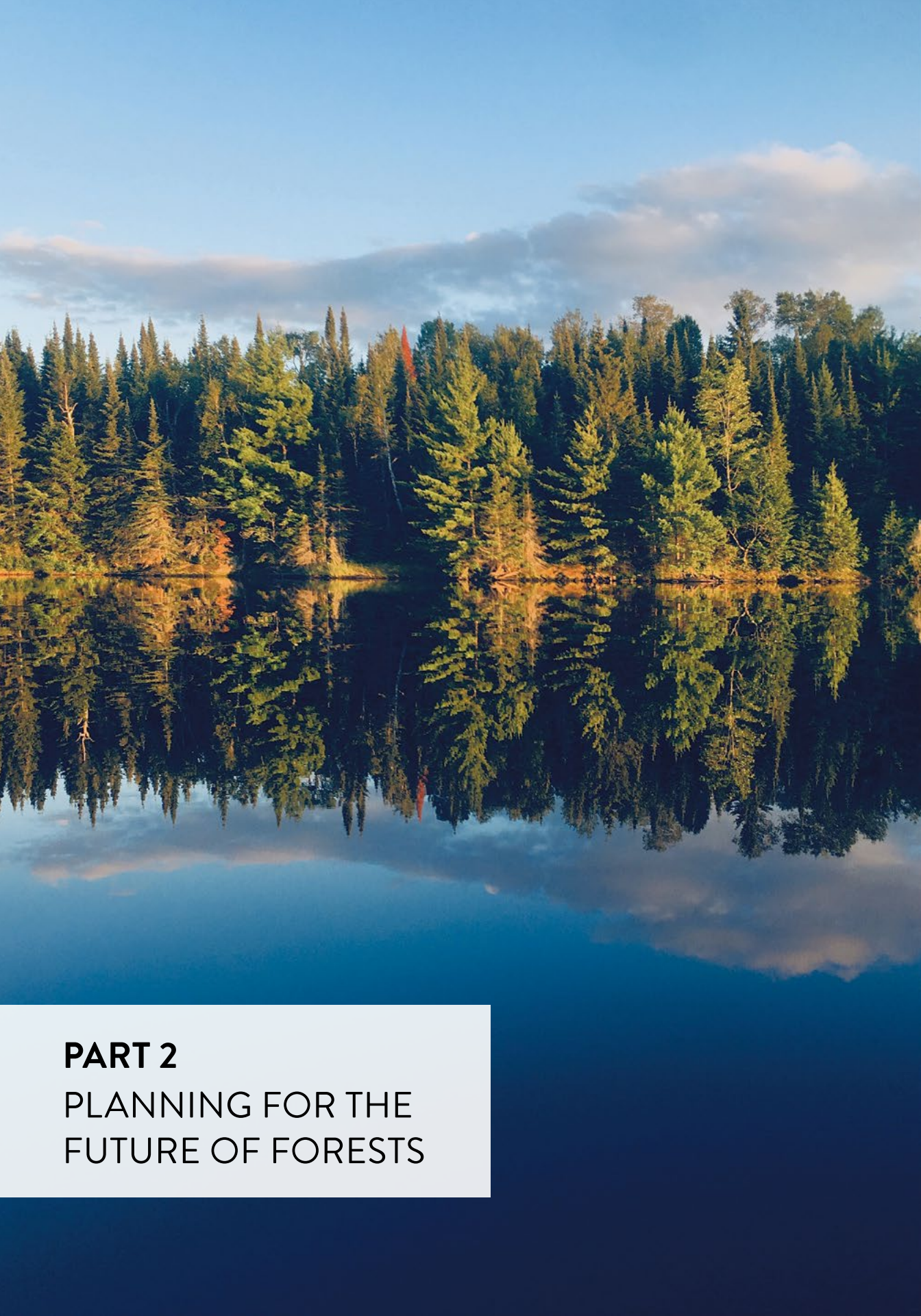
Section
Units within the ***Ecological Classification System provinces*** that are defined by origin of glacial deposits, regional elevation, distribution of plants, and regional climate. Minnesota has 10 sections, five of which are within the ***Laurentian Mixed Forest Province***.

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 the ***Ecological Classification System 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***.

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

Watershed
An area containing all the land and water features that drain excess surface water to a specific location on the landscape such as a river or lakes.



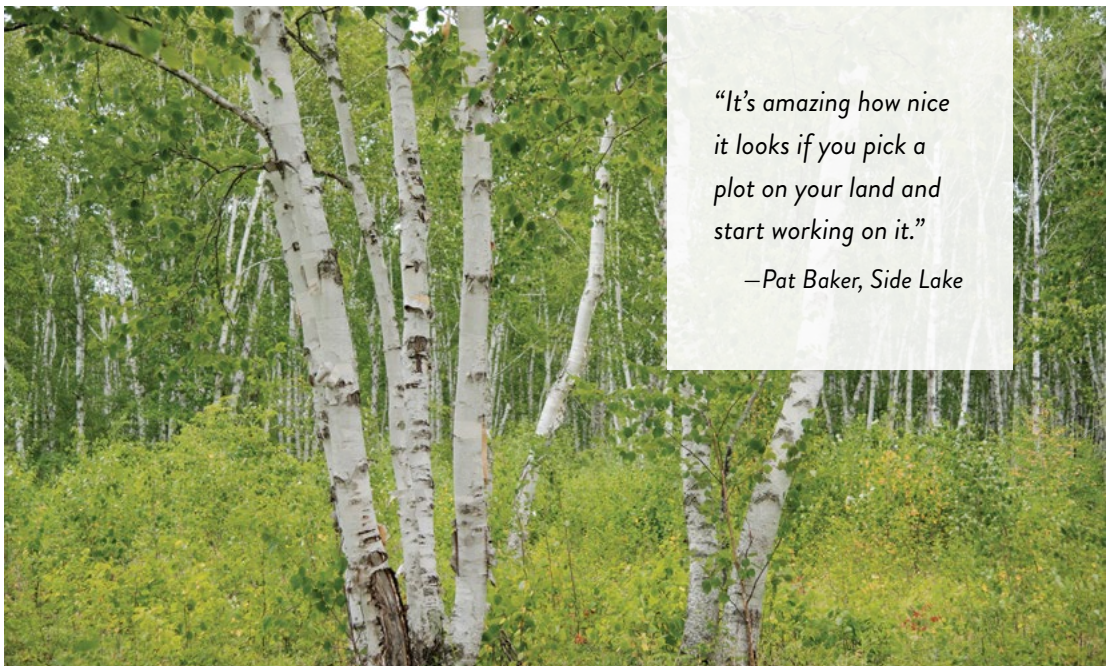
PART 2
PLANNING FOR THE FUTURE OF FORESTS

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 woods.

Private landowners like you own about 32 percent of the forested land in the Agassiz Lowlands and Littlefork–Vermilion Uplands. 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 in itself a decision that impacts the forest landscape. However, 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. As a woodland owner, you can restore some of the natural balance through ***woodland management***—actively shaping and directing your woods to keep them healthy, productive, and resilient.



"It's amazing how nice it looks if you pick a plot on your land and start working on it."

—Pat Baker, Side Lake

Managing Your Woods

Taking care of your woods often requires a plan. This handbook guides you through the steps:

- Setting goals
- Choosing a management theme
- Selecting strategies
- Working with a professional forester to develop a personalized Woodland Stewardship Plan
- Choosing work projects, depending on tools and budget

The Big Picture—Thinking From a Landscape Perspective

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

- 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 tie your goals with landscape features found beyond your property lines.

"I want to make sure there's openings for the deer. And I want to make sure I always maintain our trail system."

—Pat Baker, Side Lake

Goals for the Landscape

Before determining goals for your woodlands, it's a good idea to understand the landscape management goals shared by natural resource professionals, land managers, and local community members. Collectively this group is known as the Minnesota Forest Resources Council. More information about the MFRC is in Chapter 7.

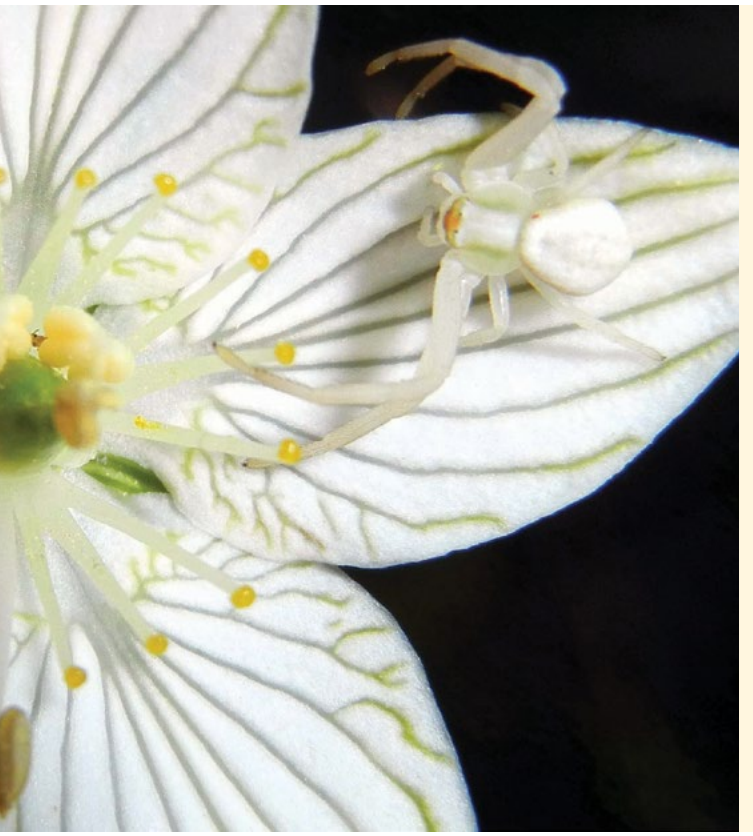
The MFRC developed goals for northern Minnesota that includes the Agassiz Lowlands and Littlefork–Vermilion Uplands through large-scale forest planning efforts. These goals show a long-term vision of what future forests in this area could look like while providing for wildlife, the local economy, and society.

- **Manage forests using the Ecological Classification System.** Natural resource managers and private landowners will manage their forests using ecological classification system concepts to determine site suitability for trees and potential forest management opportunities.
- **Sustainable use of natural resources.** Understanding the unique nature of the landscape ensures the appropriate tree species occupy sites to promote ecological sustainability.
- **Use natural processes and disturbance in planning.** Forests management practices that incorporate natural processes and disturbances will be healthier by mimicking nature.

- **Actively manage forests.** Forests that are actively and sustainably managed using site-level guidelines will maintain or increase timber harvest levels.
- **Enhance recreational opportunities.** Maintain or increase access to public lands and waters, and private lands open to the public, for sustainable multiple uses.

What Are Your Goals?

Your goals may include making a financial investment, improving the health of your woods, 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.



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. The results of this work have taught us a lot about the locations and abundance of Visit **mndnr.gov/mbs/index.html** to learn more.

Many woodland owners own land for wildlife habitat.

Setting Goals for Your Woodland Using the "Woods Workbook"

The workbook on pages 88-93 of this book and on **mndnr.gov/woodlands** is for you to 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 explore them. Perhaps you already do this regularly, but in case you are not familiar with what lies in your woods, you may have some questions. For example, which trees make up the canopy and what is 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 woods, consider why you own them. 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 that you enjoy for the solitude and visual beauty it provides. Or maybe your woods are 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 that you want from that land.

Choosing a Management Theme

Once you have identified your goals, develop a management theme to guide your strategies to achieve your goals. You may not be able to accomplish all your goals on one piece of woodland or all at once, but having a central theme can help you focus and prioritize your efforts. Here are four common themes that many woodland owners use to guide their decisions.

Theme 1: Wildlife Habitat

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, you can take steps to make your woods more friendly for wildlife.

Wildlife need four key features: food, water, shelter, and space.

Songbirds, wood ducks, foxes, and other species rely on nut- and fruit-bearing trees and shrubs such as dogwood, serviceberry, blueberry, northern bush honeysuckle, and chokecherry. Wildlife can generally find their own water sources, given suitable habitat.

To attract wildlife, some landowners create wildlife openings—clearings in the woods. Chapter 5 discusses how to create wildlife openings and choose vegetation.

Large-diameter trees with cavities and dead trees—or ***snags***—provide shelter for a variety of wildlife species. Brush piles, understory trees, and shrubs can provide protected areas for birds and small mammals. Maintaining large, connected woodland ***patches*** provides space and attracts wildlife that prefer forest interiors.

Maintaining wooded ***corridors*** between smaller patches of woods provides shelter for wildlife passing between them. Keeping woody debris in streams creates habitat for juvenile trout and provides refuge areas and deep pools for larger fish. Woody debris in lakes provides habitat for species such as ducks, turtles, aquatic insects, and fish. 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 you are clear about what kinds of wildlife you wish to attract before making any changes to your land.

Snag

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.

"On Sunday afternoon, we'll just go for a walk and look for animal tracks."

—Jennifer Feist, Gheen

Theme 2: Recreation

Perhaps you want to use your woods to hunt, hike, watch wildlife, snowmobile, or do some other form of recreation. If improving 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 thin your woods to improve the health and quality of the remaining trees. Removing invasive plants can make recreation more enjoyable while also improving forest health. Building trails creates accessibility. The design of your trails will depend on their purpose, who will use them, and your land's features. Your land's shape, size, slope, soil, 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. Chapter 5 provides more information on how to do this.

Learning to identify the trees and plants growing in your woodland is fun in any season. For links to field guides and to learn more, visit **mndnr.gov/woodlands**

PlayCleanGo

While important for recreation, trails also provide pathways for invasive species to damage 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**

Theme 3: Healthy Woods

Many woodland owners want healthy woods. Keeping your woods healthy may involve actively managing your woods to mimic natural disturbances such as wildfire and blowdowns and increasing the diversity of trees and plants.

Woodland stand improvement activities keep your woods healthy and resilient. Activities include:

- Removing invasive species, less desirable trees and shrubs, and dead and diseased trees.
- Thinning out overcrowded trees.
- Preventing the establishment of invasive species.
- Planting a diversity of tree species that are suitable for your site.
- Creating layers of vegetation in the canopy, understory, and forest floor.
- Keeping a mix of trees that are young-, middle-, and old-aged.

A professional forester can assess your woods, develop a plan to increase its health, and recommend trees to plant. Chapter 4 provides information on who to contact for advice on actively managing your woods.

Removing undesirable trees is one way to improve your woods.

Theme 4: Income

Your woods can provide economic returns for generations to come such as income earned from harvesting timber or leasing your woods for hunting. The condition of your woods, dominant tree species, and your goals determine the type of harvest to use. Foresters may prescribe clear-cuts with reserves of live and dead trees when full sunlight is needed to regrow trees such as red oak. Thinning is used to decrease competition for the trees you wish to keep and grow into the future.

"If you have a poplar woods that has reached maturity, and you cut it, it definitely brings in regeneration."

—Jennifer Feist, Gheen

To get the most revenue out of your woods, you may want to do ***timber stand improvement*** activities. Timber stand improvement helps your woods grow faster, become healthier, and allows you to harvest sooner and more frequently. Depending on your woods and your specific goals, these improvements may involve thinning out lower quality or overcrowded trees, removing diseased or dying trees, pruning trees, and protecting trees from damage. See Chapter 5.

Your woods may also provide forest products that have established markets such as spruce tops used to make holiday and winter decorations that are distributed worldwide. Because spruce grows on predominately peatland sites that are extremely susceptible to rutting and soil compaction, careful harvest techniques are necessary. 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 more examples.

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 private woods provide many public benefits, you can use public funds to help pay for some of the costs incurred from improving your woods. See Chapter 6.

Combination Approach: Multiple Benefits

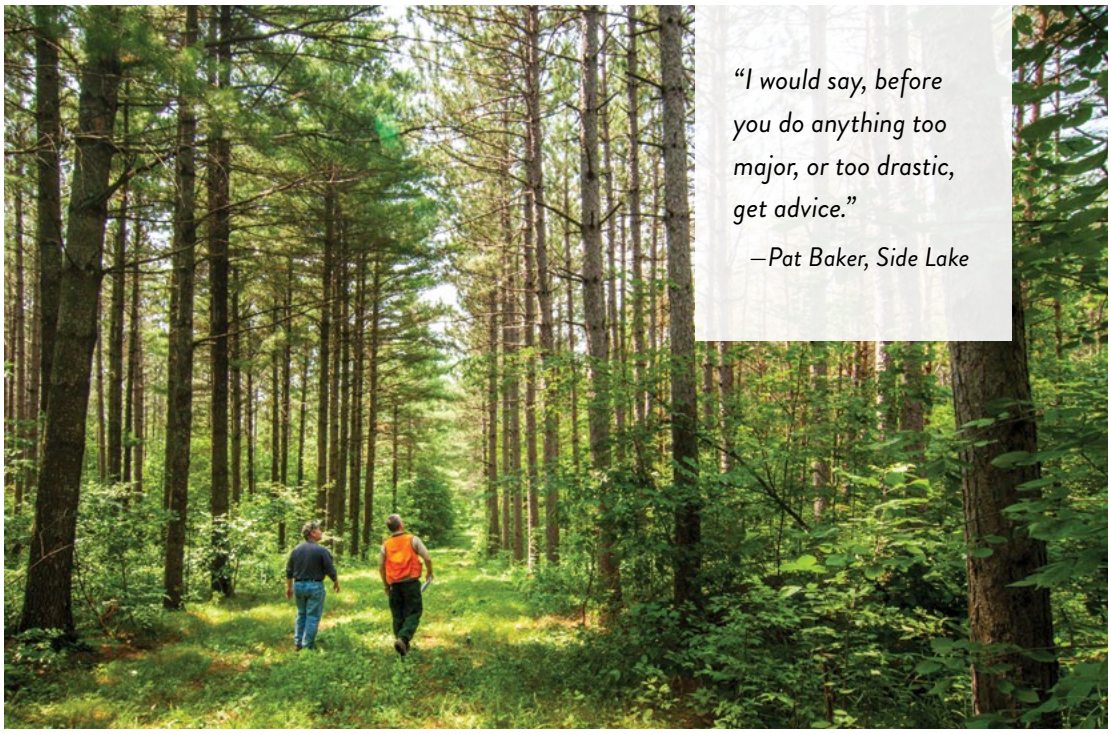
Management themes may overlap, and you want to incorporate elements of most or all of them into your approach. You might have different goals for different areas of your woods, or perhaps your goals do not fit into one of these categories. Examples might include planting a shelterbelt around your home or improving the water quality in your lakeshore. 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. Thinning woods that are within 100 feet of homes, barns, and garages can also help protect expensive structures from wildfire danger.

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. To learn more about rare plants and animals, trees to harvest, and property taxes, read Chapter 4.

Chapter 4: Choosing a Strategy

Chess players know that good strategy is key to winning the game. Like chess, managing your woods requires foresight. 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 woods, achieving those goals depends on your interests and available resources. Options 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.



"I would say, before you do anything too major, or too drastic, get advice."

—Pat Baker, Side Lake

Photo credit: Leslie Robertson/NASF

Attending a field tour is a great way to meet other landowners and get project ideas for your woods.

Who to Know: Key Players

Key players can help you reach your goals. Minnesota has many agencies and organizations that can help.

Join a group: These organizations provide print materials, online resources, classes, workshops, field days, and other professional advice. Additional groups to join are discussed in Chapter 7.

- **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. **extension.umn.edu/natural-resources/my-minnesota-woods**
- **Minnesota Forestry Association (MFA)**—MFA is an organization for private woodland owners that offers educational opportunities and other services. Their "Call Before You Cut" hotline directs woodland owners to free information before a harvest including lists of foresters, certified loggers, and a variety of other resources. **minnesotaforestry.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.

A woods walk with a forester is a good first woodland management step.

What to Do: Create Your Strategy

Based on your goals and theme, develop a strategy starting with these basic steps.

1. **Get advice.** Schedule a time for a professional forester to visit your property and walk through your woods with you. A forester will help you learn more about your woods' potential for wildlife management, timber harvest, and recreation, and identify invasive species, areas in need of thinning or restoration, and important natural features. This process can help you plan your strategy and choose specific projects you want to do in your woods.
   - **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 5 million acres of public forest land and assist Minnesota's private landowners with woodland decisions and projects. The DNR can also 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, locate your closest forester at **mndnr.gov/woodlands/cfm-map.html**
   - **Private Consulting Foresters**—Private, independent consulting foresters help woodland owners meet their goals by writing stewardship plans, developing project plans, setting up timber harvests, and much more. **mnacf.org**

- **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, at least one for each county. **maswcd.org**
- **Industry Foresters**—Employed by timber harvesting companies, they can set up a timber sale and write a stewardship plan.

2. **Have a management plan prepared.** The DNR's Forest Stewardship Program helps woodland owners finalize goals and prepare a professional, voluntary ***management plan*** for their woods. A management plan (also known as a ***Woodland Stewardship Plan***), 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. If you want something simpler, your forester can also create a brief or streamlined management plan using the ideas that you have recorded in your Woods Workbook.
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 get great exercise.

"Good communication is important. Ask the contractor what their goals are and impact it might have on your land, so that you're not surprised."

—Jennifer Feist, Gheen

Photo credit: Leslie Robertson/NASF

Photo credit: Leslie Robertson/NASF

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

- **Minnesota Logger Education Program (MLEP)**—MLEP educates loggers on sustainable forestry practices. MLEP-certified loggers meet Minnesota Master Logger standards, and may market timber from private lands as "certified wood." The organization also has a free, online directory of its trained member including a list of Minnesota Master Loggers. **mlep.org**
- **Minnesota Association of Consulting Foresters** (MACF) has a similar directory of trained professional foresters, along with descriptions of their experience and service areas. **mnacf.org**
- Your local DNR Forestry office also has lists of contractors for your surrounding area. **mndnr.gov/areas/forestry**
- You might consider asking your neighboring landowners if they've had woodland work done and what their experiences were like.

Part 2 covered some of the goals for the forested landscape of which your land is a 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 3 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.

Jennifer Feist and Alan Presley—Gheen, Minn.

LITTLEFORK–VERMILION UPLANDS

Jennifer and Alan aren't your average timber harvesters. While most woodland managers are in pursuit of the perfect log, Jennifer and Alan prefer the twisted, gnarled, knotty, and worm-eaten timbers. "Basically any wood that does not cooperate with commercial logging equipment," Jennifer says. "They want long and straight. And we want oddly shaped."

Jennifer and Alan make artisan furniture and other crafts from what is called 'character wood,' proving that one landowner's trash tree is another's treasure. They used to sell raw wood materials wholesale to log cabin builders, but after the economy changed following the Great Recession, they began to focus more on creating their own finished products. They harvest some wood

from their own 77 acres, as well as neighboring state and private lands, coming in after commercial logging operations to collect the undesired specimens that were left behind. A curved cedar trunk may become a beautiful mantelpiece or headboard for a bed. A split-topped jack pine (previously damaged by a gnawing porcupine, insects, or an ice storm) may turn into the pedestal for a table, while a large black ash burl (a rounded growth caused by damage or disease) can produce the table's uniquely-shaped top. The possibilities are endless. "You have to look at this stuff out in the woods and try to find the pieces you need in them," says Jennifer.

The couple harvest their own trees using a chainsaw and hauling equipment, though occasionally they have used their horse to pull logs. "She's kind of lazy though," Alan jokes. After harvest, they let the wood mature a bit before blasting the bark off with a pressure washer. Sometimes they get a little help from nature with the process, which adds character to the wood; Jennifer points to a shelf with worm-eaten tunnels delicately interlacing across the

surface. “That is cedar that sat with the bark on for maybe six months through the summer. If we keep our piles kind of low so that it’s more in the high humidity grass, then that encourages the bugs to work the bark loose.” Jennifer and Alan’s woodland management activities also provide materials for their business. They are currently managing a stand of large white cedar for future harvest, and the smaller trees they remove during the tree-thinning process are the perfect size for furniture legs or coat racks.

The couple say they have considered purposefully managing their trees for character wood. “If you look at what misshapes the trees naturally, you could do some of that on your own,” Jennifer says, giving examples such as clipping the tops of jack pine or tying the top of a young cedar to the ground to create a curve. However, they haven’t found this to be necessary. “We don’t get around to it because so much of it occurs naturally.” Jennifer and Alan’s approach to woodland management and harvest goes to show that a little creativity can go a long way toward making a living in the woods. “Everyone always says, ‘I’d love to live here but there’s no jobs.’ And it’s like, well do something then. Make your own job.”

Part 2 Vocabulary

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

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

Patch
Relatively homogeneous forest units that differ from surrounding habitat at an ***ecosystem*** scale.

Snag
A dead, decaying tree that provides habitat for wildlife.

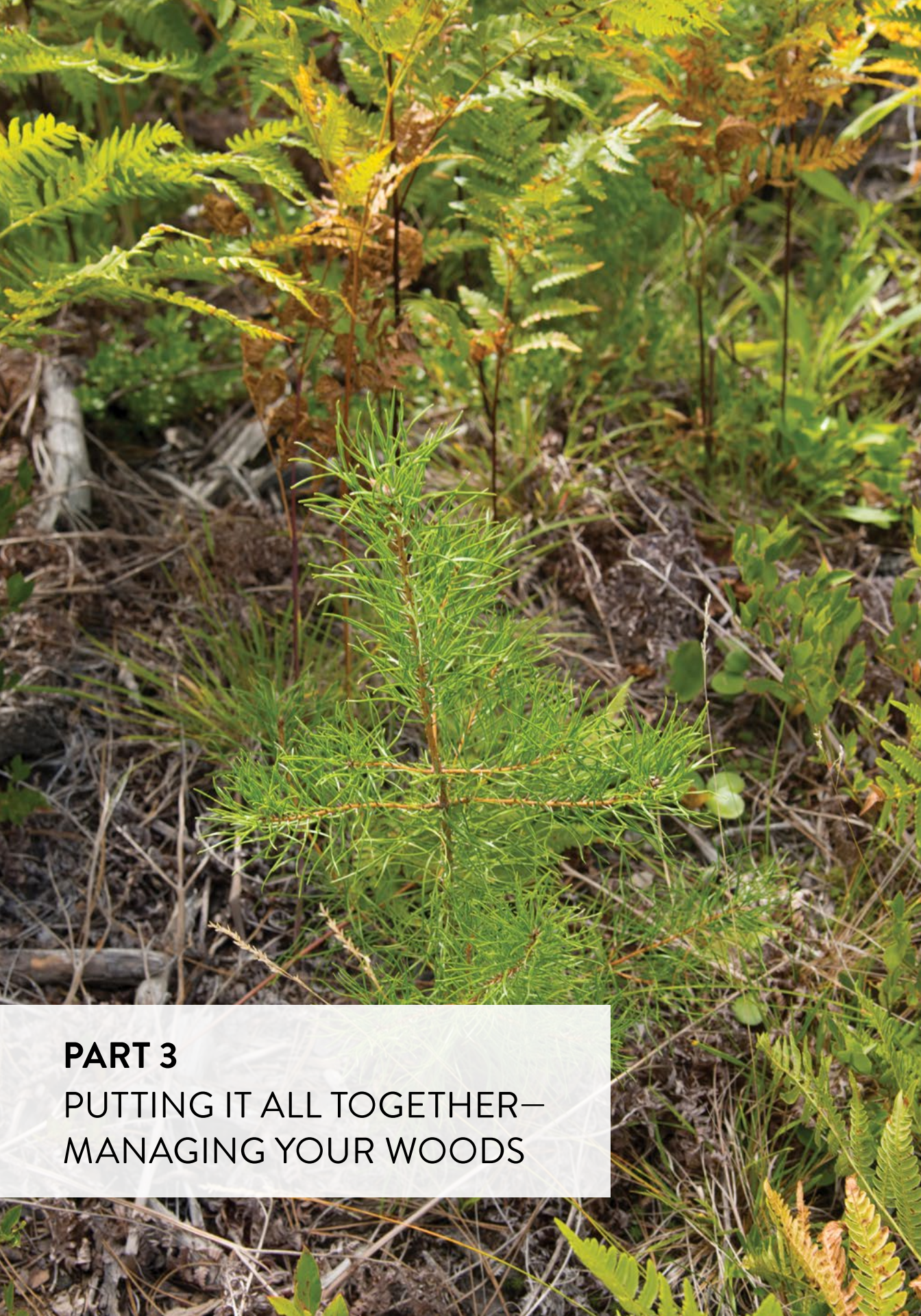
Timber stand improvement
A practice in which the quality of a forest stand is improved by removing less desirable trees, vines, and occasionally large shrubs so the best-quality trees have more room to grow. Also called "forest stand improvement" or "***woodland stand improvement***."

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

Woodland management
The process of caring for woodlands so they remain healthy and vigorous and provide the products and amenities desired by the landowner. Also called "forest management."

Woodland stand improvement
A practice where less desirable trees and shrubs are removed to increase health and encourage the growth of best-quality trees. Also called "forest stand improvement" and "***timber stand improvement***."

Woodland Stewardship Plan
A ***management plan*** written by a certified plan writer.



PART 3
PUTTING IT ALL TOGETHER—MANAGING YOUR WOODS

Chapter 5: Woodland Projects

By now you should have identified your goals, a theme, and a strategy for managing your woods. Begin executing those strategies with tools, a budget, and some defined work projects.

Tools

First, you need to prepare your toolbox. This involves more than just sharpening your chain saw!

Important tools include:

- Personalized woodland management plan written by a professional who has walked your land and discussed your goals with you.
- Aerial photographs of your property.
- Soils information.
- Mechanical equipment.
- Names and contact information of resource professionals or other landowners that can help.
- Project plan. Online project plans and planning tools, such as the American Forest Foundation's "My Land Plan," can also help.

As with any project, your most useful tool is knowledge. Visit **mndnr.gov/woodlands** for resources that can help.

Budget

Your budget 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 on pages 88-93.

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, chain saw chaps, insect repellent) and the right knowledge before trying any of these activities. Some organizations offer short courses on chain saw safety and herbicide application.

Choose 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 with the wildlife, recreation, healthy woods, income, and combination management 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 non-native grasses or crops, wildlife openings use native vegetation more suitable to meeting wildlife needs.

Wildlife openings are clearings in your woods—ranging from half an acre to 10 acres—that mimic the type of openings created by natural disturbances such as fire or wind. Disturbance is nature's way of renewing a forest, and many creatures depend on specific habitats created 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

Larger wildlife openings create better habitat for moose.
Photo credit: U.S. Fish and Wildlife Service

nesting season for birds (mid-May through early August). A natural resource professional can help you decide where to place the openings and best methods for creating them.

You do not need to remove all of the trees and shrubs in your opening. Wildlife can benefit from having a few nut- and fruit-bearing species, snags, fallen logs, and brush piles for shelter. Openings are typically irregular in shape, placed on a south- or southeast-facing slope to take advantage of the sun, and about three times as long as they are wide if small.

If your property is located within the range of moose, creating larger openings to encourage the growth of young trees and shrubs while maintaining young forests with brush or saplings provides both food and cover.

You may not need to clear new areas if you can improve existing openings by planting or regenerating native species. Pre-existing openings 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 unnecessarily fragmenting of your woods.

NATIVE PLANT COMMUNITY SPOTLIGHT

Northern Wet-Mesic Boreal Hardwood-Conifer Forest

The canopy of this common forest community is usually dominated by quaking aspen, often with paper birch and balsam fir and less frequently with white spruce, red maple, black ash, and basswood. Common ground-layer plants include Canada mayflower, wild sarsaparilla, sweet-scented bedstraw, dwarf raspberry, and large-leaved aster. The shrub-layer has variable cover and is frequently dominated by beaked hazelnut, but also often includes chokecherry, bush honeysuckle, juneberries, and mountain maple.

When in a younger stage, this native plant community is very attractive to grouse and moose due to the abundance of aspen. Cutting patches of mature aspen causes it to sprout from the roots, providing an abundance 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 implementing this strategy in the vicinity of your wildlife opening.

Option 2, Recreation Focus: Controlling Invasive Plants

Invasive species can be a big problem for forests when they displace native species. For example, shrubs such as buckthorn and honeysuckle can crowd the understory of your woods or proliferate along your trails, making recreational access difficult. Prevention is the first and least costly step to combat any plant, insect, or fungi you don't want.

Here are some steps you can take:

- Identify invasive species or signs of their presence for harder to find species such as insects.
- Avoid spreading seeds, insects, and microbes found in wood or soil to new areas by cleaning boots, tires, pets, and equipment after being in the woods. **PlayCleanGo.org**
- 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 for new invasive species.
- Detect outbreaks of invasive species early and eradicate quickly.

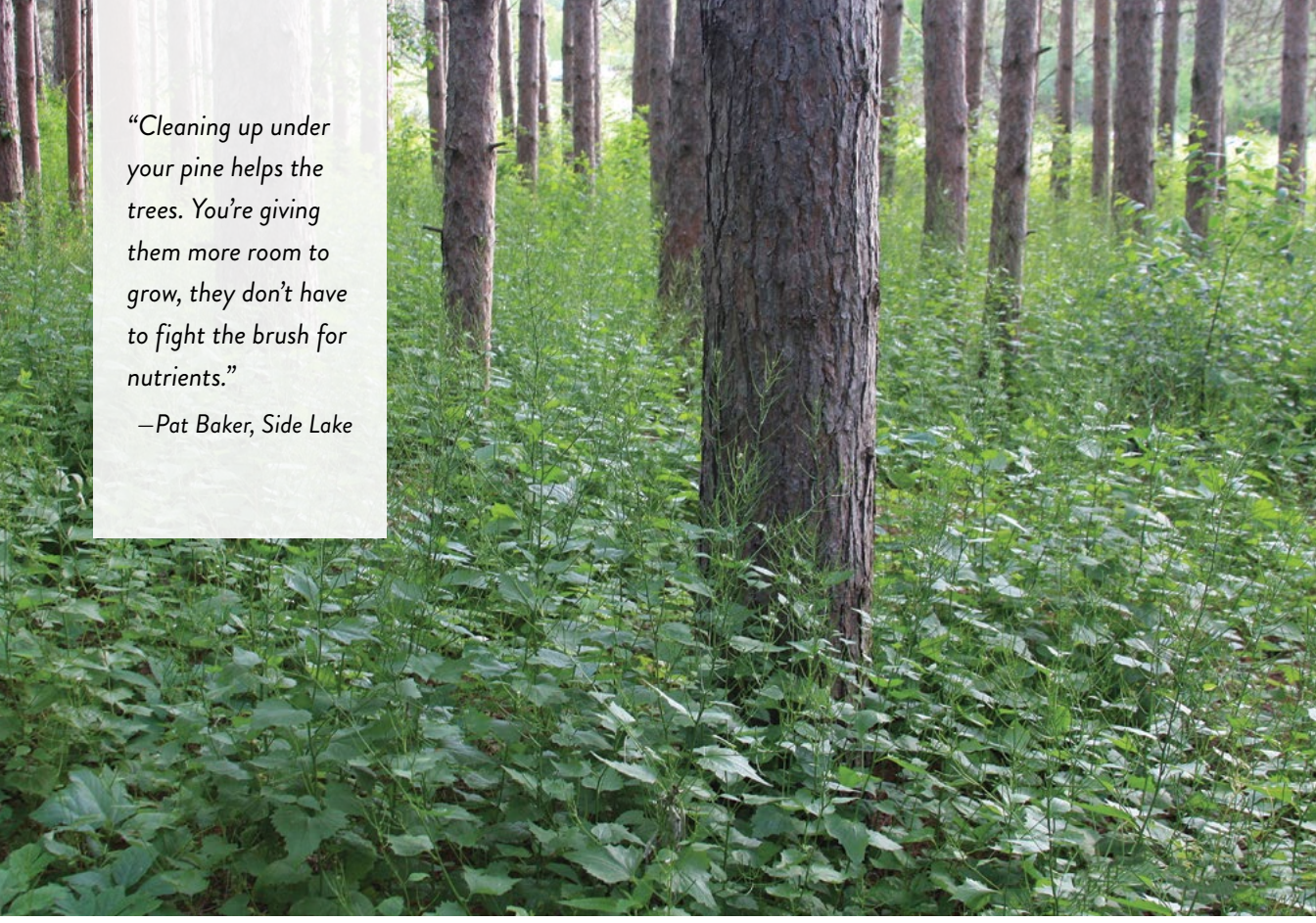
If you have confirmed that invasive plants are growing in your woods, taking steps to control them is a good first woodland management project. Catching an infestation early can be critical to successful eradication. The best time to remove an invasive plant is before it becomes well-established. Once established, eradication is more difficult and expensive, but you can still manage the problem and give your native plants a chance to compete.

Woody and weedy invasive plants in your region include:

- Common buckthorn
- Meadow knapweed
- Spotted knapweed
- Common tansey
- Wild parsnip

Watch for garlic mustard, which is a prolific understory plant that is present but not yet prevalent in your area. Look in May for plants about a foot tall having clusters of small four-petaled white flowers and garlicky scented leaves. Additionally, garlic mustard releases compounds from its roots that prohibit other seeds from germinating. If you spot garlic mustard, act quickly to remove before it becomes established and degrades your woods.

Visit **mndnr.gov/woodlands** to help identify these and other invaders that might be present in your region, as well as tips for distinguishing invasives from natives.



"Cleaning up under your pine helps the trees. You're giving them more room to grow, they don't have to fight the brush for nutrients."

—Pat Baker, Side Lake

Garlic mustard can prevent germination of tree and shrub seeds.
Photo credit: Steve Katorich, Bugwood.org

A variety of methods are used to control invasive plants.

- **Hand-pulling:** Pull by hand small seedlings in the spring when the soil is moist, taking care to remove the entire root so the plant does not resprout.
- **Herbicide:** Spray the leaves of young invasive sprouts and seedlings, preferably after native plants have lost their leaves and gone dormant. This reduces the chance of killing the plants you want to keep. Cut the base of large woody plants and treat the stumps with the appropriate herbicide to prevent resprouting. You can apply specific oil-based herbicides as a "basal bark treatment." This is done by spraying herbicide on the bark around the lower portion of the plant's stem. The herbicide penetrates through the bark and kills the standing tree. Finally, you can control infestations of invasive plants using spot herbicide treatments. As always, be sure you're treating the correct plant and take care to protect native plants. Before applying any herbicides, ask your forester to recommend 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—it's the law.

- **Fire**: ***Prescribed burning*** can be effective at killing seedlings and sprouts. Consult with a professional to determine if burning is appropriate for controlling the invasive species in your woods, and how frequently you need to burn. 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. Talk to your forester if grazing might be an option.
- **Insects**: In a few cases, scientists have identified insects that selectively attack particular invasive plants. These biological controls 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. One weevil attacks the seedhead. Another weevil attacks the roots of the knapweed, weakening or killing those plants. Both weevils are needed to control knapweed. Purple loosestrife and leafy spurge are two other species that have biological control insects in Minnesota. For information on applying biological controls on your property, contact your county agricultural inspector or the Minnesota Department of Agriculture.

Goats eating buckthorn.

Arrest the Pest

You are able to report newly detected invasive species to the Minnesota Department of Agriculture by leaving a message at **Arrest.the.Pest@state.mn.us** or **888-545-6684**. If you can, provide digital photographs and GPS coordinates of the infested site.

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, 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 highbush cranberry, Juneberry, nannyberry, American hazelnut, and wild plum. Native ***forbs*** in your region include wild sarsaparilla, large-leaved aster, bunchberry, dwarf-raspberry, and Canadian mayflower. More information about choosing native plants is on **mndnr.gov/woodlands** and **mndnr.gov/plants**

Unfortunately, new invasive species can pop up in areas where they have not been spotted before. Stay current on forest pests, including insects and diseases, and watch for them. Projects that increase the diversity of plant species and ages will strengthen your woods' resiliency to change. Always clean your equipment to reduce the chance of introducing unwanted pests to your land.

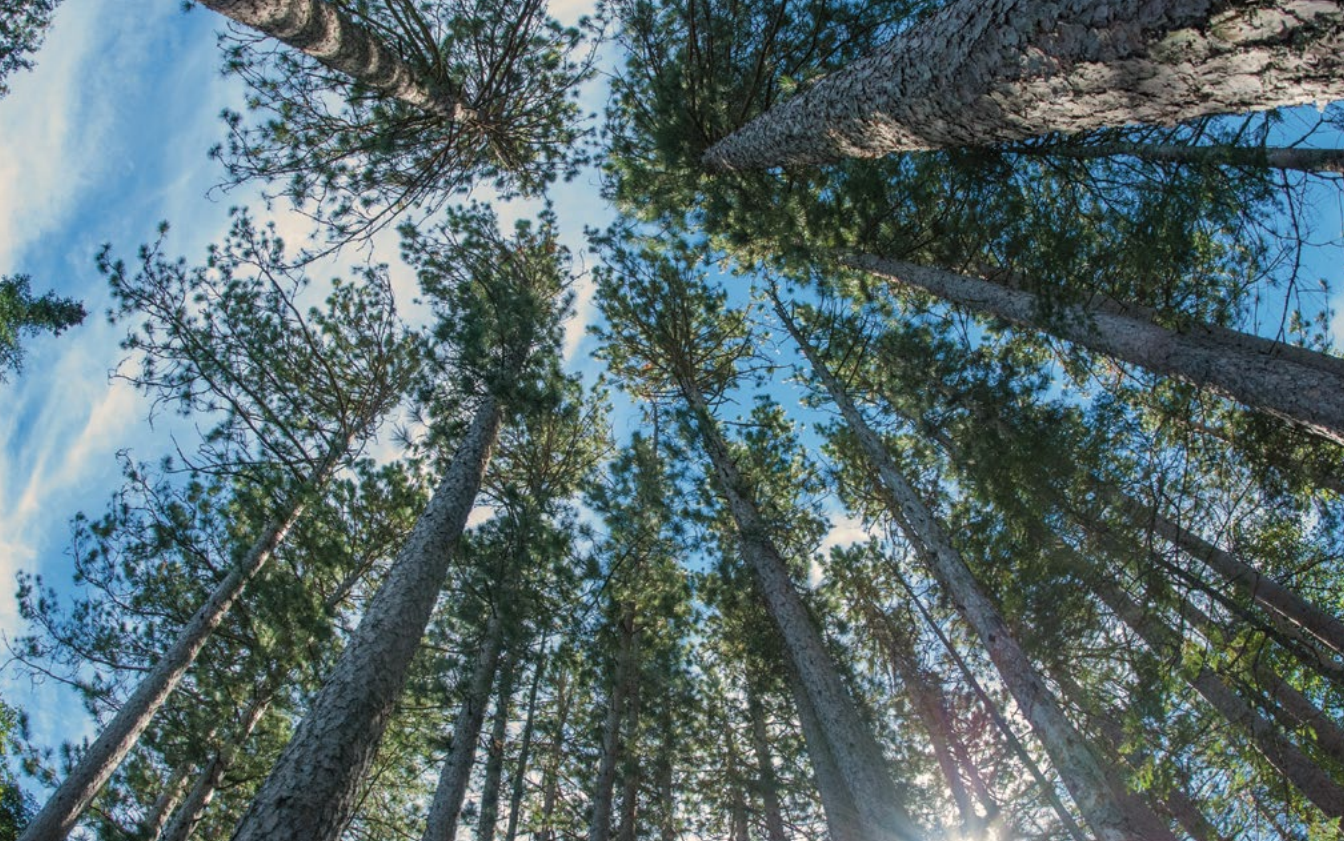
Fire can be used to control some invasive species. Always take precautions and get a permit.
Photo credit: Elina Teich

NATIVE PLANT COMMUNITY SPOTLIGHT

Northern Spruce Bog

This extremely nutrient poor and acidic plant community is found in poorly drained level basins with a carpet of peat-forming sphagnum moss. The canopy is often sparse and typically dominated by stunted (less than 30-feet tall) black spruce with scattered tamaracks. The understory is composed of prominent, and often ubiquitous, low shrubs such as Labrador tea, bog laurel, small cranberry, and leatherleaf. Grasses and sedges are also often present with species such as three-fruited bog sedge and tussock cottongrass.

This plant community is relatively common in northern Minnesota's expansive glacial lake plains, but it is vulnerable to changes in the water cycle that result from road construction or ditching. This community is also vulnerable to aggressive invasive species that may threaten the diversity and community structure of bogs, including glossy buckthorn, narrow-leaved cattail, hybrid cattail, and reed canary grass. At present, these invasive species are either not present in your region or appear to be restricted to the ditches and roads along the margins of bogs. Monitoring the understory and edges of your spruce bog for these invasive plants—and taking fast action to control them—can help protect this biologically unique northern Minnesota ecosystem that stores greater amounts of carbon than most other forests.



Removing smaller trees reduces competition by opening up the canopy.

Option 3, Healthy Woods 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 while improving the health of your woods.

Harvesting firewood on your property also saves money. Choose your firewood trees strategically. Mark for harvest trees that are:

- **On the small side**—Trees that measure 6 to 8 inches in diameter (or 19 to 25 inches in circumference) at 4½ feet from the ground are good choices for firewood harvests.
- **Dying or dead**—Choose trees that have diseases or insects, as they will likely not survive to be part of your future forest. You may wish to leave a few dead trees behind for wildlife habitat, especially ones that wildlife such as wood ducks, owls, or bats are already using.
- **Low timber quality**—Choose trees that are crooked, damaged, or have trunks that fork close to the ground. Harvest species that are less desired by timber markets.
- **Crowding out high-quality trees**—If the trees in your woods 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 that your best trees have plenty of room for their crowns to grow.

Don't Move Firewood!

Are you tempted to transport and store firewood from your land to another location? Resist the urge! Instead, use firewood from trees cut in your county, or buy firewood that is heat-treated and certified by the Minnesota Department of Agriculture. Moving firewood from one location 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. Some Minnesota counties have quarantines that prohibit moving firewood, and violations can result in hefty fines.

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

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 cut. Visit **mndnr.gov/woodlands** for information about safety considerations when felling trees.

NATIVE PLANT COMMUNITY SPOTLIGHT

Northern Mesic Mixed Forest

The canopy of this very diverse community often features a mix of tree species, ranging from solely deciduous to solely coniferous. Important canopy species include paper birch, quaking aspen, white pine, balsam fir, white spruce, red pine, and white cedar. The shrub-layer in this community is variable in cover and usually dominated by deciduous species such as beaked hazelnut, fly honeysuckle, and mountain maple, but most sites have at least some balsam fir in the sub-canopy. Common ground-layer plants include wild sarsaparilla, large-leaved aster, bluebead lily, bunchberry, and Canada mayflower.

Disturbances that created a mix of canopy layers were more common in the natural evolution of this community. Tailoring your firewood harvesting strategy to create medium to large gaps—up to an acre—in your woods will allow paper birch and white pine saplings to develop and give your forest more vertical diversity. If you want to add additional species diversity to your forest, consider developing additional small gaps—single trees or small clusters—that may encourage other species like white spruce, northern white cedar, balsam fir, and red maple. For best results in either gap size, target this activity on areas where some of the desired saplings and seedlings are already present or plan to do some additional planting. Either strategy will help create diverse age groups among your trees, similar to historic disturbances, which will create better wildlife habitat and help your woods be more resistant to environmental stress.

Photo credit: Ethan Perry

Photo credit: Aaron Burden/NASF

Option 4, Income Focus: Having a Timber Harvest

The first step to having a good harvest is working with a professional forester who can walk your property to design a harvest that meets your goals. Those goals may include generating income, improving wildlife habitat, or increasing the health of your woods.

Working with a forester—whether DNR, consulting, or industry—is an investment of time and money. You will likely recover your costs because your forester will design a plan to maximize revenue, improve your woods, and address your goals.

Your goals determine which trees to harvest. For example, removing older trees can create deer or grouse habitat and removing dead or dying trees can improve the health of your woods. Depending on your harvest design, your forester will mark the boundaries of the sale or individual trees with paint to show the logger which trees to cut.

Having your timber appraised is key to collecting a fair price for the trees you sell. Many factors influence tree value, including:

- Industry—forest product companies are interested in certain tree species.
- Species—some species are worth more than others.
- Diameter and length—larger and longer trees can be more valuable.
- Quality—straighter trees with fewer defects can be more valuable.
- Accessibility—easy access by loggers makes harvesting cheaper.
- Location—sites closer to mills are often more desirable to loggers.

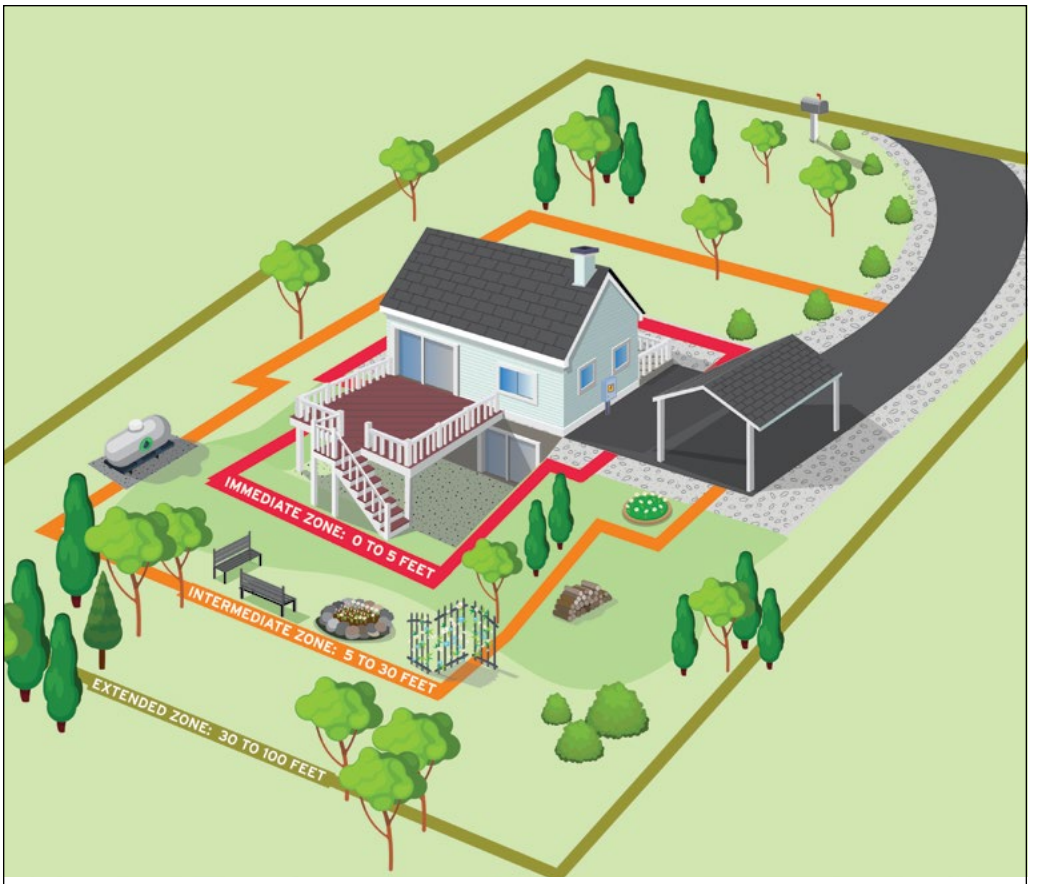
Consider a joint timber sale with adjacent woodland owners to make your harvest more desirable to loggers. Be sure to work with your forester to develop a plan to regrow trees in your woods.

NATIVE PLANT COMMUNITY SPOTLIGHT

Northern Wet Ash Swamp

These native plant communities are widespread across northern and east-central Minnesota. They grow on mucky mineral soils in shallow basins and ground-water seepage areas and on low, level terrain near waterbodies. They typically have standing water in the spring but drain by late summer. Because ash can tolerate harsh growing conditions of wet forests, their canopies consists of black ash or black ash mixed with other deciduous trees like red maple, quaking aspen, green ash, and balsam poplar. Catastrophic events by wildfire have been historically rare. Smaller disturbances such as windthrow creating gaps in the forest have been more common.

Now is the time to start reducing the amount of black ash in the canopy to prepare for the eventual arrival of emerald ash borer, an invasive beetle that kills 99.9 percent of all ash trees. Due to the wet nature of the soil, harvesting should only occur when the ground is frozen. To prevent sedges from taking over and prolific stump sprouting of ash, avoid a clearcut. Instead, use group selection to create gaps that are one-tenth to a quarter acre in size to mimic windthrow or natural tree death. To add diversity, introduce new tree species and leave non-ash trees to reseed the area after the harvest. Tree species known to do well in a gap include disease-resistant American elm, balsam poplar, and northern white cedar (cedars will need to be caged or fenced to protect from deer browse). Additional replacement trees include tamarack, yellow birch, red maple, silver maple, and black spruce. Focus on planting trees in mounds above ground. Consider combining a harvest with adjacent landowners to increase appeal to loggers.



Firewise properties can better withstand wildfires.

Be Firewise

Protect your home, barn, and other structures from wildfire with these easy, inexpensive steps:

- Maintain at least 5 feet of cleared area around buildings.
- Limit or remove flammable materials such as trees, overhanging branches, brush, and firewood within 30 feet of a building.
- For trees that are within 30 feet of a building, prune lower branches 6 to 10 feet from the ground, or no more than one-third the tree's height.
- In a 30- to 100-foot zone around each building, reduce fuels by mowing grasses, removing brush, and pruning lower branches to decrease the intensity of approaching wildfires.

firewise.org

Combination Focus: Lakeshore Restoration

Forests play a critical role in maintaining the health and beauty of northern Minnesota's many lakes. If you own lakeshore property, a lakeshore restoration project will provide 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.

You can take several steps to improve the quality of your shoreline.

- **Stabilize the soil bank**—If the bank 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 perennials and grasses is one way to secure the bank and prevent further erosion. Visit **mndnr.gov/woodlands** for tips on selecting native plants in your county.
- **Control invasive plants**—Aggressive invasive species, such as reed canary grass and purple loosestrife, plague the shores of lakes and other water bodies in Minnesota. Controlling invasive plants helps native plants compete for space.
- **Create wildlife habitat structures**—If the area has few snags and downed logs, consider installing some habitat structures for wildlife such as tree boxes for wood ducks or floating nest platforms for waterfowl.

Specific recommendations for lakeshore restoration projects 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 grants 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.

Shoreline of a lake restored with native plants.
Photo credit: Minnesota Pollution Control Agency

NATIVE PLANT COMMUNITY SPOTLIGHT

Lakeshore

Lakeshore is prevalent in far northern Minnesota. Shores may be sandy or rocky and could contain a variety of terrestrial and aquatic plants depending on the season and current water level. Just above the normal water level, you would find shrubs and forbs such as alder, meadowsweet, spotted Joe pye weed, and sweet gale. 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.

A variety of ecosystems, from upland forest to lowland swamp, surround these lakes. Proper management along the shore provides important protection from waves, while land use and vegetation management in the surrounding areas also play key roles in erosion control. Forests help filter runoff and hold soil in place, whereas land uses such as agriculture and lawns may contribute soil and other inputs like 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. Additionally, lakeshores offer important nesting and foraging habitat for a wide variety of aquatic and terrestrial wildlife species.

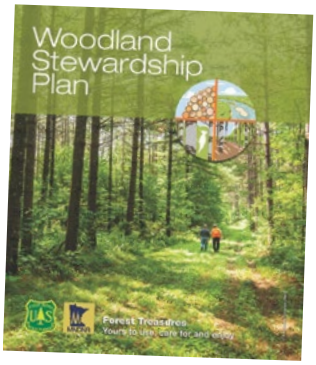
Next steps:

- Choose your project.
- Record it in your Woods Workbook.
- Write your expected timeline and the contact information of any professionals with whom you are working.
- Consider breaking your project into concrete steps and record these as well.
- Take before and after photographs of your woods.
- Be proud of your work!

Chapter 6: Next Steps

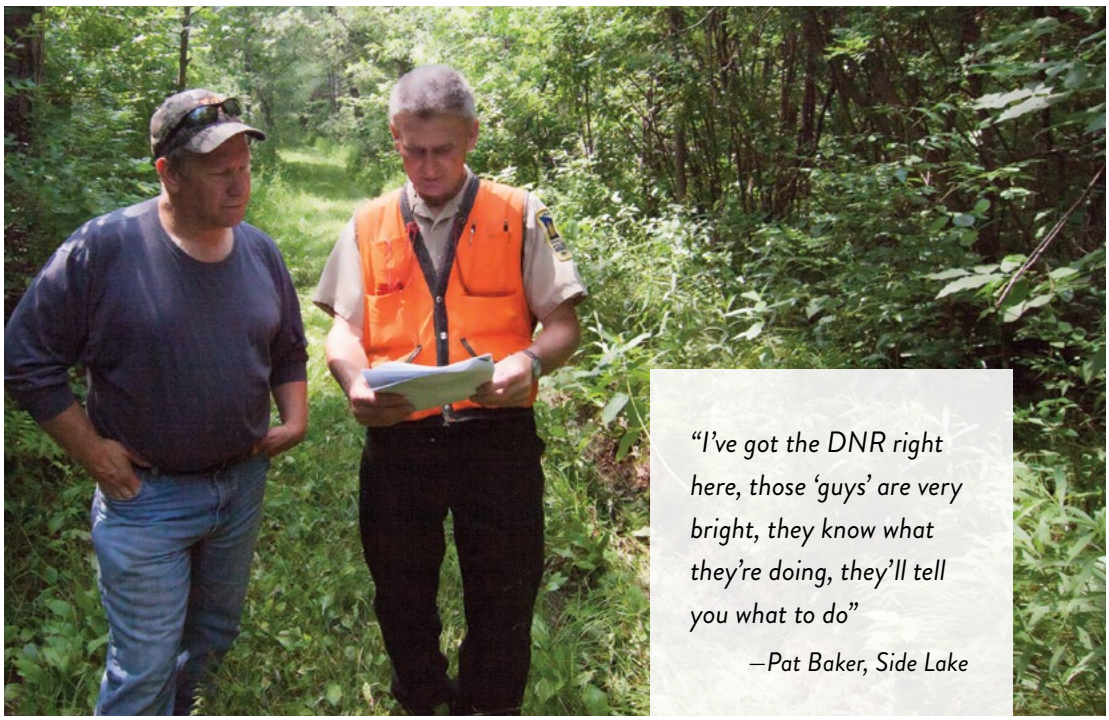
Programs and resources are available to help you develop an in-depth property plan, use sustainable practices, save money, and protect your land long-term.

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 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 access one of these programs, a landowner must have at least 20 qualifying acres of land. Of those 20 acres, at least 10 must be currently wooded or will be converted to woodland or woody vegetation.

Plan-writing services include 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 locate a certified plan writer, visit **mndnr.gov/foreststewardship/index.html**



"I've got the DNR right here, those 'guys' are very bright, they know what they're doing, they'll tell you what to do"

—Pat Baker, Side Lake

To create your personalized plan, you'll walk through your woods with a forester discussing your goals while they note your woodland's current status and 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 information on your woods' diversity and health, 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 its recommendations.

Management Plan Options for Landowners With Less Than 20 Acres

Managing smaller woodlots is becoming more important as more wooded plots are subdivided into smaller ownerships. All woodland owners, regardless of acreage, can contact the DNR or a professional forester to schedule a woods walk and get a streamlined management plan or a plan designed 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*** is a set of science-based guidelines designed to reduce negative impacts during 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**

Following voluntary guidelines protects sensitive areas by preventing compaction during a harvest.

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. Request a free paper copy of the field guide from the Minnesota Forest Resources Council by emailing **mfrc.info@state.mn.us**

Financial Assistance

Because managing your woods can benefit nature and society, public financial assistance is available. Programs are always changing, so go to the website for the most up-to-date information. **mndnr.gov/woodlands**

Cost-Share Programs:

Federal

- **Conservation Reserve Program (CRP)**—Administered through the Farm Service Agency, the 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 to 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" plan 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 to help woodland owners complete projects to improve their woods and to get a Woodland Stewardship Plan.

County

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

Tax and Incentive Programs:

Federal

- **Reforestation Tax Credit**—Treating your woods like an investment or a business may make you 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 seven years.

State

- **Sustainable Forest Incentive Act (SFIA)**—Passed in 2001, landowners who enroll their land in the program receive a fixed annual payment per acre. Requirements include a minimum enrollment of 20 qualifying acres, an 8-year minimum commitment, 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.
- **2c Managed Forest Land**—Created in 2008, 2c is a property tax designation that offers woodland owners a property tax rate of 0.65 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 woodlands that produce agricultural products (maple syrup, biomass) or is adjacent to a landowner's farmland.

Minnesota State Forest Nursery

The Minnesota State Forest Nursery sells native, bareroot seedlings grown from seeds collected in Minnesota. Nursery staff notes seed source locations and tracks where seedlings are shipped. When possible, seedlings are shipped to the same region from which the seeds were collected. This way the seedlings are well-adapted to local growing conditions and have a better chance of survival. Seedlings sales begin in mid-October and seedlings are shipped for planting in the spring. More information is available at **mndnr.gov/nursery**

Photo credit: Eli Sagor

Conservation easements keep forests as forests.
Photo credit: ColdSnap Photography

Conservation Easements

Some landowners sell or donate a ***conservation easement*** on their land to make sure their land will never be developed or converted to another use. Conservation easements are generally intended to protect important features of a property. Landowners enter these voluntary, legal agreements to give up some of the rights (such as restrictions on the right to develop, divide, mine, or farm the land) to protect long-term goals such as ensuring healthy land, water, habitat, open spaces, and other conservation values. Agreements are tied to the land and not the owner so that the property remains 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.

Two kinds of easements exist. Perpetual conservation easements are intended to last forever. Term easements are for a specified length of time, up to 30 years or more, but most are permanent.

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

Organizations Offering Conservation Easement Programs:

- **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 DNR administers the FLP and MFF programs to prevent the conversion of forests to nonforest 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 economical, recreational, and environmental 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 Minnesota 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. 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.

Visit **mndnr.gov/woodlands** for more information.

"I would like to see somebody 40 years younger than me take advantage of the maple trees we planted."

—Alan Presley and Jennifer Feist, Gheen

Transferring Land to the Next Generation

If you want to keep your woods in the family and make sure it remains intact, consider creating a family limited liability company (FLLC or LLC) for your land. A LLC is a business entity that can hold and manage 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 a future heir sells the land—known as "avoidance of partition" in legal terms. Rather, the land is titled in the name of the company and divided into units of membership, similar to the way a corporation is divided into shares. 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. Bestowing land as annual gifts below a certain maximum value can help landowners potentially decrease the estate taxes associated with high-value property.

Importantly, LLCs offer opportunities to engage the next generation in caring for and managing the land during your lifetime, and may provide a good platform to pass on your goals and values. 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. More than 190,000 private woodland owners like you are 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. It is Minnesota's oldest conservation organization, founded in 1876. Working on behalf of family forest owners through education and advocacy to promote woodland stewardship, MFA offers educational opportunities such as field days on member properties. **minnesotaforestry.org**

Minnesota Women's Woodland Network

The Minnesota Women's Woodland Network (MNWWN) recognizes women play a vital role in keeping Minnesota's forests healthy. MNWWN focuses on engaging women woodland owners in sustainable woodland management by creating peer-learning opportunities. These small groups offer informal and supportive education on topics that include trees, nature, and land management. MNWWN also helps build relationships between women woodland owners, their families, and professionals through local networks. Visit MNWWNs website to find the local network closest to your neck of the woods. **mnwwn.org**

Photo credit: Barb Spears

University of Minnesota Extension Woodland Owner Programs

The University of Minnesota Extension teaches landowners how to best steward their land and improve forest health in their community. See **extension.umn.edu/natural-resources/my-minnesota-woods**

- **Master Woodland Owner**—This program offers training to landowners who want to become better stewards of their woods. Participants complete self-paced, online educational courses on a range of woodland stewardship topics, and attend in-person field tours and workshops. Participants complete a capstone exercise designed to help them implement a project on their property.
- **Forest Pest First Detector**—This program trains citizens to become community leaders who identify, detect, and report on Minnesota's most threatening forest invasive species.
- **Woodland Transition Workshops**—The University of Minnesota occasionally offers workshops on how to bestow your woodland legacy to the next generation. Woodland owners learn how to develop a vision for their property, share their vision and goals with family, and explore wills, trusts, and limited liability companies.

Urban and Community Forestry Organizations

To help protect the trees that grow in urban and community areas, consider these organizations:

- **Minnesota Shade Tree Advisory Committee (MnSTAC)**—MnSTAC advocates for the interests of Minnesota's public and private community forests and serves as a forum for sharing ideas and information. The committee works with policy makers and community leaders to identify legislative priorities and leads 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. It recognizes communities with tree management plans and encourages action and public education around sustainable community forests. To see if your city has a Tree City USA designation, visit **arborday.org/treecityusa**
- **Minnesota Tree Care Advocate**—Minnesota Tree Care Advocate is a program committed to enabling volunteers to create healthy community forests. The program, administered by the University of Minnesota's Department of Forest Resources, trains and connects volunteers to opportunities within their community. They also work directly with communities to develop locally based volunteer programs to meet needs of the community. To learn more, go to **mntca.umn.edu**
- **Minnesota Tree Inspector**—Certified tree inspectors identify and manage disease and insect problems in communities and counties. **mndnr.gov/treeinspector**

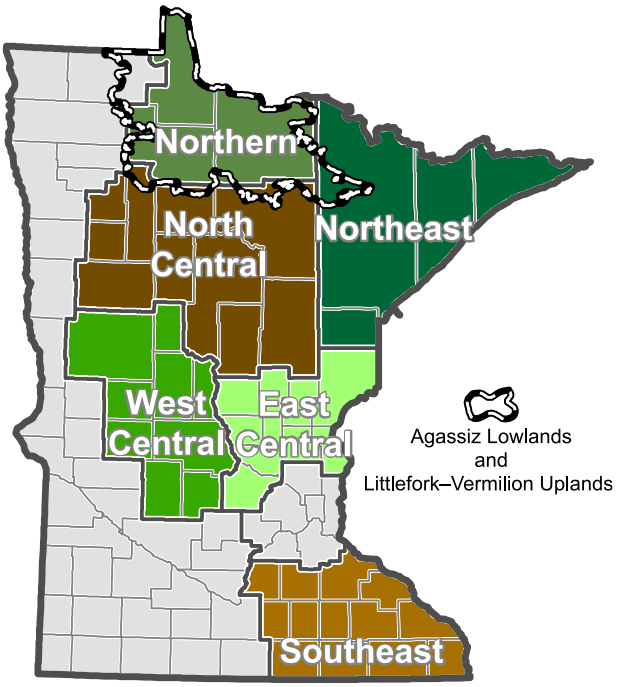
Minnesota Forest Resources Council (MFRC) Landscape Committees

The MFRC is a state-appointed council established by Minnesota statute and exists "to promote long-term sustainable management of Minnesota's forests." The Council consists of 17 members who represent forest-related interests in the state including timber, conservation, and private woodland owners. Staff manage several supporting programs including a Landscape Program that supports and guides six regional Landscape Committees spanning the forested areas of the state.

Each Landscape Committee contains volunteers from the public and private sectors including natural resource professionals, landowners, and other interested community members. Committees partner with local natural resource groups to coordinate and support 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. Your region is represented by the Northern Landscape Committee. The committees meets quarterly and is open to the public. **mn.gov/frc/regional-landscape-committees.html**

MFRC LANDSCAPE REGIONS



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 forest, soil, and water quality; growing productive forests; and maintaining biodiversity and wildlife habitat. Applicants must own at least 10 acres of woods and have a management plan. Membership is free. Benefits include; free technical advice from volunteer foresters during inspections; opportunities to network with other landowners and educators through workshops, field days, and seminars; and an annual national convention. Email **info@minnesotaforests.com** for more information.

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, who may help you throughout your woodland-owning journey.

Jennifer Feist and Alan Presley—Gheen, Minn.

LITTLEFORK–VERMILION UPLANDS

If you're in the business of cutting down trees, it is important to have access to resources for learning how to do it safely and sustainably. That, at least, is one of the guiding principles behind the Minnesota Logger Education Program (MLEP), a nonprofit that was created in 1995 to "assist logging business owners in meeting ever-changing demands of their profession," according to their website.

MLEP offers educational classes on a variety of topics related to timber harvest, and loggers who wish to become members of MLEP must meet certain educational requirements each year. Jennifer and Alan first began attending MLEP classes in 2006 when they were harvesting larger volumes of timber for their business. However, it was easy to see how the classes could benefit landowners as well. "What would be handy for the average landowner is to go to some of the classes on the different methods of thinning and timber management," says Alan, noting that they usually saw a few other landowners at each class who were just trying to get up-to-speed on how to do small harvests on their own land. Other class topics they have taken include how to control erosion during stream crossings and how to harvest for improved wildlife habitat. MLEP members pay an annual fee to attend classes, but classes are also offered a la carte. "You can pick and choose the various classes to go to," says Alan. Classes are held all over the state. "We picked one onetime down at the Whitewater State Park in southern Minnesota, because we wanted to go camping down there."

Jennifer and Alan see another potential benefit for landowners who attend MLEP classes: "It would really be handy for the landowners to go to some of the MLEP stuff and interact with the loggers, and see things from their perspective too," explains Alan. "And it would actually be a good way, I think, for small landowners to find a good fit in a logger in their area." MLEP also provides an online tool called the Minnesota Forest Resource Management Directory, which provides a state-wide list of their members. Small landowners could benefit from this resource as well, says Alan: "Generally speaking, there are really small loggers in everybody's district that they could connect with to help them with thinning. And that's where this directory comes in handy, because you could really find the ones that are sized for your operation. I mean, there are some guys as small as pulling logs out with horses. They're not all on a monstrous scale."

Jennifer and Alan continue to benefit from the network of folks they met through MLEP. “I think the people you meet is probably the most valuable thing,” says Alan, noting that natural resource agency employees and private foresters often attended classes in addition to the loggers and landowners; “you get to build relationships with other people you would never interact with otherwise.”

For more information on MLEP, please visit: **www.mlep.org**

Part 3 Vocabulary

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

Food plot
A small area planted to annual or perennial agricultural crops to provide a supplemental food source for wildlife. They have less value to native wildlife than ***wildlife opening***.

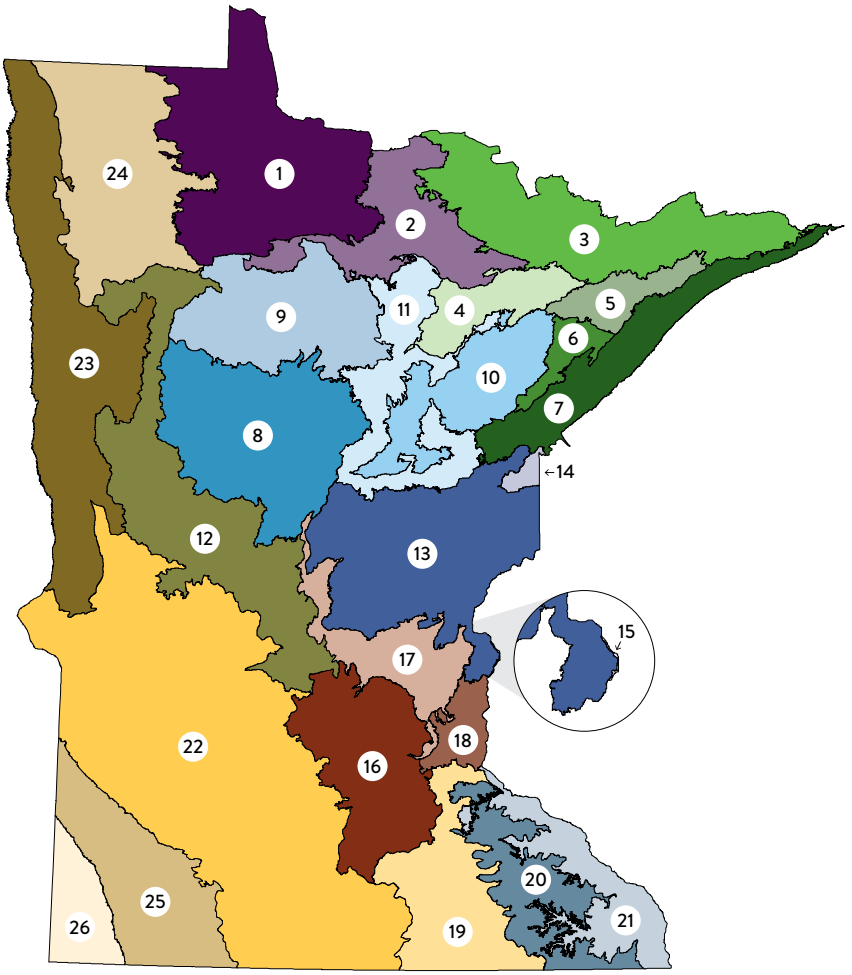
Forb
An herbaceous, flowering plant that is not a grass, sedge, or rush.

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

Wildlife opening
Small areas 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 fewer opportunities for invasive plant introduction, and have greater plant diversity and structure than traditional ***food plots***.

Ecological Subsections Within Minnesota

1. Agassiz Lowlands
2. Littlefork–Vermilion Uplands
3. Border Lakes
4. Nashwauk Uplands
5. Laurentian Uplands
6. Toimi Uplands
7. North Shore Highlands
8. Pine Moraines–Outwash Plains
9. Chippewa Plains
10. Tamarack Lowlands
11. St. Louis Moraines
12. Hardwood Hills
13. Mille Lacs Uplands
14. Glacial Lake Superior Plain
15. St. Croix Moraine
16. Big Woods
17. Anoka Sand Plain
18. St. Paul–Baldwin Plains and Moraines
19. Oak Savanna
20. Rochester Plateau
21. Blufflands
22. Minnesota River Prairie
23. Red River Prairie
24. Aspen Parklands
25. Coteau Moraines
26. Inner Coteau



Woods Workbook

You can print a user-friendly version of this workbook at **mndnr.gov/woodlands**

About my 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 located in?
☐ Agassiz Lowlands ☐ Littlefork–Vermilion Uplands ☐ Other:

What major watershed is my land in? _____

What minor watershed is my land in? _____

Evaluating my property

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

1. What kinds of trees are there? Are they old, young, or a mix of ages?
2. 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?
3. Are there 'islands' of woods surrounded by open land or is all of my woodland connected?
4. What is the understory like? Is it thick with shrubs and brush or is it open?
5. What wildlife is there?
6. Are there any invasive species? Which species? Where are they located?
7. Are there any ponds, wetlands, swamps, springs, or streams within my woods or nearby?
8. 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.

Identifying what interests me about my woods

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:

What are your top three topics? _____

- ☐ Game wildlife
- ☐ Non-game 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.)
- ☐ Other:

Identifying my management theme

After looking at your top three topics, your theme may be managing for wildlife habitat, recreation, income, or something else.

My 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 supports more wild turkeys."

Goal 1: _____

_____

Goal 2: _____

_____

Goal 3: _____

_____

Other goals: _____

_____

_____

Consult a professional forester

A professional forester can give advice and can walk your property with you to discuss your goals and write you a voluntary, non-binding, personalized Woodland Stewardship Plan.

Describe a work project

First, choose a goal you want to tackle that may involve setting up a work project. Example: If your goal is to "Make sure my property supports more wild turkeys," then your project may be to "Locate existing openings and enhance them by removing trees and planting native species that turkeys eat."

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

_____

_____

_____

_____

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: _____

_____

Pull it together

For each work project, use the Action Step Work Project 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. Remember to take before and after photos!

ACTION STEP CONSIDERATIONS:

Date/Season

- 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—year one; Enhance wildlife openings—year two; Incorporate as an LLC—year three; etc.

Tools needed

- You might include aerial photos, chain saw, management plan, project plan, shovel, seedlings, etc. You may want to note where you might get these tools.

Partners/Contacts

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

ACTION STEP WORK PROJECT

Work project name and description: _____

_____

_____

Year: _____

Steps (describe): _____

_____

_____

_____

Date/season: _____

Tools needed: _____

_____

_____

Partners/contacts: _____

_____

_____

Budget estimates: _____

_____

_____

My contribution: _____

Financial assistance: _____

Notes: _____

_____

_____

_____

Acknowledgments

Special thanks to the landowners who contributed their time and wisdom: Pat Baker, Jennifer Feist, and Alan Presley

Project Manager and editor: Jennifer Teegarden, Department of Natural Resources (DNR) Division of Forestry

Reviewers and Contributors: Jana Albers, DNR Division of Forestry · John Almendinger, DNR Division of Forestry · Heather Baird, DNR Division of Fisheries and Wildlife · Casey Baysal, DNR Division of Forestry · Sue Brakl, Minnesota Association of Consulting Foresters · Charles Blinn, University of Minnesota Extension · Kristen Bergstrand, DNR Division of Forestry · Alex Brothen, DNR Division of Forestry · Leann Buck, Minnesota Association of Soil and Water Conservation Districts · Jennifer Burington, Minnesota Department of Agriculture · Susan Burks, DNR Division of Forestry · John Carlson, DNR Division of Forestry · Daren Carlson, DNR Division of Ecological and Water Resources · Val Cervenka, DNR Division of Forestry · Dave Chura, Minnesota Logger Education Program · Don Deckard, DNR Division of Forestry · Laura Duffey, DNR Division of Forestry · Forest Eidbo, DNR Division of Forestry · Allison Eklund, Eklund Law PC · Lindberg Ekola, Minnesota Forest Resources Council · Lindy Ekola, DNR Division of Fish and Wildlife · Angie Gupta, University of Minnesota Extension · Stephen Handler, USDA Forest Service Northern Institute of Applied Climate Science · Keith Jacobson, DNR Division of Forestry · Amy Kay Kerber, DNR Division of Forestry · Amanda Kueper, DNR Division of Forestry · Dennis McDougall, USDA Forest Service · Ashlee Lehner, DNR Division of Forestry · Michael Lynch, Minnesota Forest Resources Council · Valerie McClannahan, DNR Division of Forestry · Casey McCoy, DNR Division of Forestry · Tony Miller, DNR Division of Forestry · Tim O'Hara, Minnesota Forest Industries · Christine Ostern, DNR Division of Forestry · Eric Otto, DNR Division of Forestry · Jodie Provost, DNR Division of Fisheries and Wildlife · Tim Quincer, DNR Division of Fisheries and Wildlife · Mike Reichenbach, University of Minnesota Extension · Matt Russell, University of Minnesota Extension · Eli Sagor, University of Minnesota Extension · Rob Slesak, Minnesota Forest Resources Council · Kristina Somes, DNR Division of Forestry · Barb Spears, Minnesota Women's Woodland Network · Steve Swenson, Aldo Leopold Foundation · Dennis Thompson, Aitkin County Soil and Water Conservation District · Clarence Turner, DNR Division of Forestry · Laura Van Riper, Division of Ecological and Water Resources · Tim Witkowski, Minnesota Tree Farm · David Zumeta, Minnesota Forest Resources Council

DEPARTMENT OF NATURAL RESOURCES

FORESTRY
Minnesota Department of Natural Resources
500 Lafayette Road St. Paul, MN 55155-4044
888-646-6367 or 651-296-6157

mndnr.gov

This publication was funded primarily through the DNR and the USDA Forest Service, State and Private Forestry.

Printed on Minnesota-made paper.

Certified logo placeholder

FOR_0012_22

WOODLANDS OF MINNESOTA

LANDOWNER HANDBOOK

If you own woods in northern Minnesota, your decisions can impact the future of this rich and unique forest landscape.

This handbook is a tool for taking care of your woods and connecting your property to the larger landscape. It helps you:

- Identify what you have in your woods.
- Plan for what you want your woods to be in the future.
- Understand what you can do to keep your woods healthy.
- Consider strategies for accomplishing goals in your woods.

From learning about plant communities to connecting with local foresters and sources of funding, this book shows you how to get a management plan written just for your woods so that your dreams can become reality. Your choices will leave a mark on your future woods.

What will your woodland owning legacy be?

DEPARTMENT OF NATURAL RESOURCES

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

MINNESOTA FOREST RESOURCES COUNCIL

This handbook series is a collaborative project of the Minnesota Department of Natural Resources' Division of Forestry and the Minnesota Forest Resources Council with funding from the USDA Forest Service.

mndnr.gov/woodlands