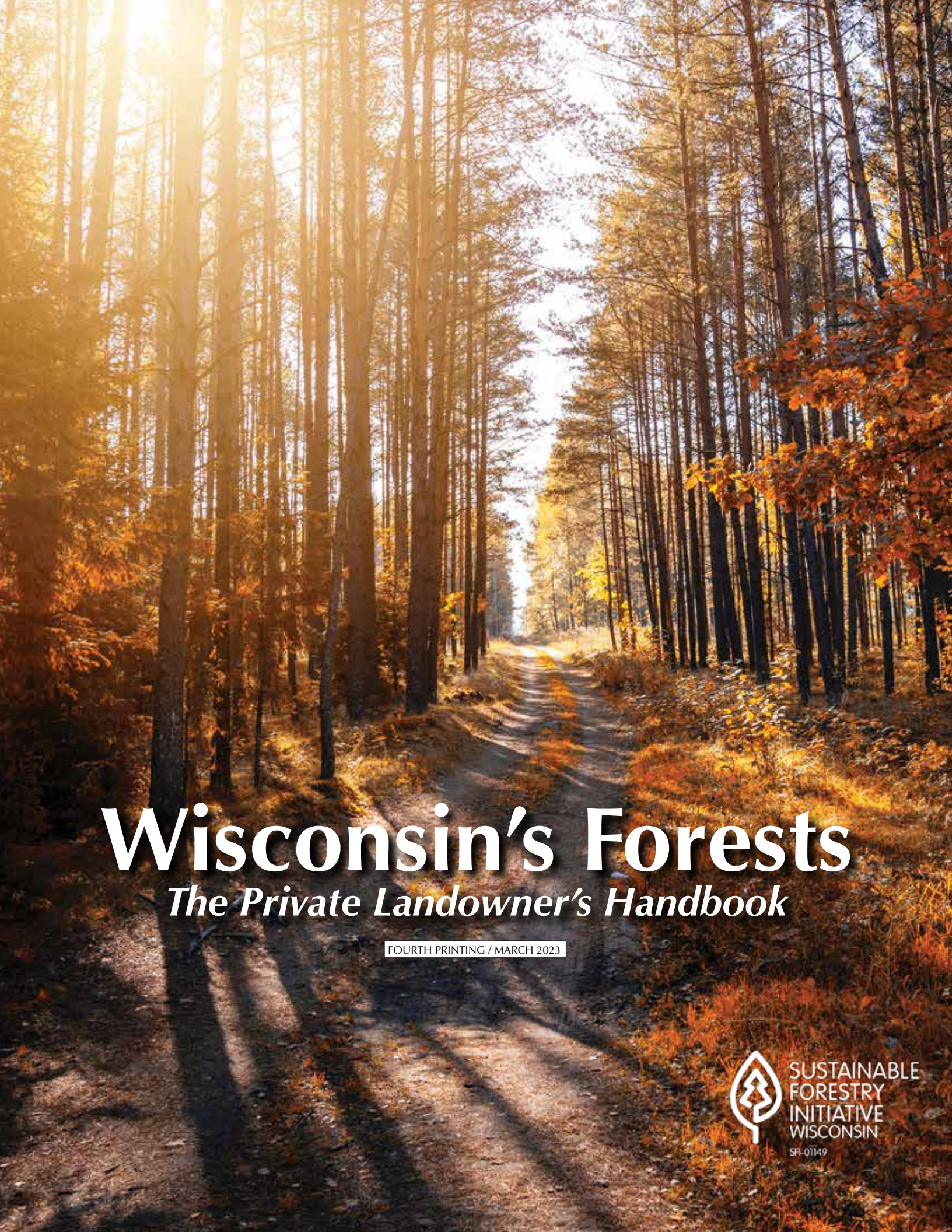

Wisconsin's Forests

The Private Landowner's Handbook

FOURTH PRINTING / MARCH 2023

SUSTAINABLE FORESTRY INITIATIVE WISCONSIN

SFI-01149

An Invitation to Wisconsin's Private Forest Landowners

You are important to Wisconsin. Of the state's nearly 17 million acres of forested land, private landowners and their families own over 50 percent. Those very woodlands are the source of Wisconsin's wildlife habitat, clean air and water, recreational opportunities, and the timber and wood products that build our communities, heat our homes, and provide for a diverse forest products industry with economic returns.

All of us share in the responsibility to ensure the health and vitality of those forests – not only for today, but also for the generations of citizens of the future. It is a very large responsibility, and not one to be taken lightly.

To assist you in shouldering that responsibility, the Wisconsin Sustainable Forestry Initiative® (SFI®) Implementation Committee (SIC) has produced this landowner handbook to provide important basics about the forests that grow in this state, and some ideas on how to care for them.

The Wisconsin SIC has contributed nearly $4.0 million to interests providing forestry training, education, safety and sustainable management since 1996. Organizations receiving Wisconsin SFI financial support include: Forest Industry Safety & Training Alliance (FISTA), Lumberjack RC&D, Ruffed Grouse Society, Trees for Tomorrow, U.S. Forest Service-Northern Research Station, UW-Madison, UW-Stevens Point, WI Master Loggers Certification Program, and WI Tree Farm Committee.

Wisconsin's SIC is a state-level implementation committee that administers the Sustainable Forestry Initiative in the state. This comprehensive system of principles, objectives, and performance measures combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soils, and water quality.

We hope that you will acknowledge and appreciate the vital role you play, and the significant responsibility you have as a Wisconsin woodland owner, in sustaining this significant forest resource of Wisconsin.

We leave you with the invitation to contact any member of the Wisconsin SIC to answer questions and assist you. And we leave you with our collective thank you for your care of Wisconsin's exceptional private forests.

Financial supporters of the SFI program in Wisconsin who bring you this publication:

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Table of Contents

Throughout the publication you will find Web site resources. You are encouraged to visit these Web sites.

To assist you, Keywords are given that will help you navigate to the information, once you are on the Web site.

This Handbook complies with objectives of the Sustainable Forestry Initiative to reach private landowners with educational and informative forest management information. Following are the specific indicators for meeting that standard, and the associated page numbers.

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Why you? Why forest management?

Welcome to Wisconsin's woodlands. Actually, it is more accurate to say, Welcome to your woods!

Of the nearly 17 million acres of forested land in Wisconsin, individual private owners hold the majority (57%) of those forests. In the public sector, counties and municipalities own the largest amount of forestland: 14%. The federal government owns 9%, the state owns 7%.

Wisconsin's forests are very important to the state, its citizens, and its visitors. They clean the air, filter drinking water, are habitat for wildlife, and provide jobs. These woodlands can boost property values, lower energy bills, and provide a myriad of other benefits – like recreation and beauty – for the state's citizens and its visitors.

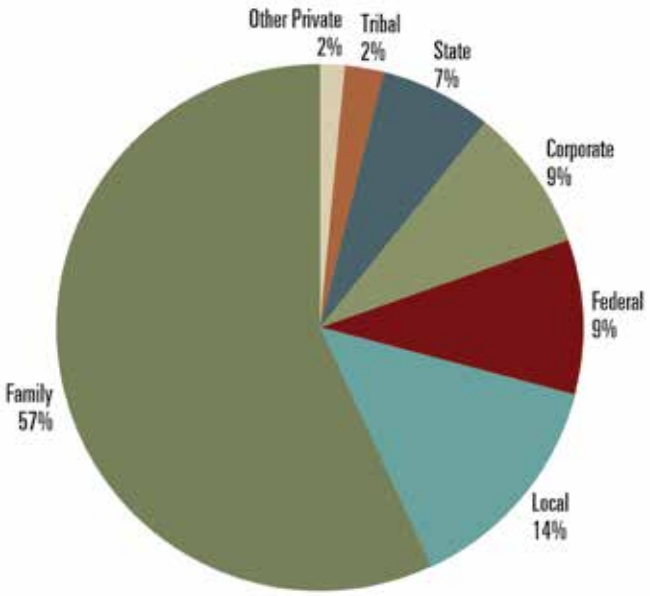

Figure 1. *Forest acres by ownership category.*

All of this leads to the very reason why YOU, as a woodland owner, are so important. The majority of Wisconsin's wildlife habitat, drinking water, paper and wood products, and clean air are in your hands. People like you – private individuals and your families – are depended on to take care of Wisconsin's woodlands and ensure their amenities are managed for present and future generations of people.

There are a number of steps to take, when assuming the responsibility of maintaining these natural benefits. The first, however, is to go out into your woodland. Have a picnic, go fishing, hike some trails, listen for birdsong. As you discover what it is that you value most – be it generating income, hunting, protecting nature, or viewing autumn's colors – this Handbook will help you familiarize yourself with your woodland and the benefits it provides. Importantly, it will guide you in the steps you can take and familiarize you with the people and resources that will help you meet your goals.

Take a read. And then head for the woods.

Wisconsin's Forests

Wisconsin's forests can be divided into two broad categories, the northern mixed forest and the southern broadleaf forest. These two forest types exist in Wisconsin because they have adapted to the different soil types and climates that have supported them over thousands of years.

These two broad categories of forests meet in an area called the tension zone (see Figure 2). The tension zone stretches across Wisconsin from northwest to southeast in an S-shape.

The tension zone forms the northern boundary of many species' ranges, both plant and animal. From Polk and St. Croix counties southeast to Milwaukee, the tension zone divides the state into two major ecological regions. The northern mixed forests are more closely related to the forests of northeastern Minnesota, northern Michigan, and southern Ontario. The southern broadleaf forests are generally considered closer, ecologically, to the forests of southern Michigan, Illinois, and Indiana.

Figure 2. Wisconsin tension zone and the 16 ecological landscapes.

The tension zone is a diverse area, where representative plant and animal species from both the northern and southern forest types can be found, as well as a significant shift in vegetation.

In addition to these two broad categories of forests, the state can be divided into 16 ecological landscapes, as shown in the diagram.

A majority of Wisconsin's forests are "hardwood types:" oak-hickory, maple-basswood, and aspen-birch are the more common forest types. There are also significant "softwood types" occupying large areas, especially in the north. Red pine, black spruce, white pine, tamarack, northern white cedar, and Jack pine are the most common types.

Photo by Brenda Cooke

Of Wisconsin's 35 million acres of land, approximately 17 million acres are forested. In other words, forests cover 48 percent of the total land area of the state.

Forest area in Wisconsin has been steadily increasing since the 1960's, mostly due to the conversion of marginal agricultural land back into forests. Since 1983, forestland has increased by 11 percent, or 1.7 million acres.

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A forest management plan is a key to the successful long-term management of your forest. It's like a road map, helping you to reach your destination in the most direct way. Remember that planning is not a single event, but a series of continuous steps leading to a desired goal. Plans are, by necessity, long-term, providing continuity through successive generations. That does not mean they cannot be revised over time.

Forest Management Planning: Getting Started

Forest management is likely one of the biggest leaps of faith you will ever take. Since trees take so long to grow, the decisions you make today will affect the wildlife, the beauty, the wood products, the recreation, and a myriad of other woodland benefits long down the road for the generations of tomorrow. The destiny of your forests is in your hands.

A written management plan, prepared with the assistance of a forester, can guide you and your woodlands into that future.

What is the first step? It's the best one: take a step – into your woods. Give some thought to what your woodlands means to you. The goals you have for your woodlands and the decisions you make about management will be influenced by many things, including your family situation, income needs, and philosophy about land ownership and the environment. You also have to consider your resources, skills, time constraints, and applicable regulations that may affect your decisions on your forest and its management.

The second step? Take another walk – this time with a professional forester. This is the time to begin creating a flexible management plan that you and your heirs can follow to reach your goals for your forest.

A management plan allows you to document your forestry activities. Generally, management practices fall into three categories depending on the age and condition of the forest: 1) forest establishment or regeneration, 2) intermediate stand management practices, and 3) harvest systems. A detailed plan will identify specific stand management goals and the series of ***management prescriptions*** that describe actions needed to achieve your goals.

The range of practices used over the life of a forest is called the "silvicultural system." It is the linking of timber harvesting, regeneration, and intermediate stand management treatments in a logical sequence to meet your goals and objectives.

No two plans are alike, even on adjoining properties. A plan reflects YOUR goals for the woodland and what your land can grow.

You are a short-term caretaker of long-term renewable resources.

The following points are important components of any forest management plans:

- Landowner goals: Likely you have more than one! Create wildlife habitat? Maximize income from wood production? Provide the best deer habitat possible? There are many more possibilities!
- Maps, plats, aerial photos.
- Forest inventory and stand descriptions.
- Forest management prescriptions.
- Harvest dates, methods, and regeneration plans.

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Planning Your Forest:

Fill out this questionnaire, share it with your family and your resource professional, and then tailor your silvicultural activities to achieve your goals.



1. What are your goals? (Check all that apply)

- ❑ Clean water
- ❑ Income
- ❑ Hunt/Fish
- ❑ Timber production or Firewood
- ❑ Soil protection
- ❑ Reduced tax burden
- ❑ Protection from development
- ❑ Aesthetics

2. What are your resource priorities? (Rank in order of importance)

- _____ Wildlife
- _____ Water protection
- _____ Recreation
- _____ Beauty (Aesthetics)
- _____ Soil protection
- _____ Timber production

3. What are your recreation and aesthetic goals? (Check all that apply)

- ❑ Horseback riding
- ❑ Biking or hiking trails
- ❑ Camping
- ❑ Fishing
- ❑ Boating
- ❑ Harvest berries/fruit
- ❑ Promote flowering trees/plants
- ❑ Park-like appearance
- ❑ Observe fall colors
- ❑ Protect historic/unique areas
- ❑ Allow others to use your forest
- ❑ Nature study/photography
- ❑ Bird watching
- ❑ Wildflower enhancement

4. Which water quality protection actions would you undertake?

- ❑ Stabilize roads and trails
- ❑ Plan and select Best Management Practices (BMPs) before site disturbance
- ❑ Leave buffer strips next to streams and water bodies
- ❑ Re-vegetate bare roads and trails where erosion is likely
- ❑ Restrict cattle from woodlots and streamside areas
- ❑ Test soil to determine fertilizer and lime rates
- ❑ Construct proper stream crossings

5. Which forest management approach appeals to you?

- ❑ Improve the forest's health
- ❑ Provide periodic income
- ❑ Have recreation and timber
- ❑ Protect wildlife and timber
- ❑ Produce future timber income
- ❑ Have wildlife and healthy forests
- ❑ Have recreation and healthy forests
- ❑ Other combinations

  Please list:_____

Types of Forest Planning Assistance

There are approximately 426,000 of you out there: private forest landowners. Cooperation among natural resource professionals is essential in order to meet your demands for planning and managing your forest.

Forest management information and assistance is available in Wisconsin through a network of public and private resource managers, industries, landowner organizations, and educators.

In the public sector, including university extension and agencies, assistance with management questions and concerns is generally provided at no charge or a minimal charge for some services. Demand and workload constraints may limit the availability of public sector assistance.

In the private sector, there are about 200 private consulting and industrial foresters who offer services to private landowners. Consulting foresters are independent contractors who make their living by charging a fee. Forest products companies employ industrial foresters. They may offer free advice in return for the first right to bid on timber when you are ready for a harvest.

Private consulting foresters and industrial foresters can voluntarily apply to participate in the DNR's Cooperating Forester Program. Find an up-to-date listing of foresters at ***dnr.wi.gov*** **(Keyword: Forestry Asistance Locator).**

Cooperating foresters must comply with DNR standards and rules when giving forest management advice; they must attend continuing education courses and file periodic reports with the department.

A directory is also available from your local DNR Service Center or Wisconsin DNR/Div. of Forestry 101 South Webster St. • PO Box 7921, Madison, WI 53707-7921 or call 1-888-936-7463.

Things to Consider When Selecting a Private Forester

To achieve your objectives, it is essential that you select the right forester. Review a forester's qualifications, talk to their references, ***ask questions***!

Consider:

- Years and types of experience.
- Educational background.
- Affiliation with professional forestry organizations, such as the Association of Consulting Foresters or the Society of American Foresters.
- Availability throughout your entire project.
- Whether they carry appropriate insurance.
- References from former clients.
- Empathy towards your objectives.
- Knowledge of sustainable forestry and willingness to follow its principles.
- Overall attitude towards you and consideration of your land.

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The Forestry of Private Lands and the Tree Farm Program

As one of 426,000 private forest landowners in Wisconsin, managing and tending your woodland may seem like a thankless and solitary calling.

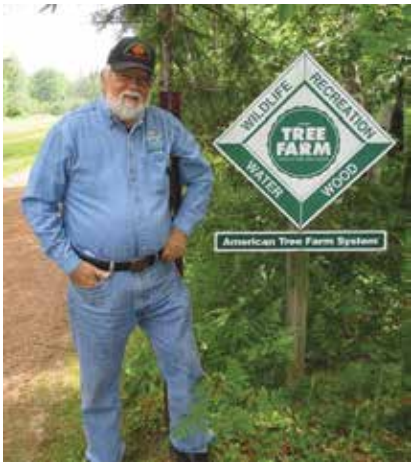
You, however, are NOT alone! Take a drive through the Wisconsin countryside – chances are you'll come across forested property displaying the familiar diamond-shaped green and white Tree Farm sign.

The sign means the landowner's property has been certified by a professional forester as being sustainably managed for the future. See pages 16-18 for more information on certification.

Landowners who enroll in the American Tree Farm System (ATFS) are following a management plan that meets certain standards and guidelines that demonstrate a commitment to stewardship of the land.

ATFS supports Tree Farmers with the direct involvement of some 2161 certified Tree Farm Inspectors nationwide. These specially trained professional foresters work individually with landowners to determine if the American Forest Foundation's Standards and Guidelines are met.

Certified Tree Farmers in Wisconsin gain access to a special set of learning opportunities, including the annual Tree Farm field day, Outstanding Tree Farmer of the Year competition, and the opportunity to attend the National Tree Farmer Convention. For more information about Wisconsin Tree Farm, go to ***witreefarm.org***.



Chuck Pogorelcnik
2022 Midwest Regional
Tree Farmer of the Year

The American Tree Farm System® (ATFS) includes 19 million acres of certified forestland managed by America's family forest owners who are meeting the highest standards of sustainability and managing their lands for water, wildlife, wood, and recreation.

ATFS is the largest and oldest sustainable family woodland system in America, internationally recognized, and meeting strict certification standards. ATFS is a program of the American Forest Foundation.

Contact the Wisconsin Tree Farm Program to be part of this national program. The Wisconsin Woodland Owners Association is a cosponsor of Wisconsin Tree Farm.

WTFC Tree Farm Administrator

PO Box 285 • Stevens Point • WI 54481-0285
715-252-2001
Contact us at witreefarmcommittee@gmail.com

The Wisconsin Woodland Owners Association (WWOA) welcomes owners of Wisconsin's private woodlands and those interested in the sustainable management of Wisconsin's forests. WWOA members are woodland owners from all walks of life gathering to share their passion for woodlands. Membership includes on-line resources, award winning quarterly magazine, gift shop publications, local chapter field days, regional winter conferences, statewide Annual Meeting, and more.

Wisconsin Woodland Owners Association

PO Box 285 • Stevens Point • WI 54481
www.wisconsinwoodlands.org
Call 715-346-4798. Email: ***wwoa@uwsp.edu***

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The Harvester

Timber harvesting provides the basic material Wisconsin's forest products industry turns into lumber, paper, packaging and a variety of other wood products. Harvests are also a crucial tool for use in protecting and enhancing the health of our woodlands.

Timber harvesting is an important tool for use in the maintenance and health of our woodlands. Simply stated, the timber harvester (logger) makes every on-ground operational decision affecting implementation of the forest harvest plan. The logger's actions will be the determining factor as to how the land will look post-harvest regarding residual timber condition, ground surface rutting, road/landing condition and variety of other factors from the harvest activity. Consequences and benefits from the harvest activity are both short and long term. New landowners doing a first time harvest may want to see pictures of what a post-harvest would look like and what to expect at various stages of future forest growth.

Landowners should, however, make sure to find the right logger best suited for their particular property, as logging businesses come in all shapes and sizes. Proper credentials, including insurance, training, and references from previous clients, should be sought when hiring anyone to work on your property. Landowners must also be aware that the highest price offered for timber does not necessarily result in the best logging job. It can, in fact, signal just the opposite.

Landowners should especially make sure the logger they choose is up to date with Sustainable Forestry Initiative training. To ensure this, the Forest Industry Safety and Training Alliance, (FISTA) located in Rhinelander Wisconsin, provides logger and forester training in accordance with the standards set by SFI to be certified as a Qualified Logging Professional (QLP) or Qualified Resource Professional (QRP). The suite of core and elective coursework addresses topics such as:

a) awareness of sustainable forestry principles and the SFI's work
b) best management practices, including streamside management and road construction, maintenance, and retirement
c) reforestation, invasive species management, forest resource conservation, aesthetics and special sites
d) awareness of rare forested natural communities as identified by provincial or state agencies, or by credible organizations such as NatureServe or The Nature Conservancy
e) transportation issues

Continued on page 14

Don't hesitate to meet with your forester and the logger in the woods before, during, and after harvest. These meetings can help your logger understand your goals, as well as reassure you that everything is being completed according to contract and to your satisfaction.

Photo by Tim Pulskamp

The Harvester Continued from page 12

f) business management
g) public policy and outreach
h) awareness of emerging technologie
i) logging safety or
j) other topics identified by the WI SFI Implementation Committee that improve their responsibilities in meeting the SFI 2022 Standards.

There are many ways to find reputable logging professionals. Websites provided by the WI Master Logger Program, Great Lakes Timber Professionals Association, and Wisconsin Department of Natural Resources are just a few of the ways to make contact. A professional forester may also make recommendations, but ultimately it is a landowner's responsibility to check references and to be comfortable with the forest practitioner.

The Wisconsin Master Logger Certification Program (WMLCP) was created by the Wisconsin Professional Loggers Association in 2001. WMLCP became fully operational in 2004 with an initial group of 24 certified loggers which has grown to 56 today. Certified loggers ensure that the harvesting of timber is based on the highest ethical and sustainable standards for generating a continuously improving, working forest. Wisconsin's MLCP has seven areas of responsibility, each of which is upheld by specific goals and harvest responsibilities:

- protection of water quality and soil.
- compliance with government regulations appropriate to a logging business.
- conformance with acceptable silviculture and utilization standards.
- adherence to state specific logger training standards.
- application of aesthetic management techniques, where applicable.
- implementation of site-specific management plans that are agreed to by the landowner.
- use of sound business management practices.

Detailed information regarding Wisconsin Master Loggers can be found on its website at ***www.wimlc.com***

Seven Steps to a Successful Timber Harvest

1) *Mark boundaries and identify trees to be cut*
2) *Appraise the value*
3) *Locate roads, trails, and landings*
4) *Solicit bids and select winning bid*
5) *Prepare timber sale contract*
6) *Monitor the sale*
7) *Complete post-harvest administration and activities*

SFI Inc. is an independent, nonprofit organization that is solely responsible for maintaining, overseeing and improving the internationally recognized Sustainable Forestry Initiative® (SFI®) program. Across Canada and the United States, more than 364 million acres (147 million hectares) are certified to the SFI forest management standard, the largest single forest standard in the North America.

Photo by Brenda Cooke

Wisconsin is fortunate to have a number of guiding principles and management practices that ensure sustainable management – you will find some of the important guidelines in this section.

Wisconsin's SFI and Forest Certification

SUSTAINABLE FORESTRY INITIATIVE WISCONSIN
SFI-01149

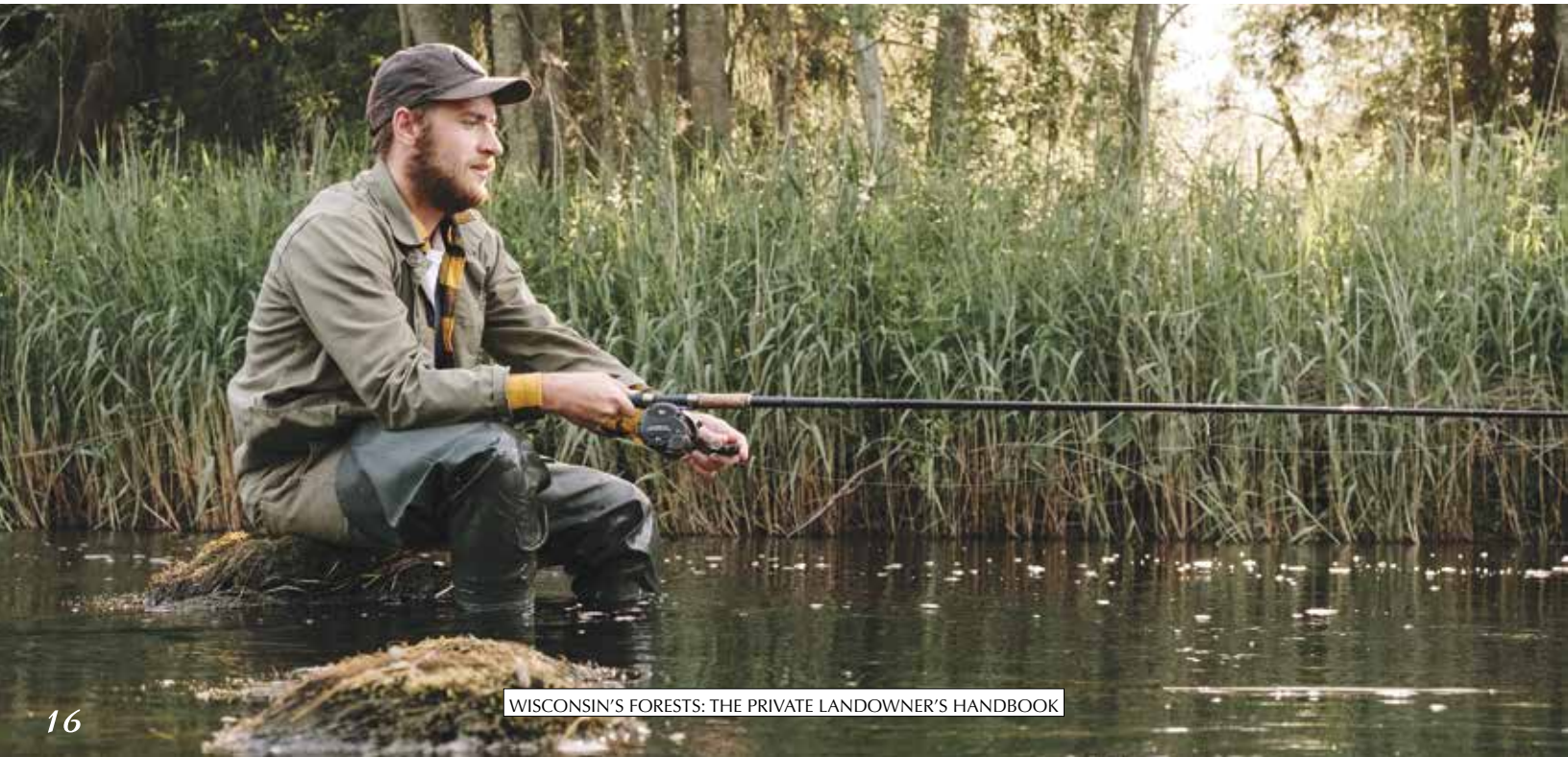
"Sustainable managment" means *managing and conserving our forest resources to meet the needs of society today, without compromising the needs of tomorrow.*

Sustainable management is a charge to you, the private landowner who recreates, hunts, and fishes Wisconsin's woodlands. It is also the responsibility of those who harvest trees for forest products – Wisconsin's forest products industry.

Forest products companies demonstrate their commitment to the Sustainable Forestry Initiative® by promoting sustainable forestry practices with private forest landowners, foresters, and loggers. The program is one of the world's most rigorous and widely applied standards of sustainable forestry.

The Sustainable Forestry Initiative® program has been working to make a positive difference in Wisconsin forests since 1995.

Continued on page 18



VISION

A world that values and benefits from sustainably managed forests.

MISSION

To advance sustainability through forest-focused collaborations.

At the Sustainable Forestry Initiative, we believe that sustainable forests are critical to our collective future. SFI® is a sustainability leader through our work in standards, conservation, community, and education.

As an independent, non-profit organization, we collaborate with our diverse network to provide solutions to local and global sustainability challenges. SFI works with the forest sector, brand owners, conservation groups, resource professionals, landowners, educators, local communities, Indigenous Peoples, governments, and universities.

forests.org | info@forests.org

Follow us on
@sfiprogram
@SustainableForestryInitiative
@Sustainable Forestry Initiative

SUSTAINABLE FORESTRY INITIATIVE
SFI-00001

SFI's work is supported by four pillars of interconnected activity

STANDARDS

To advance sustainable forestry and responsible purchasing globally through certification standards and certified products.

CONSERVATION

To advance credible and effective solutions to environmental challenges through the SFI standards and leadership initiatives.

COMMUNITY

To advance collaborations between local communities and the SFI network to increase mutual understanding of the values and benefits provided by sustainably managed forests.

EDUCATION

To advance environmental literacy, stewardship, and career pathways using trees and forests as windows on the world.

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Wisconsin SFI Continued from page 16

Wisconsin SFI Program participants have:

- helped train thousands of loggers and foresters
- provided forestry information and support to family forest owners, including publication of this Handbook
- applied SFI principles on millions of acres of SFI Program participant lands in Wisconsin
- used responsible wood procurement practices that conform to the SFI Standard
- provided assurance to customers and consumers that the forest and paper products they purchase are from sustainably managed forests
- an important stewardship responsibility and a commitment to society, and they recognize the importance of maintaining viable commercial, family forest, and conservation forest land bases
- supported efforts to safeguard private property rights, Indigenous Peoples' rights, and to help all private landowners manage their forestland sustainably
- engaged with Indigenous Peoples whose rights may be affected by forest management practices so they can be aware of traditional forest-related knowledge such as known cultural heritage sites, the use of wood in traditional buildings and crafts, and flora that may be used for food, ceremonies, or medicine

Sustainable Forestry Inconsistent Practices Hotline:

The Wisconsin Sustainable Forestry Initiative (SFI®) Implementation Committee (SIC) operates an "inconsistent practices" program which provides individuals concerned about a specific forestry activity an opportunity to report it. If it involves SFI trained loggers or a wood utilizing company that is SFI certified, the call will result in an investigation, report to inquirer, and if an inconsistent practice is detected, corrective recommendations to those responsible. Call the Wisconsin Paper Council at 1-608-467-6025 to report an inconsistent practice.

Wisconsin's Forest Management Guidelines

Wisconsin is fortunate to have approximately 17 million acres of forestland. Early in the last century, the tremendous value of Wisconsin's forests was realized after nearly losing them to land use conversion and to fires.

One outcome of that consciousness was the development of *Wisconsin Forest Management Guidelines (FMG)* ***dnr.wi.gov*** **(Keyword: Forest Management Guidelines).**

What do the Guidelines mean to you, as an owner of Wisconsin's forestland?

The Wisconsin FMG celebrates the wealth of our forest resources and emphasizes our responsibility to care for them. It outlines practical, site-specific considerations that land managers need to take into account when they plan and carry out forestry operations. The FMG covers sustainable forest management principles that can serve recreation, wildlife habitat improvement, threatened and endangered species protection, water quality, forest products and many other objectives.

The 300+ page FMG is written for resource managers and enthusiasts. As a result, it might be somewhat challenging for a general reader, but the hope is that it is straightforward and appealing enough to be easily understood.

Wildlife: *Wisconsin's forests provide habitat for such endangered species as the American Marten and Kirtland's Warbler.*

Photo by Earl Orf

Wisconsin Forest Management Guidelines: *https://dnr.wisconsin.gov/topic/forestmanagement/guidelines*

Part One of the Guide: Chapters 1- 9 is designed to address the "whys" of each of a number of important resource components: Why do the forests of Wisconsin look like they do? How are they changing? Why are various timber stands harvested differently? What are the key issues related to wildlife, protection of water resources, riparian areas, soils, and cultural resources, etc.?

Part Two of the Guide: Chapters 10 – 18 focuses on the "how" of specific activities that are normally carried out in the management of a forest.

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Wisconsin's Forest Tax Laws

Wisconsin's forest tax laws encourage sustainable forest management on private lands by providing a ***property tax incentive*** to landowners. Approximately 3.4 million acres (20 percent of the state's total forestland) are enrolled in the Managed Forest Law (MFL) program This enrollment encompasses more than 50,000 entries.

Participating landowners agree to follow a Department of Natural Resources (DNR) approved management plan in exchange for reduced annual property taxes.

Another forest tax law program on Wisconsin books is the Forest Crop Law (FCL). **No new enrollees are being accepted into the FCL. Private forest landowners who are interested in a property tax incentive program are now enrolled in the Managed Forest Law, or MFL.**

In addition to the information provided here, look to your local DNR forester for guidance. You can find one near you by going to: ***dnr.wi.gov*** **(Keyword: Forestry Assistance Locator)**

Enrollment

Enrollment in the MFL program is open to all private owners of forested land. Eligible landowners must have at least 20 acres of contiguous land which is 80% forested.

Lands enrolled in the MFL are designated as "Open" or "Closed" to public recreation. Open designation allows public access to the property only for hunting, fishing, hiking, sightseeing and cross-country skiing without additional permission from landowners. Closed designation affords landowners the right to either restrict or permit access.

Owners of MFL land are permitted, without fee, to modify their Open or Closed designation twice during their MFL entry period, or when all or part of the MFL land is withdrawn or transferred. To change designation, landowners must submit a **Managed Forest Law Public Access Modification Request (Form 2450-193)** to the DNR.

For information about the Managed Forest Law, go to dnr.wi.gov (Keyword: Managed Forest Law).

To apply for the MFL program, an application must be submitted with a management plan written by a Certified Plan Writer. To find a Certified Plan Writer, go to ***dnr.wi.gov*** **(Keyword: Forest Assistance Locator)**. This is a forester who is either a private consultant or industrial forester certified by the DNR to write MFL plans.

The deadline for submitting an application and required attachments is **June 1 for entry effective the following January 1.**

Best Management Practices

In Wisconsin, over 12,600 rivers and streams flow more than 84,000 miles through forests, wetlands, and grasslands. In addition to the Great Lakes of Michigan and Superior, Wisconsin has more than 15,000 inland lakes covering nearly 1 million acres. Wetlands cover 5 million acres of the state, with forests covering nearly 17 million acres.

Wisconsin's timber industry employs over 63,000 people and produces products worth $24.5 billion every year. Forests not only contribute directly to Wisconsin's economy, but also indirectly protect water quality and water-based economies.

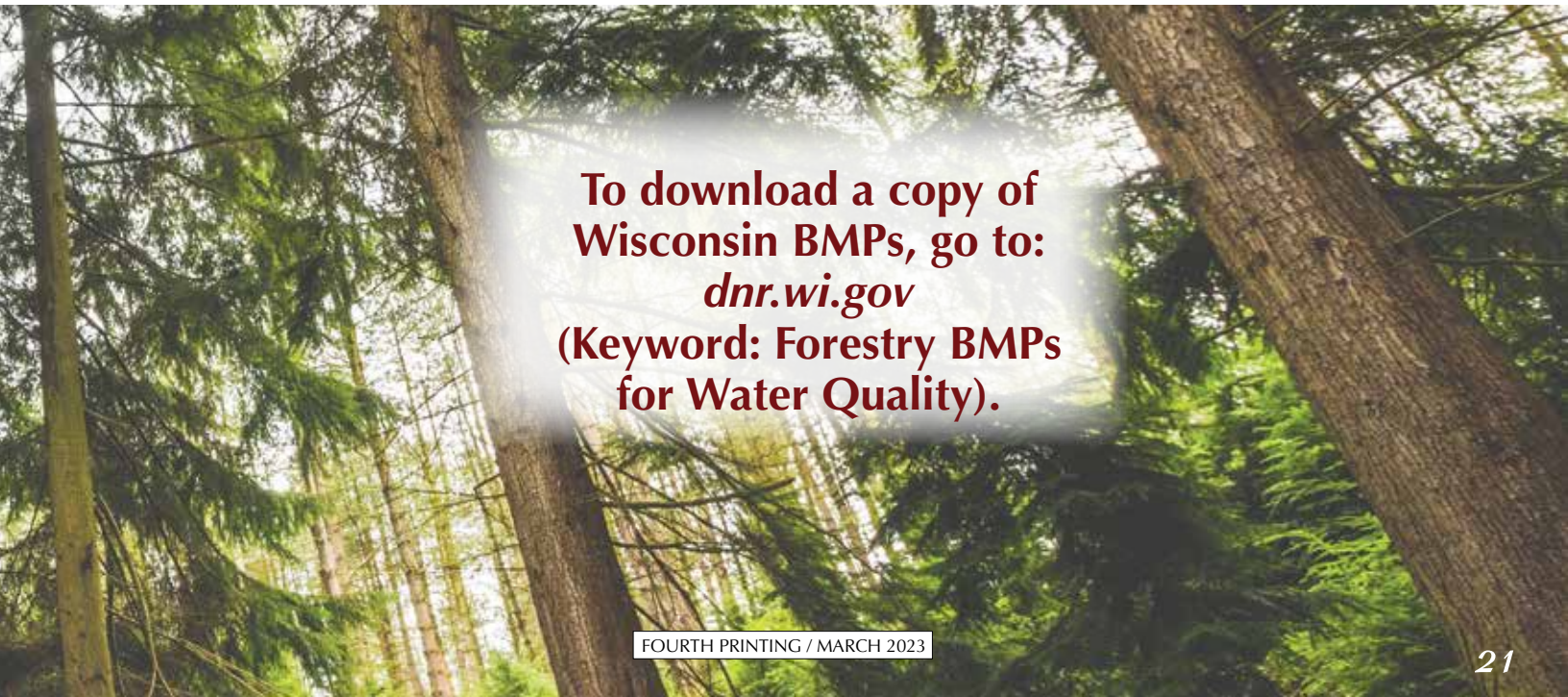
Forests play an important role in the water cycle, contributing to the high quality of water found in Wisconsin's lakes, streams, and wetlands. The term "water quality" broadly encompasses the chemical, physical, and biological properties of water in lakes, streams, and wetlands.

Protecting Wisconsin's forests and water resources from pollution is crucial to the state's economy. ***Nonpoint source pollution*** occurs when rainfall and snowmelt move across the ground, picking up pollutants, like sediment and chemicals, that are carried into lakes, rivers, and wetlands. The primary pollutant associated with forestry activities is sediment, especially at stream crossings for forest roads and skid trails.

Wisconsin's Forestry Best Management Practices for Water Quality (BMP) were developed to provide simple and cost-effective methods for protecting water quality in lakes, streams, and wetlands before, during, and after forest management activities.

The Forestry BMPs for Water Quality Program is a *non-regulatory program*; however, the use of BMPs *is mandatory in a number of situations*. On public lands, such as national forests, state forests, and county forests, following BMPs is a requirement of timber sales.

In addition, landowners participating in the Managed Forest Law Program agree to practice sustainable forest management on their wood- lands, which includes using Forestry BMPs for Water Quality. Other programs or regulations may also require that Forestry BMPs be used.



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Woody Biomass

Woody biomass has become a familiar term, and for good reason: biomass offers Wisconsin woodland owners and timber producers a potential new market for a previously underutilized product: small diameter trees and the branches, tops, and limbs of harvested trees.

Traditional timber harvests have generally removed wood (or biomass) greater than four inches in diameter for use in forest products. In biomass harvests, the entire aboveground portion of a tree may be removed, including trunk, branches, bark, and leaves or needles, typically for use as bio-energy. Biomass harvests may also include the removal of small-diameter trees and shrubs. Because the harvest of **fine woody material** from forests results in increased removals from a site, concerns have been raised about sustainability. *Wisconsin's Forestland Woody Biomass Harvesting Guidelines* were developed by the state's forestry community to ensure that woody biomass is a sustainable forest product and to limit the impacts of harvesting of woody biomass on:

- biodiversity conservation
- soil nutrient depletion
- physical properties of soil
- water quality

These guidelines are the result of a cooperative effort between the Council on Forestry, Wisconsin DNR, a stakeholder advisory committee, and a panel of expert reviewers to evaluate potential impacts of woody biomass harvests.

To read a copy of Wisconsin's Forestland Woody Biomass Harvesting Guidelines, go to: http://wisconsinforestry.org

In this section is the "walk and talk" of forest management. Refer to it often as you expand your knowledge about forest terminology, and about the path you are on as you step forward as a forest landowner and land manager.

Forest Management Systems

A **"system"** is a method, an approach, a technique, a practice, or simply a way of doing something.

When discussing forest management, a silvicultural system refers to three basic actions or practices in your forest: harvesting, regenerating, and tending.

If you are managing an even-aged stand, where the majority of trees are approximately the same age, there are five common silvicultural systems:

- clearcut
- coppice
- over story removal
- seed tree, and
- shelterwood

These systems are used for more sun-loving or ***shade intolerant*** tree species.

If you are managing an uneven-aged stand, where there are more than two age classes of trees present, there are three silvicultural systems used:

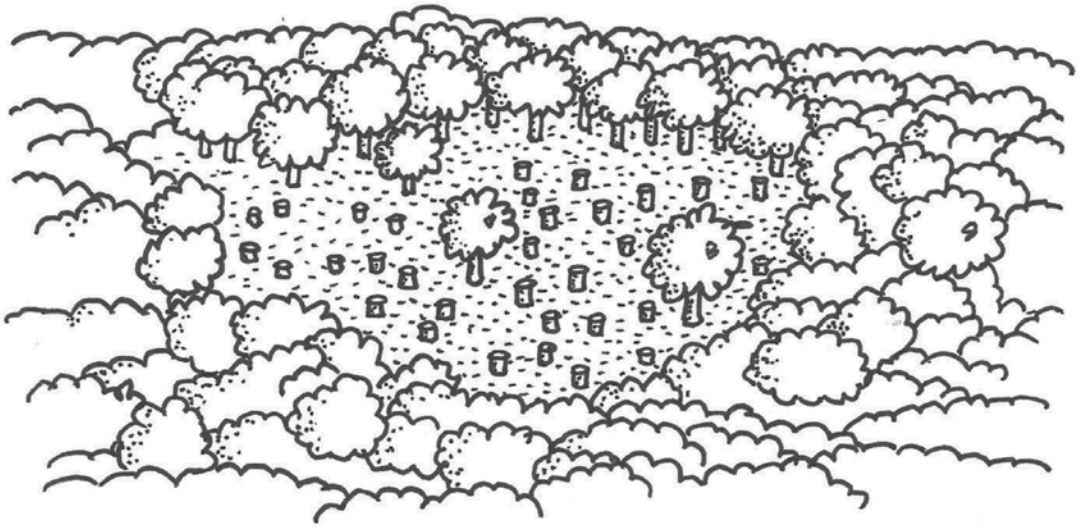
- single tree selection
- group selection
- patch selection

These systems are typically used for more ***shade-tolerant*** species.

The diagrams on pages 24 and 25 will help you to understand them.

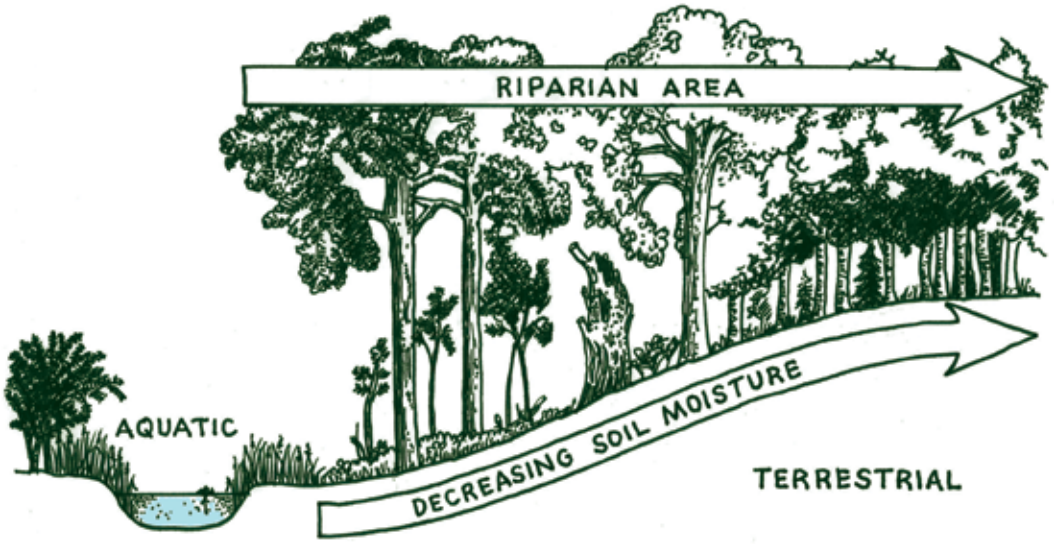
Graphics of Silvicultural Systems

Clearcut System



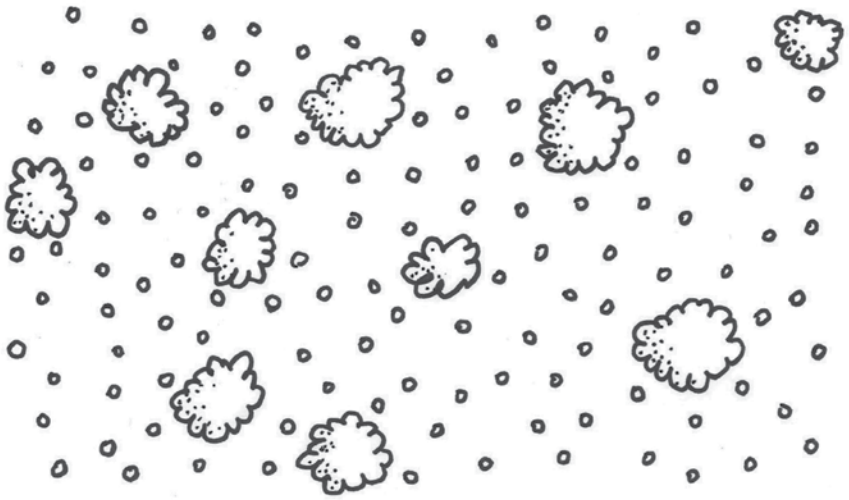
A clearcut removes most or all of the woody vegetation greater than 2 inches in diameter in a given area. Trees regenerate from sprouts, direct seeding, or replanting. A clearcut is one of the most efficient and easiest harvests to administer and is appropriate for mature stands, or where the stand is of poor quality and even-aged regeneration is desired.

Riparian Area



Riparian areas form a transition from aquatic to terrestrial ecosystems. They are among the most important and diverse parts of forest ecosystems, limiting streambank erosion, reducing flood size flows, filtering and settling out pollutants, and protecting aquatic and terrestrial habitats. Chapter NR 115, Wisconsin Administrative Code, sets state-wide minimum standards for the cutting of trees and shrubs in shoreland areas. Every county and many towns have a shoreland zoning ordinance which addresses vegetation management and other activities near lakes and streams.

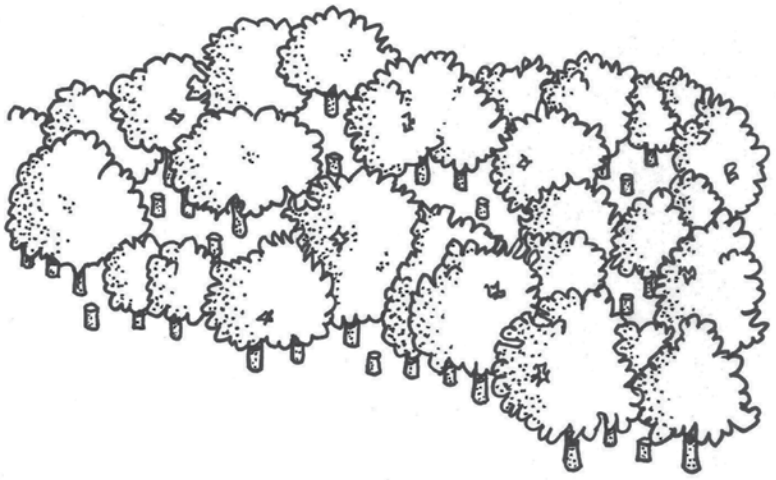
Seed Tree System



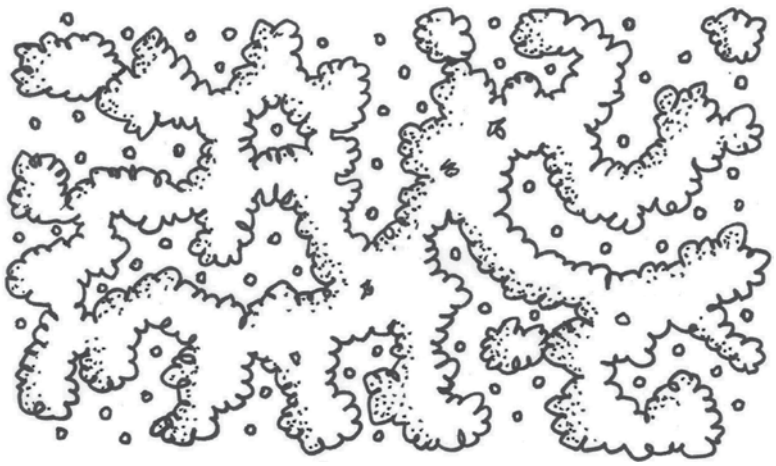
A seed tree harvest is similar to a clear-cut except that some of the seed-producing trees are left standing in the cut area. Their seed will produce the next generation of trees. Seed trees are typically large-crowned (capable of producing large quantities of seeds) and are able to survive in windy and exposed conditions.

Selection System

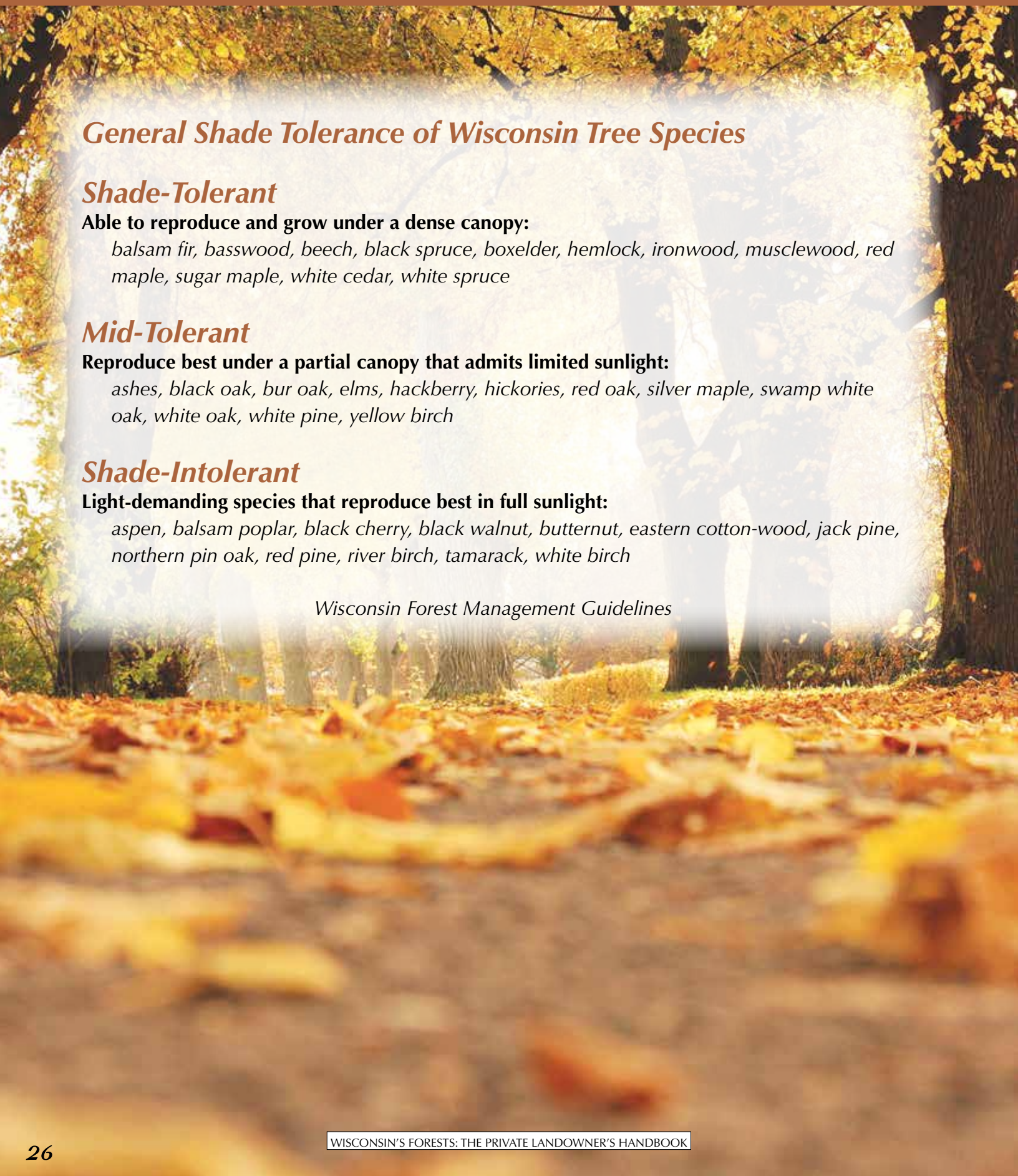
Individual trees or groups of unhealthy, mature, or other selected trees are harvested periodically. The trees left are intended to regenerate the stands. Selecting individual trees to harvest can encourage the growth of shade-tolerant species. Cutting groups of trees tends to encourage the growth of fewer shade-intolerant trees.



Shelterwood System



The shelterwood method of harvest involves the harvest of mature trees in a series of two or more partial harvests. These harvests stimulate the germination and rapid growth of a new forest in the shelter and shade of mature trees. It is most appropriate where the species to be regenerated can grow under partial shade.



General Shade Tolerance of Wisconsin Tree Species

Shade-Tolerant

Able to reproduce and grow under a dense canopy:

balsam fir, basswood, beech, black spruce, boxelder, hemlock, ironwood, musclewood, red maple, sugar maple, white cedar, white spruce

Mid-Tolerant

Reproduce best under a partial canopy that admits limited sunlight:

ashes, black oak, bur oak, elms, hackberry, hickories, red oak, silver maple, swamp white oak, white oak, white pine, yellow birch

Shade-Intolerant

Light-demanding species that reproduce best in full sunlight:

aspen, balsam poplar, black cherry, black walnut, butternut, eastern cotton-wood, jack pine, northern pin oak, red pine, river birch, tamarack, white birch

Wisconsin Forest Management Guidelines

Reforestation and Afforestation

These two words have one very important common element: the word "forest."

"Reforestation" is the practice of regenerating and growing healthy trees on previously forested sites. Reforestation can include both "natural" and "artificial regeneration" methods. Reforestation is a practice that would be used, for instance, after a final harvest on a site or the strong winds that caused catastrophic damage across many parts of Wisconsin in July 2019.

"Afforestation" is the practice of planting and seeding trees to create a young forest on land that was not previously growing trees, such as a fallow agricultural field. Wisconsin's state nursery program grows high-quality, native tree seedlings and wildlife shrubs at reasonable prices to plant in Wisconsin for conservation purposes. For information about the seedlings they offer, or to create a personalized tree planting plan, go to ***dnr.wi.gov*** **(Keyword: tree planting).**

Words That are Helpful to Know in Forest Management:

Artificial regeneration

This is the regeneration of a forest by aerial and/or ground seeding, or planting seedlings and cuttings by hand or with a planting machine.

Natural regeneration

This is the regeneration of a forest through root suckering, stump sprouting, or natural seeding as a result of one of the silvicultural systems as described in Section III, pgs. 24-25.

Type conversion

This means changing the dominant species composition of a forest from one forest cover type to another.

Restoration

This is the process of reintroducing and maintaining the native flora on a given site.

What steps will increase the success of reforestation?

Implementing a few key steps at the onset of your reforestation endeavors will yield significant long-term dividends:

- Start with a written reforestation plan that identifies your short- and long-term goals.
- Determine the costs associated with tree planting and what financial assistance is available.
- Develop a planting map that identifies the acres to be planted, access routes, and fire breaks.
- Select species compatible with your planting site and growing conditions. The DNR nursery catalog describes the site requirements for each tree and shrub species they sell. ***dnr.wi.gov*** **(Keyword: tree planting).**
- Complete site preparation prior to planting. Treatments may include a chemical/herbicide application or a mechanical treatment such as disking, scalping, or trenching.
- Determine whether hand or machine planting is best for your site and what service providers are available in your area.
- Time planting when soil moisture is high; April or May is usually the best time to plant in Wisconsin.
- Store nursery stock in a cool area (~ 34°) and out of direct sunlight prior to planting. Avoid exposing roots to the air for long periods of time to prevent desiccation.
- Conifers are generally planted at a rate of 800-900 seedlings per acre, which represents an 8′ x 7′ spacing, with the wider distance between the rows.
- Don't walk away from your seedlings once they are in the ground. Some type of post-planting monitoring should be done to evaluate plantation survival rates and to assess maintenance needs. At a minimum, plantations should be evaluated 4-5 months after planting and again during the third growing season.

What are the regeneration requirements if my land is enrolled in a Wisconsin Forest Tax Law program?

- Wisconsin's forest tax programs include a number of mandatory practices that landowners are required to complete during the entry period. Two of these specifically relate to maintaining minimum stocking levels and ensuring adequate regeneration after a harvest (Chap. NR 46, Wis. Adm. Code)

- Following a catastrophic event, affected landowners should contact the DNR forester in the county where the damage occurred for specific guidelines. Salvage operations should be pursued and if adequate natural regeneration does not occur following the timber sale, landowners may be required to artificially reforest the impacted area through tree planting or direct seeding

Wisconsin Department of Natural Resources

Aliens in Your Woods

Invasive species are unwanted plants or animals on your land. Plants, insects, and disease-causing organisms are considered an ***invasive species*** if they can cause harm to the economy, ecosystem, or to human health. Invasive species thrive if they are able to establish, tolerate a wide range of environmental conditions, and disperse.

Typically, invasive species are plants and animals that are not native to the ecosystem. They are often not limited by the diseases, predators, and parasites that keep their populations in check in their native range.

Invasive species can also be native. Their populations are over-abundant because of land use. For instance, ironwood, prickly ash, and whitetail deer are examples of native plants and animals that may be abundant in your woods and are interfering with other parts of your woods.

Forest management activities can create the right conditions on a site that make it suitable for many opportunistic invasive species. For instance, site disturbance exposes soil and creates a seedbed for invasive plants.

There are numerous invasive species that might be on site – and potentially new ones arriving in the years ahead. How do you know if you have invasive species in your woodlands?

On the next few pages are profiles of three different types of invasives – plant, animal, and disease – that have widespread impacts or potential impacts on Wisconsin's woodlands. Each are excerpts from "My Healthy Woods: A Handbook for Family Woodland Owners Managing Woods in Southwest Wisconsin." This helpful guide is published by the Aldo Leopold Foundation ***(www.aldoleopold.org)*** and American Forest Foundation ***(www.forestfoundation.org)***.

There are other invasives that could be in your woods besides these. Visit ***dnr.wi.gov*** **(Keyword: invasives)** to learn what unwanted species might be in your woods and how to implement voluntary best management practices to keep invasive species from spreading.

Asian long-horned beetle
(Anoplophora glabripennis)

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Invasive Shrub Profile: Buckthorn

Common or European Buckthorn *(Rhamnus cathartica)*
Photo courtesy of Elizabeth J. Czarapata

Glossy Buckthorn *(Rhamnus frangula)* Photocourtsey of Elizabeth J. Czarapata

Why is it a problem?

Buckthorn has been sold for years as a hedge; it has dense branches and grows new leaves early in spring and holds onto them late into the fall. In the woods, buckthorn thickets can prevent light from reaching wildflowers and tree seedlings for the entire growing season. Without light, these native plants and trees eventually die.

Invasive Animal Profile: Emerald Ash Borer

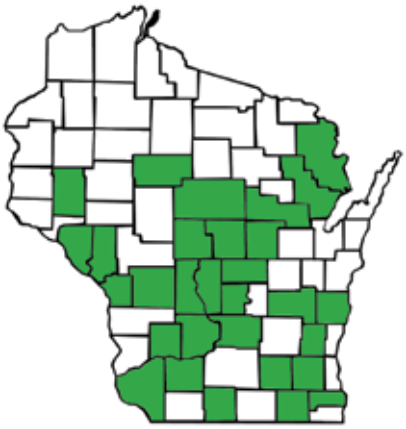
Why is it a problem?

Emerald ash borer (EAB, *Agrilus planipennis*) is an invasive wood-boring beetle that kills ash trees by feeding on the tissues under the bark that transport water and nutrients for the tree. It will kill all types of native ash trees of any size, age, or state of health. A tree that has been attacked by EAB can die within 2-4 years. EAB is now widespread throughout most of Wisconsin. For up-to-date information about EAB in Wisconsin, go to ***dnr.wi.gov*** **(Keyword: emerald ash borer).**

Invasive Fungus Profile: Heterobasidian Root Rot

Why is it a problem?

Heterobasidian Root disease, caused by the fungus *Heterobasidion irregulare*, was first found in Wisconsin in 1993. It is considered one of the most destructive diseases of conifers in the northern parts of the world. Prevention of this disease is key, as it is difficult to treat and control. Many tree species can be hosts, but in Wisconsin Heterobasidian root disease is most common on red and white pine plantations. It is most damaging in plantation-grown conifers (especially pines) where stumps of trees that were cut down offer a place for infection to start and connected roots provide a pathway for Heterobasidian to move from tree to tree underground. Learn more at ***dnr.wi.gov*** **(Keyword: Heterobasidian).**



Confirmed counties in Wisconsin with HRD (as of June 2021)

The following invasives also have widespread impacts on Wisconsin's woodlands:

Japanese Barberry

Why is it a problem?

Japanese barberry is a widely planted ornamental. It is a small dense shrub with reddish brown branches and leaves that vary in color from green, bluish-green, or dark reddish purple. While it is not currently regulated as an invasive plant, it spreads prolifically when birds disperse its bright red berries, and branches root when they touch the ground.

Honeysuckle

Why is it a problem?

Honeysuckle develops new leaves early in spring and holds onto them late into the fall. This shrub can prevent light from reaching wildflowers and tree seedlings for the entire growing season. Without light, the native flowers and trees eventually die.

Photo courtesy of Elizabeth J. Czarapata

Garlic Mustard

First year basal rosette plant.
Photo courtsey of Elizabeth J. Czarapata

Second year flowering plant.
Photo courtsey of M. Putnam

Why is it a problem?

Garlic mustard (*Alliaria petiolata*) grows well in cool temperatures, so it is actively growing before many native plants. It forms dense stands, out-competing wildflowers and even tree seedlings. It can out-compete almost any native plant in your woods. Adding to the problem, the seeds survive in the soil for up to seven years. Therefore, multiple years of control are needed to exhaust the seeds in the soil. It grows best in slight to heavy shade. It will grow on almost any soil type, but spreads most quickly in moist, rich soils.

Oak wilt

Photo courtsey of Wisconsin DNR

Why is it a problem?

Oak wilt is capable of spreading quickly through oak woods and killing any oak species of any age – including the several-hundred-year-old oak you cherish. Oak wilt breakouts in high-quality timber stands may require im- mediate harvest to capture value before it is lost or the breakout spreads. Learn more at ***dnr.wi.gov*** **(Keyword: oak wilt).**

The Rare Ones in Your Woods

Wisconsinites (and their many visitors) likely agree that the state is a very special place – its waters, its woods, and its wildlife make it uniquely "us" with familiar icons such as the natural wonders of the Apostle Islands. Wisconsin has been called a "paradise" for campers, hunters, and fishermen.

But there are some less-talked-about resources of the state; they are rare and unique – and they are also very cherished. They are Wisconsin's threatened and endangered species.

An ***endangered species*** is a species facing a very high risk of extinction. ***Threatened species*** are any species (including animals and plants) that are vulnerable to endangerment in the near future.

In 1973, the U.S. Congress passed the Endangered Species Act. Its purpose is to conserve the ecosystems that rare species depend on, and to protect those species from going extinct. To do this, the federal government "lists" species that are in danger of going extinct. Once on the threatened and endangered species list, these plants and animals are generally protected from actions that could cause them harm (known as "take" in state and federal laws). Habitat Conservation Plans are sometimes used to protect and conserve these species while allowing for some "incidental" take to occur.

Wisconsin's endangered and threatened species laws

In 1972 Wisconsin passed its own endangered species law creating rules and regulations and identifying which species were to be protected. Since that time, species have been added and removed from the list, as needed.

State Laws

Endangered and Threatened Species Laws (Chap. 29.604 Wis. Stats., Chap. NR 27, Wis. Admin. Code)

Animals – It is illegal to take, transport, possess, process or sell any wild animal that is included on the Wisconsin Endangered and Threatened Species List without a valid permit.

Plants – No one may process or sell any wild plant that is a listed species without a valid permit. On public lands or lands you do not own, lease, or have the permission of the landowner, you may not cut, root up, sever, injure, destroy, remove, transport or carry away a listed plant without a permit. There are exemptions on public lands for forestry, agriculture, and utility or bulk sampling activities

Permits – Two types of permits issued by the Department of Natural Resources can allow take to occur under specific circumstances: Endangered or Threatened Species Permits are used by researchers for scientific purposes; Incidental Take Permits cover unintentional take during otherwise lawful activities. Both types have legal requirements. Permit information and application are available from the Natural Heritage Conservation Bureau.

For more information:

Wisconsin Natural Heritage Conservation Bureau
dnr.wi.gov (Keyword:ER) • 608-261-6449

To learn more about the history of the Endangered Species Act and habitat conservation plans, visit the U.S. Fish and Wildlife Service website:
http://www.fws.gov/endangered/

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Definitions:

Wisconsin Endangered Species:

Any species whose continued existence as a viable component of this state's wild animals or wild plants is determined by the Department (of Natural Resources) to be in jeopardy on the basis of scientific evidence.

Wisconsin Threatened Species:

Any species that appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered.

Visit https://dnr.wisconsin.gov/topic/EndangeredResources/ETList

Karner blue butterfly

Photo by Mike Reese

One of the many things Wisconsinites have to be proud of is the abundance of rare habitats in the state that support the world's largest populations of the federally endangered Karner blue butterfly.

The Karner blue was federally listed as an endangered species in 1992. Although the species is rare nationwide, it is relatively common in Wisconsin, especially where pine barrens, oak savannas, and mowed corridors support wild lupine, the only food of the Karner blue caterpillar. More Karner blues live in Wisconsin than anywhere in the world. Karner blues depend on the wild lupine plant, a beautiful purple wildflower that thrives in the central and northwestern portions of Wisconsin. Land management by the forest industry, corridor managers, and the state can help ensure the continued existence of the Karner blue in these areas. For all things Karner blue go to: ***dnr.wi.gov*** **(Keyword: Karner blue).**

The Wisconsin Karner Blue Butterfly Habitat Conservation Plan (HCP) is unique. Approved in 1999 and renewed in 2009, the plan is based on a legal agreement between the US Fish and Wildlife Service, the Wisconsin DNR, and an array of public and private land managers. Over 50 land managers participate as HCP partners, including representatives from the forest industry, utility companies, and roadway management authorities. This innovative approach to endangered resources conservation was designed to move the regulated community beyond compliance and into efforts to proactively apply conservation measures on the land while engaging in their land management activities. The partnership works in cooperation with countless volunteer groups, landowners and concerned citizens to focus its efforts on a geographic area of Wisconsin with the greatest potential to support Karner blues. Wisconsin's non-industrial private landowners (those with less than 1,000 acres) can participate in the conservation efforts on a voluntary non-partner basis; activities that result in the incidental take of Karners by these landowners will be automatically covered by the HCP.

For more information on the plan, visit:
http://dnr.wi.gov/topic/endangeredresources/karner/determine

Bats and White Nose Syndrome

A fungal disease among bats called White-nose Syndrome (WNS) was discovered in the U.S. in 2006. WNS causes bats to wake up more frequently during the winter, using up their limited fat reserves very rapidly. Dead or dying bats are frequently observed with a white fuzz around their muzzles, hence the name "white-nose syndrome."

Since 2006, WNS has killed nearly 7 million bats and spread across 35 states and 7 Canadian provinces. This decimation of bat populations resulted in the northern long eared bat being federally listed as endangered, effective in March 2023. To continue managing forests while maintaining bat habitat, Wisconsin, Michigan and Minnesota have developed a Lakes States Bat Forest Management Habitat Conservation Plan (HCP). At the time of this publication, the HCP is in the final stages of review with the US Fish and Wildlife Service.

As a forest landowner, you need to consider the effects of forest management activities on bats.

Forested Bat Habitat:

- During the active season, bats use trees as day roosts and form maternity colonies in trees during the pup season.
- Riparian areas and forest openings are important foraging areas for bats.
- Sustainable forest management is an important tool in maintaining and enhancing bat habitat.
- Most forestland is privately owned, so landowners are important partners in bat conservation and habitat management.

Bat Friendly Management Recommendations:

- If possible, avoid disturbance during pup season – June & July.
- Retain all snags except where safety is a concern or there is a threat to the health of the surrounding forest.
- When possible, retain live leave tree groups around snags.
- Retain large trees and as many trees as possible with cavities, cracks, hollows or loose or exfoliating bark.

For more information on the plan, visit: https://dnr.wisconsin.gov/topic/forestplanning/bats

Photo by Dave Redell

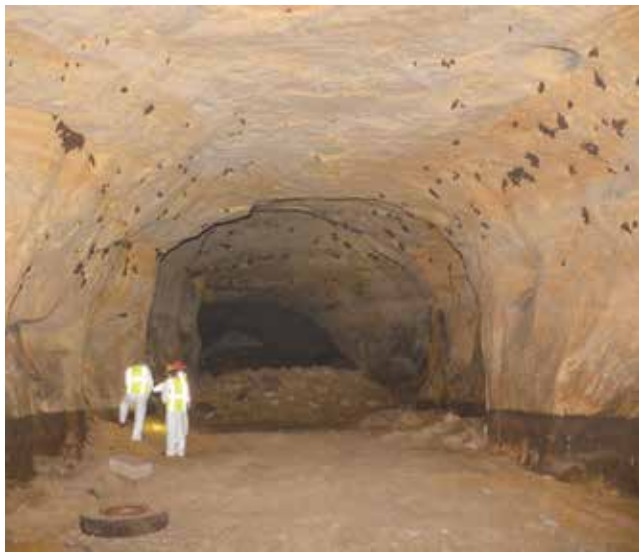

Photo by Heather Kaarakka

Photo by Paul White

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Forests With Exceptional Conservation Values & Special Sites

The forests of Wisconsin, and of the entire United States, are extremely valuable for the resources they provide for worldwide production of paper, packaging, and wood products. Certain places within these forests are also extremely valuable for other reasons. These forests might be home to a globally rare plant, animal, or rare plant or animal community. The forests that provide home to globally significant species are called Forests with Exceptional Conservation Values (FECV).

If a plant, animal, or community is found to be globally rare and especially vulnerable to extinction, then it may be classified as imperiled (G2) or critically imperiled (G1). This designation is similar to the threatened and endangered designations applied to species protected under the Endangered Species Act (ESA).

As a landowner, it is important to be aware of plant and animal species that may be designated as a FECV. You will want to recognize management activities that may affect these species.

A FECV may be a small part of a larger forest, for example, a riparian zone protecting a stream or a small patch of a rare ecosystem. In other cases, the FECV may be the whole of a forest management unit, for example, when the forest contains several threatened or endangered species that range throughout the forest.

SFI Regional Assessment for Forests with Exceptional Conservation Values

To meet the requirements of the 2022 SFI Fiber Sourcing standard, SFI Implementation Commit-

tees (SICs) in Minnesota, Wisconsin, and Michigan worked collaboratively on a Lake States Assessment for FECVs. Trained biologists and foresters reviewed listed G1/G2 species and ecosystems and evaluated the potential for forestry activities to impact them positively or negatively in their respective states. Information gained from the assessment is used to develop training resources and programs to educate landowners, forest managers, and loggers about the importance of FECVs and how to mitigate adverse impacts to imperiled species and ecosystems found within them.

Many imperiled species and ecosystems inhabit aquatic or non-forest environments. Accordingly, adhering to best management practices for water quality and/or avoidance may be adequate to protect them during forest management activities.

The first edition of the regional FECV assessment was completed in late 2022 and serves as a living document that will be subject to annual review to reflect the latest developments in global listings and regional management practices. You can view the assessment by visiting: *https://www.fistausa.org/images/gltpa/documents/2023/LK-States-FECV-Assessment-FISTA.pdf*

How do I know if I have rare species inhabiting my land?

If you are interested in knowing if threatened or endangered species, or imperiled or critically imperiled species and communities have been documented near your property, the Wisconsin DNR's Bureau of Natural Heritage Conservation has a number of tools available at ***dnr.wi.gov*** **(Keyword: NHI data).**

What do I have to do if I have rare species inhabiting my land?

You are not required by law to do anything for imperiled or critically imperiled species and communities unless that species is listed under the U.S. Endangered Species Act and/or listed under applicable state or provincial laws requiring protection. For threatened and endangered species in Wisconsin, visit: ***dnr.wi.gov*** **(Keyword: etlist)**

Photo by Brenda Cooke

Many times, threatened and endangered species and imperiled or critically imperiled species and communities can thrive in managed forests. However, since take of Endangered and Threatened animals is illegal, the Wisconsin DNR has developed guides to help landowners avoid rare animals during forestry and other activities; (e.g., seasonal harvest modifications). The DNR also provides voluntary measures for rare plants and species of animals not legally protected.

Characteristics of SFI Special Sites

Your land may hold sites that have geological

or cultural significance that should be protected for future generations. Such sites may include cemeteries, waterfalls, Indian mounds or other geological or culturally important sites. By preserving these special sites you can enhance your property and ensure these sites will not disappear from the landscape. Some examples of special sites that you may want to consider protecting are caves, seepage slopes, rocky outcrops, and dry sand hills. Your resource professionals can assist you in identifying and protecting these special sites.

Examples of FECVs Impacted by Forest Management in Wisconsin

Jack Pine Barrens

Jack pine barrens occur on flat, sandy soils and are characterized by a low-density canopy of jack pine (*Pinus banksiana*) and minor components of red pine (*Pinus resinosa*) or scrub oak (*Quercus ellipsoidalis* or *Q. velutina*), with openings in which scattered shrubs like hazelnut (*Corylus spp.*) thrive. The ground layer is comprised of prairie grasses and forbs such as little bluestem (*Schizachyrium scoparium*), blueberry (*Vaccinium spp.*), sweet fern (*Comptonia peregrina*), or wild lupine (*Lupinus perennis*). Imperiled species such as Karner blue butterfly (*Lycaeides melissa samuelis*) and Frosted Elfin (*Callophrys irus*) are known to inhabit jack pine barrens. Fire is the most important natural disturbance in this community type, keeping the tree canopy very open. In the absence of fire, oak become more abundant, and then the canopy closes and more shade-tolerant species invade. Logging in overgrown barrens stands can have a similar effect as fire in helping restore the barrens ecosystem. Aside from fire suppression, the greatest threat to this community is conversion to forest through tree planting.

Northern White Cedar – Yellow Birch Forest

Northern White Cedar - Yellow Birch Forest ecosystems are uncommon in far-northern Wisconsin on well-drained to somewhat poorly drained upland soils. The canopy of this community is dominated by white cedar (*Thuja occidentalis*) and a variety of hardwoods, most typically yellow birch

Jack Pine Barrens photo by Eric Epstein.

The Frosted Elfin is an imperiled species that inhabits jack pine barrens.

Little Goblin Moonwort thrives in the shade of closed-canopy forests. Photo by W.C. Taylor

(*Betula alleghaniensis*), paper birch (*Betula papyrifera*), and quaking aspen (*Populus tremuloides*), but occasionally red maple (*Acer rubrum*) and sugar maple (*Acer saccharum*). Associated conifers include balsam fir (*Abies balsamea*), white spruce (*Picea glauca*), and (rarely) eastern hemlock (*Tsuga canadensis*). The forest structure consists of a closed canopy with a well-developed shrub/sapling layer in the understory. The ground layer typically contains woodland forbs and mosses and receives minimal direct sunlight. Heavy logging in this forest community should be avoided as the potential exists to alter the closed canopy characteristics needed to sustain it. An imperiled species that thrives in shaded understory conditions such as those found in Northern White Cedar – Yellow Birch forests or Northern Hardwood Forests, is the Little Goblin Moonwort (*Botrychium mormo*).

Definitons:

Conservation: 1) Protection of plant and animal habitat. 2) The management of a renewable natural resource with the objective of sustaining its long-term productivity in perpetuity while providing for human use compatible with sustainability of the resource.

Critically Imperiled: A plant or animal or community, often referred to as G1, that is globally extremely rare or, because of some factor(s), especially vulnerable to extinction. Typically, five or fewer occurrences or populations remain, or very few individuals (<1,000), acres (<2,000 acres or 809 hectares), or linear miles (<10 miles or 16 kilometers) exist.

Imperiled: A plant or animal or community, often referred to as G2, that is globally rare or, because of some factor(s), is very vulnerable to extinction or elimination. Typically, six to 20 occurrences, or few remaining individuals (1,000 to 3,000), or acres (2,000 to 10,000 acres or 809 to 4,047 hectares), or linear miles (10 to 50 miles or 16 to 80.5 kilometers) exist.

Forest with Exceptional Conservation Values: Critically imperiled (G1) and imperiled (G2) species and ecological communities.

Threatened and Endangered: Listed under the U.S. Endangered Species Act, and/or listed under applicable state laws requiring protection.

Biodiversity

Biological diversity, or 'biodiversity,' is the array or variety of plants and animals and other living things in a particular area. For instance, the species that inhabit California are different from those in Wisconsin, and desert plants and animals have different characteristics and needs than those in the forests of the Midwest, even though some of the same species can be found in all of those areas. Biodiversity also means the number or abundance of different species living within a particular region.

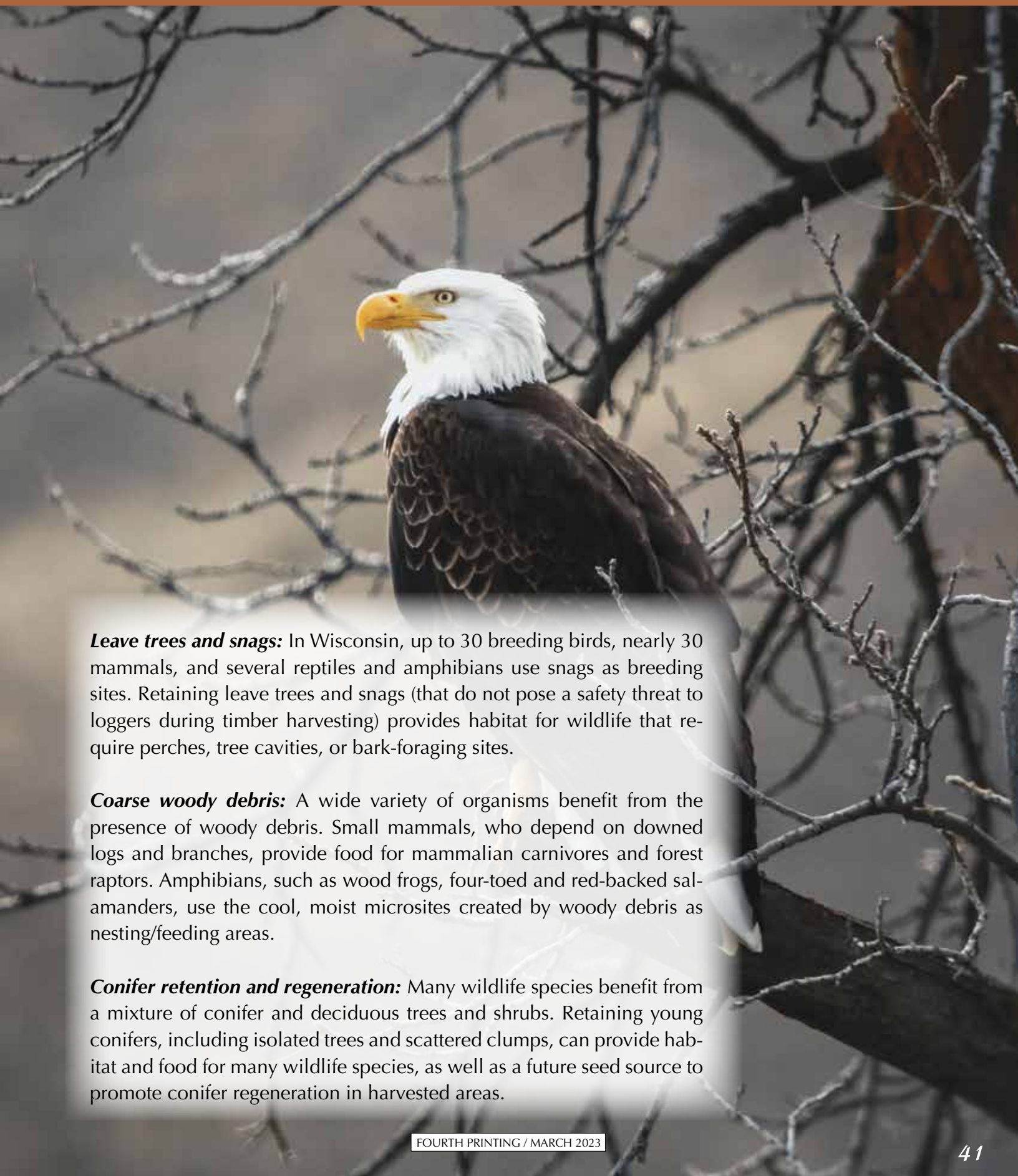
Why is biodiversity important?

Everything that lives in an ecosystem is part of the web of life, including humans. Each species of vegetation and each creature has a place on the earth and plays a vital role in the circle of life. Plant, animal, and insect species interact and depend upon one another for what each offers, such as food, shelter, oxygen, and soil enrichment. Maintaining a wide diversity of species in each ecosystem is necessary to preserve the web of life that sustains all living things.

Wisconsin supports a diverse natural heritage with almost 700 species of vertebrates, well over 2,000 native plant taxa, tens of thousands of invertebrates, more than 730 lichens, and numerous non-vascular plant species. Although not all of these organisms use forested habitats, Wisconsin forests provide important habitat for many of them.

You can play a part in protecting biodiversity. For more examples, read Chapter 3 of Wisconsin's Forest Management Guidelines: ***dnr.wi.gov*** **(Keyword: Forest Management Guidelines).**

Photo by Timothy C. Falnigan



Leave trees and snags: In Wisconsin, up to 30 breeding birds, nearly 30 mammals, and several reptiles and amphibians use snags as breeding sites. Retaining leave trees and snags (that do not pose a safety threat to loggers during timber harvesting) provides habitat for wildlife that require perches, tree cavities, or bark-foraging sites.

Coarse woody debris: A wide variety of organisms benefit from the presence of woody debris. Small mammals, who depend on downed logs and branches, provide food for mammalian carnivores and forest raptors. Amphibians, such as wood frogs, four-toed and red-backed salamanders, use the cool, moist microsites created by woody debris as nesting/feeding areas.

Conifer retention and regeneration: Many wildlife species benefit from a mixture of conifer and deciduous trees and shrubs. Retaining young conifers, including isolated trees and scattered clumps, can provide habitat and food for many wildlife species, as well as a future seed source to promote conifer regeneration in harvested areas.

Climate Smart Forestry

Climate change is a phenomenon that has been apparent since the mid to late 20th century with a general trend of increasingly warmer annual average temperatures across the globe. Much of the change is attributed to increased levels of atmospheric carbon dioxide produced by burning fossil fuels.

Scientists agree that climate change will result in continued temperature increases, changes in precipitation frequency and/or intensity, and longer growing seasons. A likely adaptive response will be that growing range of trees species will gradually migrate northward, following optimal conditions within their suitable habitat. At greatest risk of decline in Wisconsin, are species currently at the southern extent of their native range such as aspen, birch, spruce, and fir. [2 3 5]

"Sustainably managed forests are among our most important tools for addressing climate change. Vigorous and healthy forests that are sustainably managed are more resilient to the impacts of climate change. SFI-certified organizations ensure forest management activities address climate change adaptation and mitigation measures. The SFI Forest Management Standard requires a number of practices with direct climate benefits, such as ensuring forests remain vigorous and healthy, requiring harvested areas to be promptly reforested, and requiring programs and practices that reduce the likelihood of wildfire and reduce the spread of damaging invasive species." [6]

Below is an excerpt from a landowner guide entitled *Protect Your Woods for Tomorrow*, available at ***https://wicci.wisc.edu/wp-content/uploads/landowner-climate-scorecard-and-actions.pdf*** [4]

Climate change will alter the frequency and intensity of threats, such as pest outbreaks, invasive species, wildfires and storms. Our Wisconsin woodlands already face threats from invasive bugs like the emerald ash borer. A changing climate, combined with increased existing pressures, can further jeopardize the recovery of your woods from extreme weather events and other forest stressors. There are several management actions that can help you prepare your woods to cope with the unpredictable conditions that lie ahead. A forester or other natural resource professional can help you determine the appropriate actions or the unique conditions on your land.

Principles of Resilient Forest Management

1. Keep Forests as Forests.

Larger and more connected forest blocks tend to be more resilient and less impacted by stressors such as invasive plants. Aim for the long-term protection of the plant, soil and water resources on your land by considering long-term protection tools like conservation easements and legacy planning that prevent the fragmentation of your woods. Consider updating your management plan. Ensure that rare or unique species and communities are managed and protected.

2. Reduce Stressors.

The changing climate is expected to create more attractive conditions for invasive species, forest pests and pathogens that often outcompete native tree species or even render them functionally extinct. A diverse forest with healthy trees may be able to withstand threats from pests and disease and provide a future seed source. Young tree seedlings are the future of the forest — and often the tastiest morsels for your local deer population. By promoting a diverse community of younger trees, your woodland will be more adaptable to changing stressors in the future.

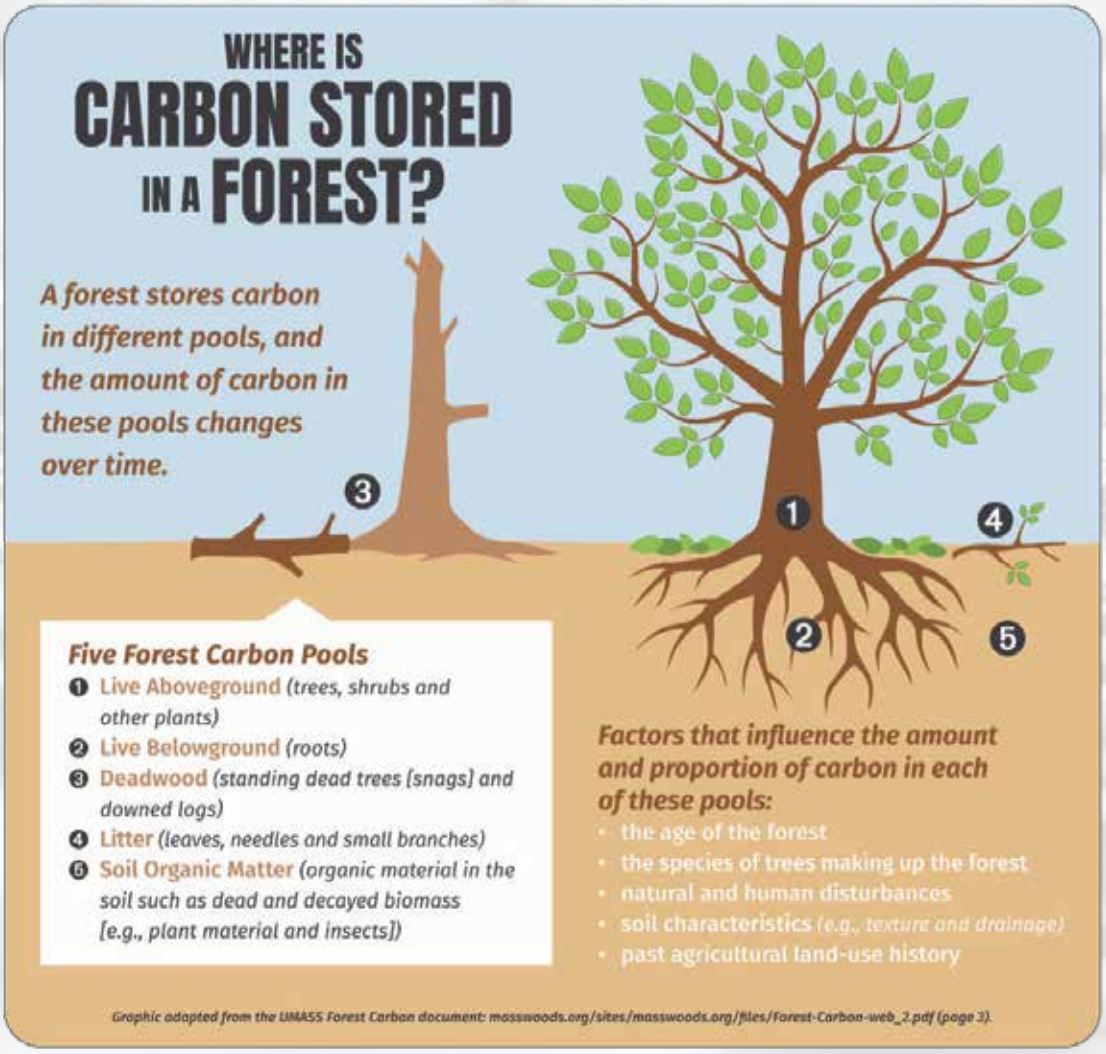
3. Address Vulnerabilities.

As the climate changes, conditions for current tree species will change, too. Hedge your bets and have a variety of native tree species present in your woods so eventual "winners" will be ready to thrive. If your focus is on maintaining a single tree species, you run the risk of that species being unable to handle future conditions — and your whole forest loses out. A diverse forest structure is just as important as the individual species. A woodland with all the same size trees can also be at risk. Keeping a good population of young trees, middle-aged trees and old trees will not only provide diverse places for wildlife to live today, but it will also enable your woods to handle a variety of situations in the future.

Use the scorecard included in the *Protect Your Woods for Tomorrow* guide to assess the conditions and vulnerabilities of your forest and take action to improve forest resilience.

Carbon in Wisconsin Forests[1]

As climate change continues to impact our environment, forests can act as sinks that take in carbon and reduce the amount of greenhouse gas in the atmosphere, helping to curb climate change. Wisconsin's forests hold about 1.162 billion metric tons of carbon. This equates to the annual carbon emissions from 491 million homes' energy use. More than half of forest carbon is stored in the soil, with the aboveground and belowground portions of live trees being the next largest pools. The live tree pools are where forest managers can most greatly influence carbon sequestration and storage through sound forest management techniques. Trees convert atmospheric carbon dioxide into carbon, which makes up about one-half of the dry weight of trees. Carbon sequestration rates vary across species and age; young trees tend to have high rates of sequestration, but old and large trees store more carbon overall. Due to the life cycles of some species, they may not ever reach periods of high storage capacity (e.g., jack pine).



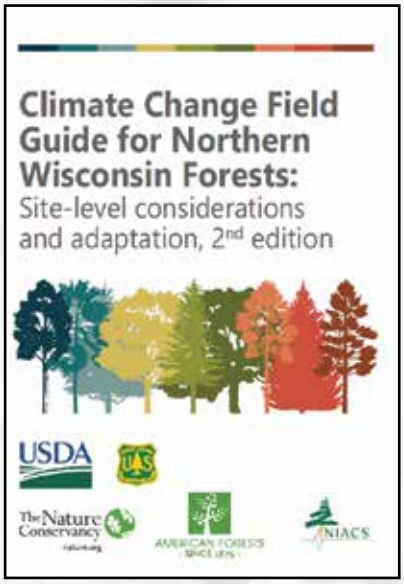
"Sustainably managed forests also produce wood products that sequester carbon for extended periods—often decades. SFI-certified wood products can replace the use of more carbon-intensive products like concrete and steel. That means sustainably managed forests fight climate change while they're growing—and long after they're harvested."

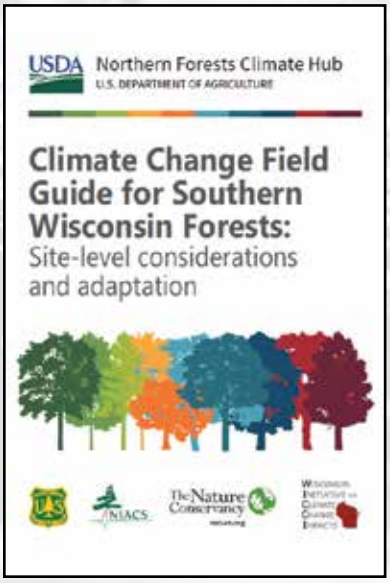
For more resources, visit the following websites:

Wisconsin Initiative on Climate Change Impacts:
https://wicci.wisc.edu/forestry-working-group/

Climate Change Response Framework:
https://forestadaptation.org/

Wisconsin Department of Natural Resources:
https://dnr.wisconsin.gov/
Search "climate change" and "Carbon in Wisconsin Forests"





Sources of data/acknowledgments:

1 DNR PUB-FR-795 2021: *Carbon in Wisconsin Forests*

2 USDA-Forest Service: *Climate Change Field Guide for Northern Wisconsin Forests: Site-level considerations and adaptation, 2nd edition*

3 USDA-Forest Service: *Climate Change Field Guide for Southern Wisconsin Forests: Site-level considerations and adaptation*

4 *Protect Your Woods for Tomorrow:* https://wicci.wisc.edu/wp-content/uploads/landowner-climate-scorecard-and-actions.pdf

5 Wisconsin Initiative on Climate Change Impacts: *Climate Wisconsin 2050*, November 2016

6 *SFI inc.* https://www.forests.org/climate/

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Protection from Fire

Wildfire management involves the control, containment, and suppression of a wild or uncontrolled fire. A wildfire is defined in Wisconsin state statutes as an uncontrolled, wild, or running fire burning in forest, marsh, field, cutover, or other lands.

Wildfires can cause great damage to woodlands. They may weaken or kill trees, cause wounds where insects and diseases can enter, increase soil erosion, and reduce soil fertility, wildlife habitat, and recreational quality. Fire also can be used constructively to manage forest vegetation.

Forest fires are classified as "surface", "crown", or "ground fires" based on their manner of spread.

Most forest fires in the Midwest are surface fires. They burn only the litter and other small fuels on the forest floor. They may scar the bases of large trees and kill small trees. Crown fires usually start as surface fires that reach into the canopy with the help of dry winds and fuel ladders. They occur most often in conifer stands and are very damaging and difficult to contain. Ground fires burn and smolder below the surface, sometimes going undetected for days or weeks. They consume soil high in organic matter including dried peat and thick litter. They produce enough heat to kill most of the trees in their path by cooking their root systems.

Few woodland owners can afford their own fire suppression equipment. To minimize your risk, consider:

- Maintaining a cleared firebreak around your woodland.
- Establishing a road/trail system around and in your woodland to provide access to all areas.
- Creating a pond as a source of water for fire suppression (and benefit wildlife)!
- Thinning and pruning pine and spruce-fir stands.
- Creating buffer strips of hardwoods around conifers.

- Lopping or chipping slash so it lies close to the ground and decays quickly after harvest.

Obtaining proper burning permits

When used appropriately, burning permits are an important tool in wildfire prevention. They allow the public to burn legal materials in the outdoors and are proven to be effective in protecting lives, property, and natural resources from the damages of unwanted wildfires.

Responsible debris burning means burning when conditions are safe. Call 1-888-WIS-BURN (947-2876) and a customer service representative will issue a free DNR burn permit over the phone. Or, visit the website at ***dnr.wi.gov*** **(Keyword: fire)** to obtain a burn permit online. The permit will be instantly emailed or mailed within 2-3 business days.

After obtaining the annual permit, it is important to check the daily fire restrictions each time before burning by calling the hotline or checking online. For more information on making homes and property more survivable in the event of a wildfire, visit **dnr.wi.gov** ***(Keyword: firewise)***.

Pesticide Use

Pesticides are any chemicals used to control weeds, insects, diseases, or rodents. They can assist in meeting forest management objectives by promoting the establishment, survival, growth, or maintenance of desired species or conditions.

Their benefits are substantial when they are applied correctly. They can, however, cause serious damage or personal injury if used incorrectly. Here are some basic application guidelines:

- Apply pesticides only to control pests known to be established in the area.
- If you do not have experience to apply forest pesticides or are not licensed for applying them to forested areas, work with a licensed professional applicator.
- Always follow label directions. The label contains valuable information about safety, uses, application rates, and environmental hazards.
- During ground applications, be aware of wind and temperature restrictions on the pesticides use.
- At a MINIMUM, wear protective clothing.

Eye protection is essential during mixing.

- Mix only as much pesticide as you need. If you have leftover mix, refill the tank and spray the diluted mix over the treated area. NEVER dump mix into a lake, stream, sewer, ditch, or soil pit. Dilute it and use it.
- Triple rinse the container and apply the rinse material to the treated area. **Never reuse any pesticide container for any other purpose.**

WI DNR: https://dnr.wisconsin.gov/topic/foresthealth/herbicides

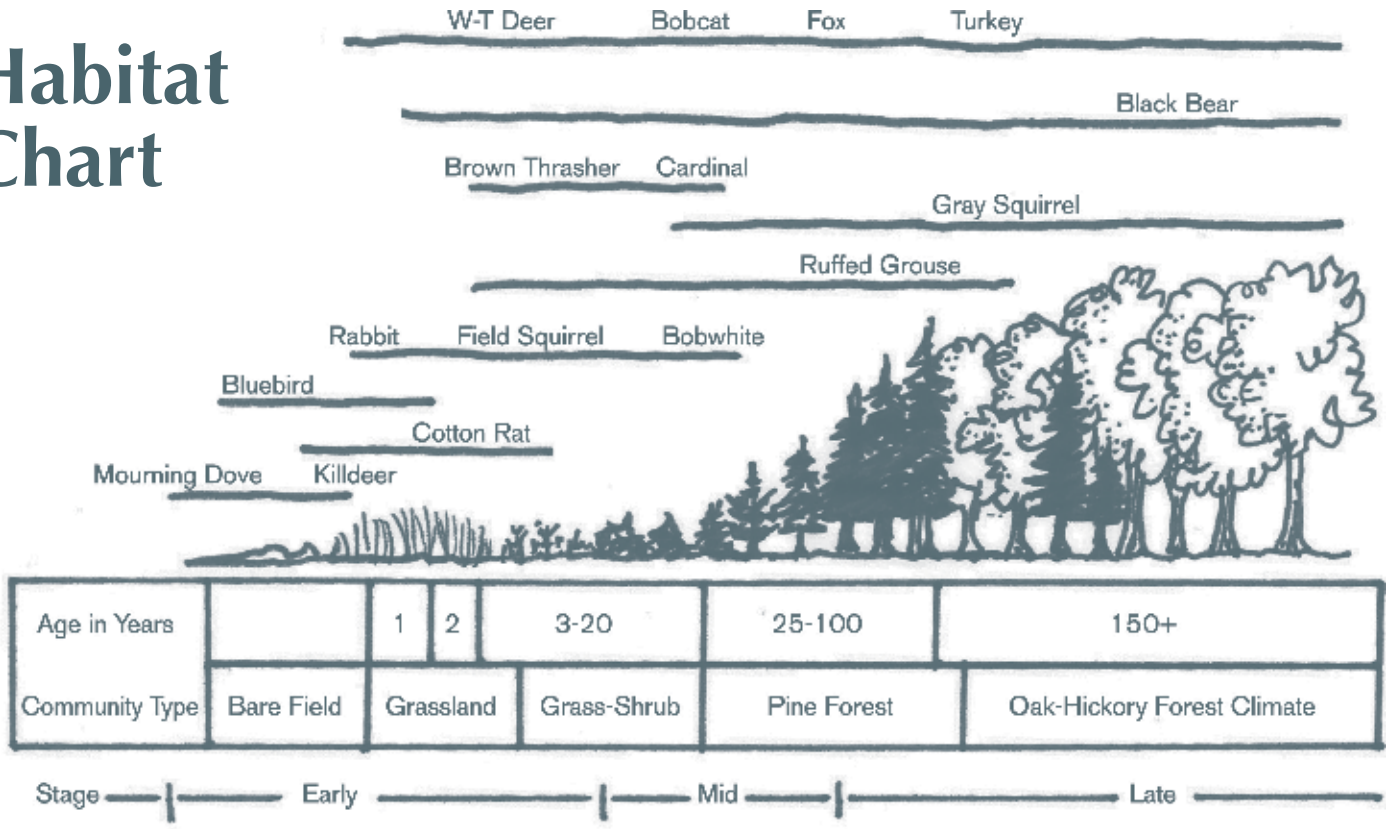
Now that you are more familiar with the basics, the guidelines, and on-the-ground practices, link your forest with your goals. Your forest management plan, professional forester, and timber harvester will help guide you on this path.

Linking Your Forest to Wildlife

Just because you have trees, it does not mean that you will have wildlife. Wildlife has five basic requirements: food, cover, water, reproduction, and space. The arrangement and relationship of habitat types, plant cover, water resources, topography, geology, human activity, and the presence of other wildlife species will dictate the number and kinds of wildlife that will live in your forest.

There is a strong relationship between the management of your woodlands and wildlife habitat. Different wildlife species require different stages of forest growth to meet their five basic needs.

Habitat Chart



For example, many birds and mammals feed on seeds of annual and perennial weeds and grasses that occur in young forests, where sunlight reaches the forest floor. This is early successional habitat (grasses, shrubs, and forbs)

Pileated woodpeckers depend on dead and rotting trees found in mature forests. This is late successional habitat (mature forests). Still other wildlife species prefer mid-successional habitat. Many species require more than one type of habitat. For example, a woodcock requires a forest opening (called its singing grounds) for courtship display, but it also requires a dense bottomland forest for nesting and feeding.

It is impossible to manage for all species of wildlife on one plot of land. By creating habitat diversity, however, you can create wildlife diversity. Use your forest management tools and systems to create diversity. Each successional stage can be managed with forestry knowledge and tools.

Linking Your Forest to Aesthetics and Recreation

Managing your forest is not a matter of choosing between multiple goals. You can simultaneously manage for wildlife habitat, recreation, beauty, and income. Properly planned forestry activities can enhance visual appearance, improve recreational opportunities, and sustain or increase wildlife populations.

You can enhance the visual appearance of your woodland by thinking of it as landscaping on a grand scale. Landscaping is the arrangement of sizes, colors, textures, and forms across your forest.

For example, protect, shape, and create open spaces. They enhance views, improve wildlife habitat, and increase plant diversity.

Manage the edge of your forest. Minimizing the contrast between the opening and the forest is a primary way to manage aesthetics on the forest edge. A soft transition from the low vegetation of the opening to shrubs and then to taller trees can be visually pleasing. Introduce irregularity to straight forest edges. Establish outlying clumps of trees to create a natural appearance. Mix hardwoods and conifer species. Establish trees and shrubs of varied shape, form, flower, or foliage color.

As for recreation, the basic need of many recreational activities is a trail or road system. Plan this carefully! Your trail and road system will also serve as access to timber and as wildlife corridors.

- Manage roadsides with perennial vegetation to enhance wildlife, visual quality, and erosion prevention.
- Plan road placement to minimize the number and extent of roads and skid trails.
- Keep slopes below 10 percent grade to minimize erosion and maintenance.
- Expand openings adjacent to road ('day lighting') to enhance plant diversity and for rapid drying of the road surface.
- Place roads and trails on the contour, taking advantage of natural curves within the landscape.
- Develop narrow paths into environmentally sensitive areas, instead of roads or major trails.
- Surface heavily used roads with low-cost native or natural materials, such as wood chips, bark or mulch.
- Vary the direction of the road or trail for variety, points of interpretive interest, and to maximize users' exposure to natural features, water bodies, and vegetative changes.
- Provide trail markers, benches, and picnic tables to increase the enjoyment of recreational trails and roads.

What are your recreation and aesthetic goals?

- ❑ Bike or hike on trails
- ❑ Hunting / Fishing
- ❑ Horseback riding
- ❑ Camping
- ❑ Bird watching
- ❑ Promote flowering trees/plants
- ❑ Allow others to use your forest
- ❑ Observe fall colors
- ❑ Boating
- ❑ Harvest berries/fruit
- ❑ Park-like appearance
- ❑ Protect historic/unique areas
- ❑ Nature study/photography
- ❑ Wildflower enhancement

Linking Your Forest to Soil Quality

Photo by Brenda Cooke

Soil is one of the fundamental resources of the forest. Identifying and minimizing impacts to the soil is an essential part of managing your forest sustainably. Think about the following considerations pertaining to the maintenance of soil productivity:

- Soil productivity is a major factor in determining the amount of timber harvesting that can be sustained over time. It also affects other forest attributes, such as wildlife habitat, biodiversity, and ecosystem services.
- Soil productivity is a strong influence on the species of trees that will grow on a site.
- Maintaining soil productivity keeps forest soils in a condition that favors regeneration, survival, and long-term growth of desired forest vegetation.
- Maintaining forest soil productivity is less costly than mitigating it after the soils have been damaged.

A handful of soil can tell a forester a lot about the management prospects for a woodland property.

Linking Your Forest to Water Quality

Water is a significant resource of forests. Forests play an important role in the water cycle by contributing to the high quality of water found in Wisconsin's lakes, streams, and wetlands. When a forest is disturbed, the potential for erosion and degradation of water quality increases. Sediment levels, water temperature, stream flow, nutrient levels, and dissolved oxygen levels affect water quality.

The following forest management practices require diligent attention to Best Management Practices and forest management guidelines, regardless of whether the purpose of that management is for timber, wildlife, recreation, aesthetic, or other reasons:

- road and trail construction, maintenance, and use
- timber harvesting and skidding logs to loading areas
- mechanical equipment operation
- controlled burning, particularly fire line construction
- site preparation by hand, chemical, or mechanical methods
- fertilizer application, particularly near water bodies
- minor drainage alterations
- pesticide applications

The transition from aquatic to terrestrial ecosystems is called a riparian area. It is the area of land and water forming a transition from aquatic to terrestrial along streams and lakes.

Riparian areas are among the most important and diverse parts of forest ecosystems. They support high soil moisture and a diversity of associated vegetation and wildlife. They perform important ecological functions that underlie aquatic and terrestrial ecosystems. Riparian areas:

- filter sediment and nutrients from runoff.
- allow water to soak into the ground.
- stabilize lakeshores and stream banks.
- shade streams.
- provide food and habitat for aquatic organisms.

Forestry Best Management Practices for Water Quality are intended to provide simple and cost-effective methods for protecting lakes, streams, and wetlands before, during, and after forestry management activities. Pay attention to them! For more information, go to ***dnr.wi.gov*** **(Keyword: Forestry BMP).**

Linking Your Forest to Timber

Many forests that are being managed for wildlife, recreation, and/or water protection goals can also produce timber, and thus an income. Often the revenues from timber can finance the steps you are taking to achieve the other goals for your woodland. Forest management can be environmentally friendly and profitable. Well-managed forests share some common features:

- A written forest management plan guides activities.
- There are minimal numbers of diseased, insect infested, or damaged trees.
- Boundaries and corners are clearly marked and maintained.
- Tree species are suited to local climate, soils, and markets.
- Forests are protected from fire and destructive grazing.
- Access is easy and is controlled.
- Best Management Practices are followed.

The range of practices you use over the life of your forest is called the silvicultural system. It links timber harvesting, tending, and regeneration in a logical sequence to meet your goals for your woodland.

Planting & Regenerating

Establishing or regenerating a forest can be achieved by either artificial means: primarily planting trees, or by natural methods: relying on seed, sprouts and/or naturally occurring seedlings. These practices are used to restock the forest with desirable trees. There are a number of different regeneration methods. The specific type of woods you have usually determines the method that works best. Natural regeneration is letting nature takes its course, which it will do through root suckering, stump sprouting, or natural seeding to start new trees after a harvest.

If you want to be certain of the type or quantity of trees you want, it may be preferable to consider artificial regeneration – sowing seeds or planting seedlings.

Timber Stand Improvement

Your forest will be healthier and more productive if it is taken care of. Taking care of trees as they mature will improve the vigor, health, and composition of your woodlands. This is called "tending." Tending your forest might include manipulating: the stocking (number of trees per acre), species composition, and competition levels. Generally speaking, trees or weeds that do not contribute to your objectives for timber production, wildlife, aesthetic or recreational goals can be eliminated in favor of more desirable components in your stand. Tending also includes pruning, releasing selected trees (removing the competition around them), controlling invasive species, and "thinning." Thinning is a harvesting method that will improve the structure, growth, and quality of the stand and provide economic returns.

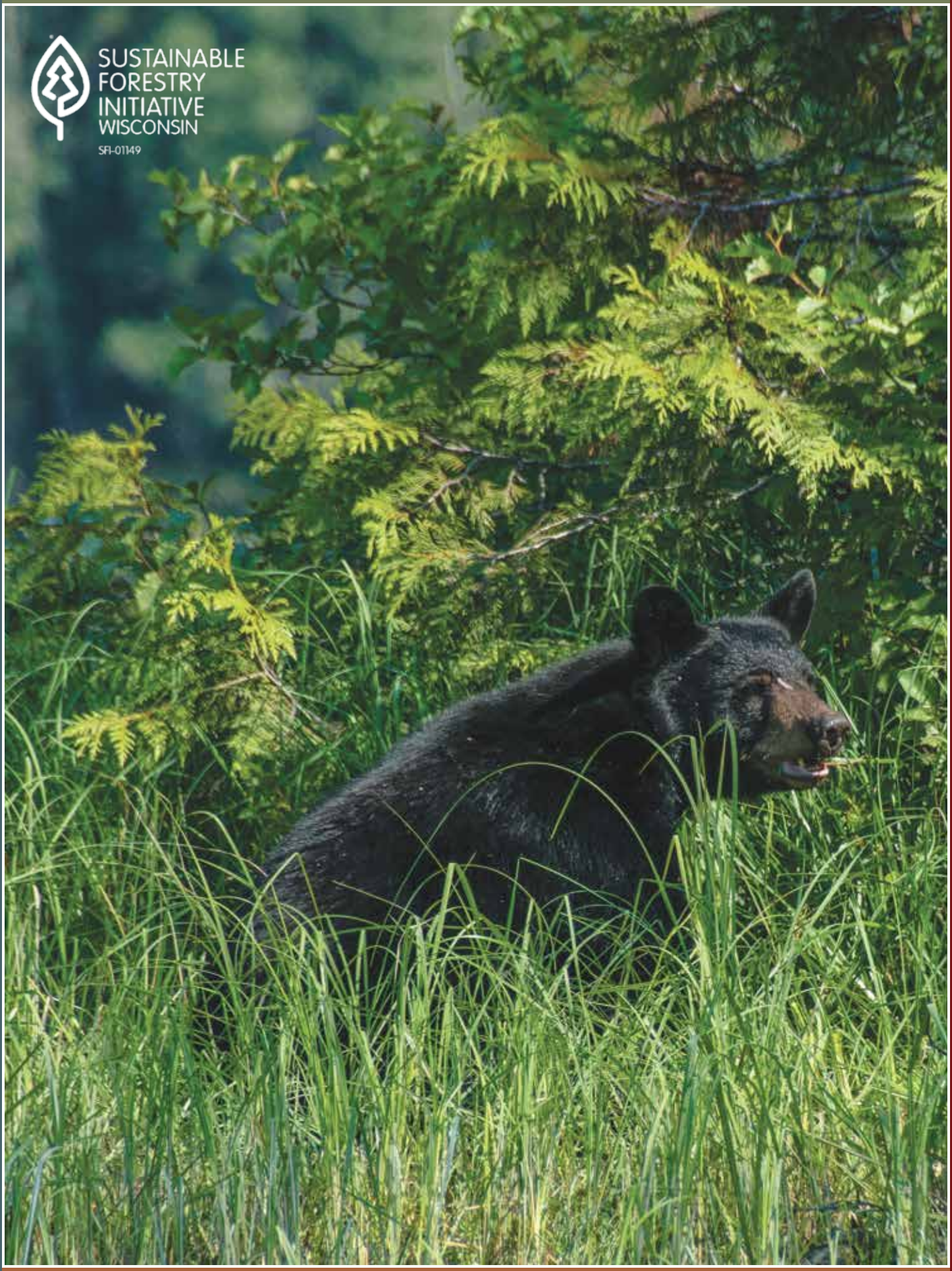
Harvesting

Forests are often harvested when all or many of the crop trees reach financial or biological maturity. Harvests create significant changes in appearance and the landscape. Many harvests create diverse habitat while producing income for the owner. The key is to plan and receive professional assistance before the harvest.

Pre-harvest planning will help you meet your objectives. Several options can be used that relate to your forest regeneration planning strategy. A light and frequent harvest (selection and group selection systems) regenerates forest with trees of many ages and sizes – typically shade-loving tree species. More complete harvests (shelterwood, seed tree, and clearcutting) create more sunlight. Therefore, faster growing, sun-loving trees flourish under these systems. Major or complete harvests tend to give rise to stands of a fairly uniform age. Trees can be harvested by hand or machine, then moved, or "skidded" to a loading area, or "landing." Here the wood is piled, or "decked" for a truck to load it and haul it to market.

Timber harvesting, skidding, and hauling on forest roads and trails are potential causes of erosion, soil degradation, and sedimentation. With the assistance of a professional forester, you can make a pre-harvest plan that will result in a good timber sale, harvest contract and adequate oversight of the process to minimize environmental impacts.

Landowner's Notes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