SFI IMPLEMENTATION COMMITTEE

WISCONSIN

Wisconsin's Forests

The Private Landowner's Handbook

First printed, August 2014

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[R] (SFI[R]) 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 over $2.9 million to interests providing forestry training, education, safety and sustainable management since 1996. Organizations receiving Wisconsin SFI financial support in 2014 include: Forest Exploration Center, Forest Industry Safety & Training Alliance, Ruffed Grouse Society, Trees For Tomorrow, Wisconsin Department of Natural Resources, Wisconsin Master Logger Certification Program, and Wisconsin 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.

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Table of Contents

YOU the private landowner and forest management ..... **Page 1**

Wisconsin's Forests
Where is it and who owns it? What's so important about it? How much is there? ..... **Page 2**

Section I: Your Guides to Private Forest Land Management ..... **Page 3**
Forest Management Planning ..... **Page 4**
Types of Forestry Assistance: Industrial, Public, Private Consulting ..... **Page 6**
Tree Farm/Private Land Forestry ..... **Page 7**
Your Timber Harvester ..... **Page 9**

Section II: Guidelines, Standards, and Practices ..... **Page 13**
Wisconsin's SFI and Forest Certification ..... **Page 14**
Wisconsin's Forest Management Guidelines ..... **Page 16**
Wisconsin's Forest Tax Laws ..... **Page 17**
Wisconsin's Best Management Practices ..... **Page 18**
Biomass ..... **Page 19**

Section III: On the Ground ..... **Page 21**
In this section you will find the walk and talk of forest management. Refer to it often as you acquire knowledge about forest terminology, and about the path you are on as a forest landowner and land manager.
Forest Management Systems ..... **Page 22**
Reforestation/Afforestation ..... **Page 25**
Aliens in Your Woods ..... **Page 27**
The Rare Ones in Your Woods ..... **Page 29**
Forests and Habitats of Special Significance ..... **Page 31**
Biodiverstity ..... **Page 34**
Climate Change and Forestry ..... **Page 35**
Protection from Fire ..... **Page 37**
Pesticide Use ..... **Page 38**

Section IV: Linking Your Forest with: Wildlife, Recreation & Aesthetics, Timber, Soil and Water Quality ..... **Page 39**
Now that you are a bit 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 ..... **Page 40**
Linking Your Forest to Aesthetics & Recreation ..... **Page 41**
Linking Your Forest to Soils and Water Quality ..... **Page 43**
Linking Your Forest to Timber ..... **Page 45**

Appendices

(A) Sample Forest Management Plan ..... **Page 47**
(B) List of Helpful Resources ..... **Page 48**
(C) Wisconsin's Threatened and Endangered Species List ..... **Page 49**

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.

- Best Management Practices ..... pg. 18
- Biodiversity ..... pg. 34
- Certification ..... pg. 14
- Conservation of Critical Wildlife Habitat ..... pg. 31
- Forests with Exceptional Conservation Value ..... pg. 31
- Invasive Species ..... pg. 27
- Management of Harvest Residue ..... pg. 43
- Reforestation and Afforestation ..... pg. 25
- Threatened and Endangered Species ..... pg. 29
- Visual Quality Management ..... pg. 41

Wisconsin Landowner Handbook:

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Why you? Why forest management?

A forest is more than the trees you see standing. It is a complex ecosystem of flowers and fruits, swamps and streams, butterflies and bears!

Forests take a long time to grow; the decisions you make today will have long-term impacts on the forests of tomorrow.

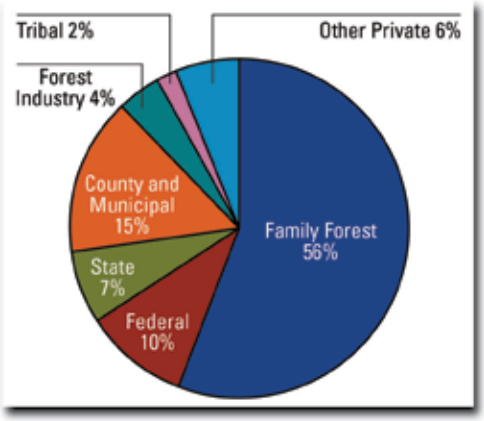


Figure 1.
Forest acres by ownership category.

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 own the majority (56%) of those forests. The state owns just seven percent, and the federal government, 10 percent.

In the public sector, counties and municipalities own the largest amount of forestland: 15 percent. This is followed by private corporations and other groups (six percent), forest industry (four percent), and tribal lands (two percent).

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.

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.

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.

Eighty percent 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.

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

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 almost nine percent, or 1.3 million acres.

Section 1:
Your Guides to Private Forest Land Management

Page 4 Forest Management Planning

Page 6 Types of Forestry Assistance: Industrial, Public, Private Consulting

Page 7 Tree Farm/Private Land Forestry

Page 9 Your Timber Harvester

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.

Photo by Brent Flint

Forest Management Planning: Why? How?

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. Appendix (A) is an example of a management plan.

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

You are a short-term caretaker of long-term renewable resources. *Wisconsin Woodland Owners Association*

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
- ❑ 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 350,000 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 over 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 Assistance Locator**).

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 608-267-7494.

Consultants 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.

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

The Forestry of Private Lands and the Tree Farm Program

Joe Arington, Wisconsin Tree Farmer, was selected as the National Outstanding Tree Farmer of the Year during the National Tree Farmer Convention held in July 2013, in Minneapolis, Minnesota.

As one of 350,000 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 Section II, pg 12 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 5,200 volunteer inspecting foresters across the country who make themselves available as certifiers. 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***.

There are 37,846 members of the American Tree Farm System in Wisconsin.

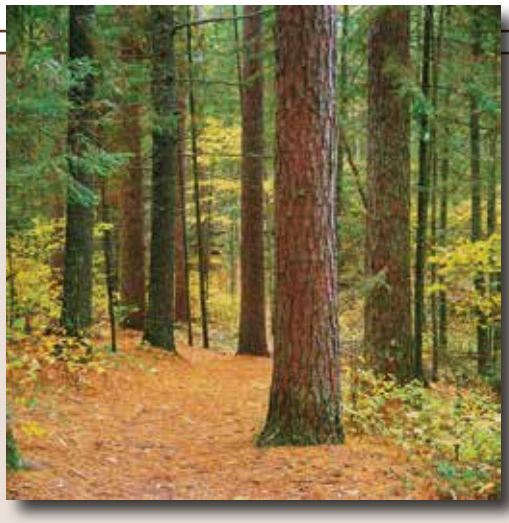


Photo by Brent Flint

The Tree Farm Program

The American Tree Farm System® (ATFS) includes 27 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 • ***witreefarm@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 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 55481 • ***www.wisconsinwoodlands.org***

The Harvester

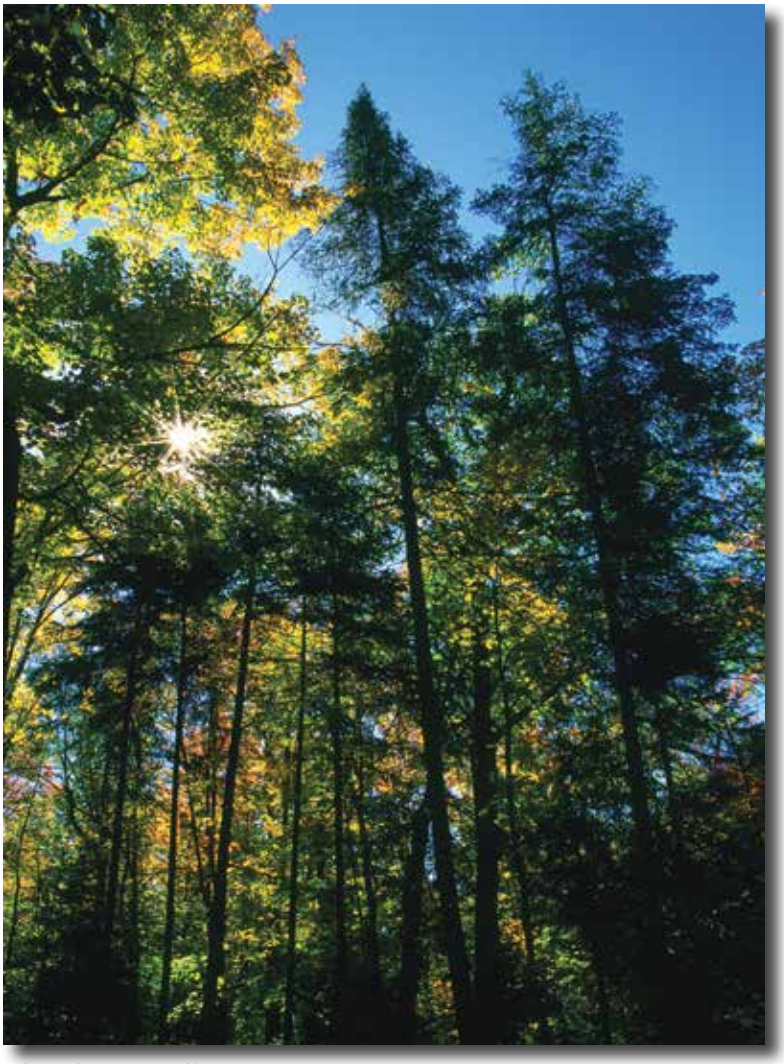


Photo by Brent Flint

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.

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.

Wisconsin landowners will have no problem finding skilled logging professionals, as they can be found throughout the entire state. 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 necessary 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 Sustain-

able 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 to the standards set by SFI. The training includes a twoday core curriculum of Best Management Practices (BMPs) for Water Quality and BMPs for Invasive Species, along with annual requirements for continuing education. All training is tracked in the FISTA data base and is generally available upon request.

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.

Notably, the state has created the Wisconsin Master Logger Certification Program (MLCP). Established in 2003, the MLCP currently has 55 members. 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 240 million acres (100 million hectares) are certified to the SFI forest management standard, the largest single forest standard in the world.

Photo by Brent Flint

Section II:
Guidelines, Standards, and Practices

Page 14 Wisconsin's SFI and Forest Certification

Page 16 Wisconsin's Forest Management Guidelines

Page 17 Wisconsin's Forest Tax Laws

Page 18 Best Management Practices

Page 19 Biomass

Photo by Brent Flint

Wisconsin is fortunate in having a number of guiding principles and management practices that will ensure the state's forests are meeting today's needs, while being managed sustainably for future generations. You will find some of those important guidelines in this section.

Principles and Guidelines to Managing Wisconsin's Forests

"Sustainable management"

is a familiar phrase throughout forestry circles. The phrase is never at risk of being overused – only our natural resources bear that risk.

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

Sustainable management is not just a charge to you, the private landowner who recreates, hunts, and fishes Wisconsin's woodlands. It is the responsibility of those who harvest trees for forest products – Wisconsin's forest products industry.

Forest products companies demonstrate their commitment to SFI by helping to improve forestry practices on industrial woodlands, but also by promoting

Continued on page 15

"The SFI program can be characterized as a program that began with strong industry focus on forest lands that were acquired or owned for the production of forest products, to which it adds an important environmental dimension.

"Voluntary third-party forest certification began in the 1990s in response to market concerns about forest management and illegal logging, primarily in developing countries.

"The SFI program was launched in 1994 as one of the U.S. forest sector's contributions to the vision of sustainable development established by the 1992 United Nations Conference on Environment and Development. Its original principles and implementation guidelines began in 1995, and it evolved as the first SFI national standard backed by third-party audits in 1998."

Excerpt from: "Beginner's Guide to Third-Party Forest Certification: a report of Dovetail Partners, Inc.

Sustainable Management... *Continued from page 14*

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.

Why is SFI important to you, as a private forest landowner in Wisconsin? Participating companies in SFI provide procurement programs, landowner outreach, and logger and forester training programs focused on sustainable management – thereby affecting millions of acres of forestland.

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

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.

Jobs:
The forest industry employed more than 55,000 men and women in 2012 creating impressive economic benefits for Wisconsin.

Wisconsin's Forest Management Guidelines

Wisconsin is fortunate to have more than nearly 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.

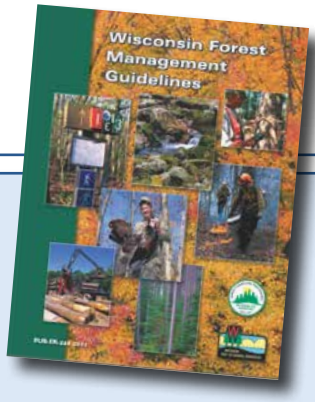
One outcome of that consciousness was the development of *Wisconsin Forest Management Guidelines (FMG)* ***dnr.wi.gov*** (**Keyword: Forest Management Guidelines**).

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 Barn Owl.



Wisconsin Forest Management Guidelines:
http://dnr.wi.gov/topic/forestmanagement/guidelines.html#toc

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.

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 three million acres (19 percent of the state's total forestland) are enrolled in the Managed Forest Law (MFL) program This enrollment encompasses more than 44,000 parcels.

Participating landowners agree to follow a Department of Natural Resources (DNR) approved management plan in exchange for reduced annual property taxes. Landowners also pay a 5 percent yield tax on commercial timber harvested on their properties. Participants enroll in the program for either 25 or 50 years.

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.**

When enrolled in the MFL, *in exchange for following a written management plan and program rules, landowners pay forest tax law program rates in lieu of regular property taxes.*

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. To be eligible, a landowner must have a minimum of 10 acres of contiguous land and at least 80 percent of that land must be 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: cpw**). 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 65,000 people and contributes over $20 billion to our state's economy every year. Forests not only contribute directly to Wisconsin's economy, but also indirectly protect water quality and water-based economies. Sport fishing alone generates $2.7 billion in business and provides $200 million in tax revenue for local and state government.

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.

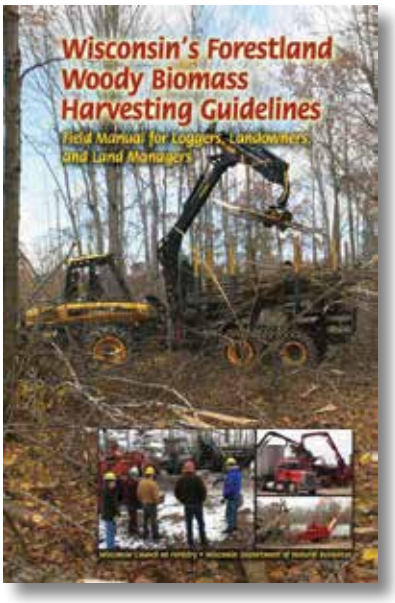
The Forestry BMPs for Water Quality Program is a *non-regulatory program*; however, the use of BMPs *is mandatory in a number of situations*. On public lands, such as national forests, state forests, and county forests, following BMPs is a requirement of timber sales.

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

To download a copy of Wisconsin BMPs, go to:
dnr.wi.gov **(Keyword: Forestry BMPs for Water Quality).**

Photo by Brent Flint

Biomass: *Biological material derived from living, or recently living organisms. (Biomass Energy Centre)*



"Biomass" may not be a household word, but it is becoming one that returns to the table during discussions focused on the management of the state's natural resources. Biomass energy is a resource that derives energy from wood or plant material or residue, biological waste, crops grown for use as a resource or landfill gases. Common examples in Wisconsin are:

- woody biomass such as logging residue,
- energy crops such as switchgrass, and
- agricultural biomass such as corncobs and stover — the stalks and material left after harvest.

In Wisconsin, guidelines for biomass harvest were developed by Wisconsin's forestry community. These guidelines are designed to ensure that woody biomass is a sustainable forest product and that increased extraction of woody biomass does not compromise the long-term productivity of Wisconsin's forestland.

Wisconsin's Forestland Woody Biomass Harvesting Guidelines were developed to limit the impacts of harvesting of woody biomass on: a) biodiversity conservation, b) soil nutrient depletion, c) physical properties of soil, and d) water quality.

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.

Harvesting woody biomass typically removes more woody material from forests than traditional harvest methods. With the emergence of markets for biomass, concerns have been raised about sustainability, including the potential loss of soil nutrients, reduced wildlife habitat, and compaction of forest soils. The Wisconsin Council on Forestry recognized the need for the harvesting guidelines to ensure that woody biomass removals do not compromise the long-term productivity of Wisconsin's forestland and that woody biomass is a sustainable, reliable forest product for landowners and timber producers.

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. States with harvesting guidelines include:

Minnesota (2007)	Missouri (2010)
Wisconsin (2008)	Maine (2010)
Pennsylvania (2008)	Maryland (2010)
Michigan (2010)	

Harvesting Woody Biomass

Harvest of fine woody material is limited or partially limited on three categories of soils: 1) shallow soils (lithic bedrock within 20 inches of the surface), 2) dry nutrient-poor sandy soils, and 3) soils classified as "dysic Histosols" (wetland soils with at least 16 inches of organic material that are nutrient-poor). Lists of soil map unit components are developed by the Natural Resources Conservation Service. The most recent updates will appear on Web Soil Survey at ***http://websoilsurvey.nrcs.usda.gov/app/***.

Traditional timber harvests have generally removed wood or biomass greater than four inches in diameter for use in forest products. In non-traditional 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. In addition, biomass harvests may include the removal of small-diameter trees and shrubs. The harvest of fine woody material from forests results in increased removals from a site, and therefore a higher level of nutrient export and other impacts. It is important to note that the guidelines apply to any sale of fine woody material regardless of whether the product is used for energy production.

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

Examples from Wisconsin's biomass harvesting guidelines:

Guideline 1.A: Retain and limit disturbance to down coarse wood debris already present, except on skid trails and landings.

Background and Implementation Notes

The goal of Guideline 1.A is to protect down woody material on the forest floor – stumps, logs, and branches– to address site nutrient, wildlife habitat and biodiversity concerns. Specifically, coarse woody debris (CWD) is dead woody material found on the forest floor and in waterways that is at least 4 inches in diameter inside the bark at the small end of the piece of wood. If the woody material is less than 4 inches in diameter, then it is fine woody debris (FWD) and is discussed in Guideline 2.A.

Biomass harvests should not include pre-existing CWD. That material is to be left on site. Care should be taken to avoid running over CWD with equipment. Route skid trails around large relic pieces of CWD as much as possible.

Guideline 3.A: Do not remove the forest litter layer, stumps, and/or root systems.

Background and Implementation Notes

The forest floor is a layer made up of organic materials, including leaves, needles, bark and wood, that lies above the mineral soil. The organic material exists in various stages of decomposition. Numerous insects, microbes and fungi feed on the litter and play an important role in nutrient cycling.

Retaining the forest litter layer, stumps and root systems on a site will help protect nutrient levels and prevent soil erosion. Soil moisture is conserved by the protective layer, providing better growing conditions for tree seedlings and other plants. The forest floor also provides important habitat features for wildlife.

In some instances it may be necessary to move stumps and root systems during site preparation, but the material should still be retained on the site so that nutrients contained in that material are not lost.

Section III:
On the Ground

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

Page 22 Forest Management Systems

Page 25 Reforestation/Afforestation

Page 27 Aliens in Your Woods

Page 29 The Rare Ones in Your Woods

Page 31 Forests and Habitats of Special Significance

Page 34 Biodiversity

Page 35 Climate Change and Forestry

Page 37 Protection from Fire

Page 38 Pesticide Use

Photo by Brent Flint

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 the next page will help you to understand them.

Photo by Brenda Cooke

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

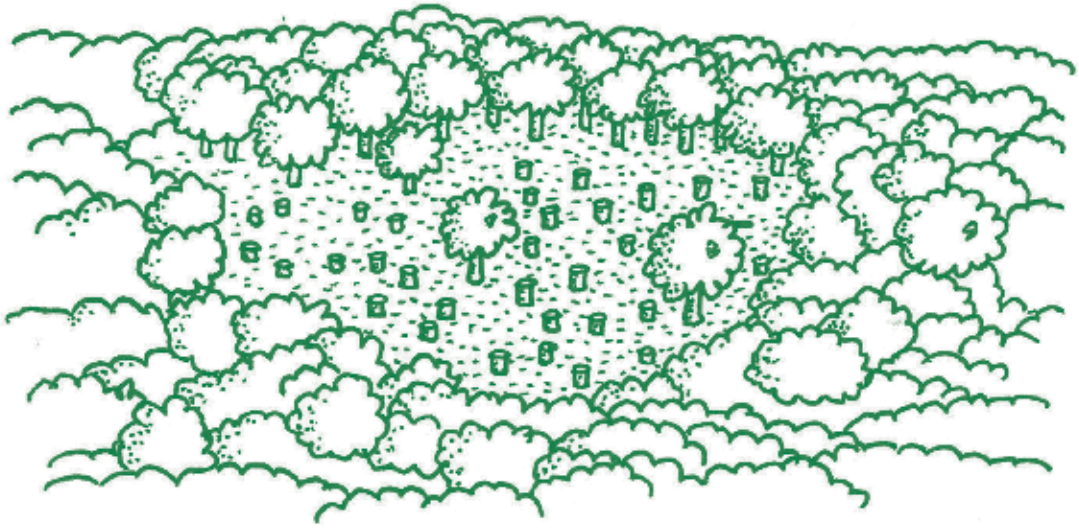
Light-demanding species that reproduce best in full sunlight:

aspen, balsam poplar, black cherry, black walnut, butternut, easter cottonwood, Jack pine, northern pin oak, red pine, river birch, tamarack, white birch

Wisconsin Forest Management Guidelines

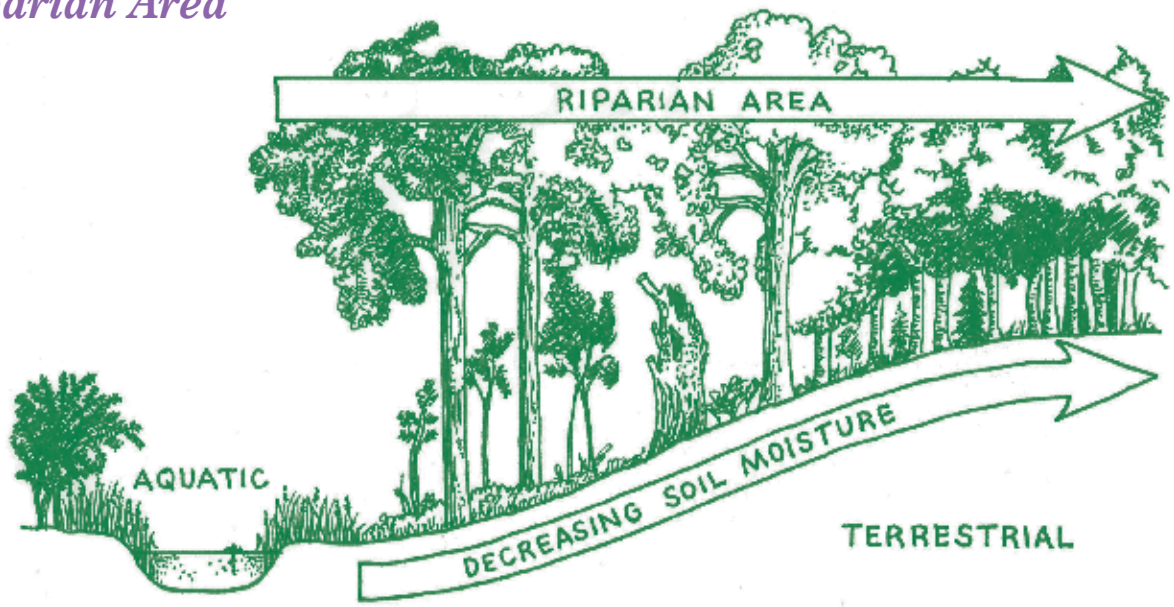
Graphics of Silvicultural Systems

Clearcut System

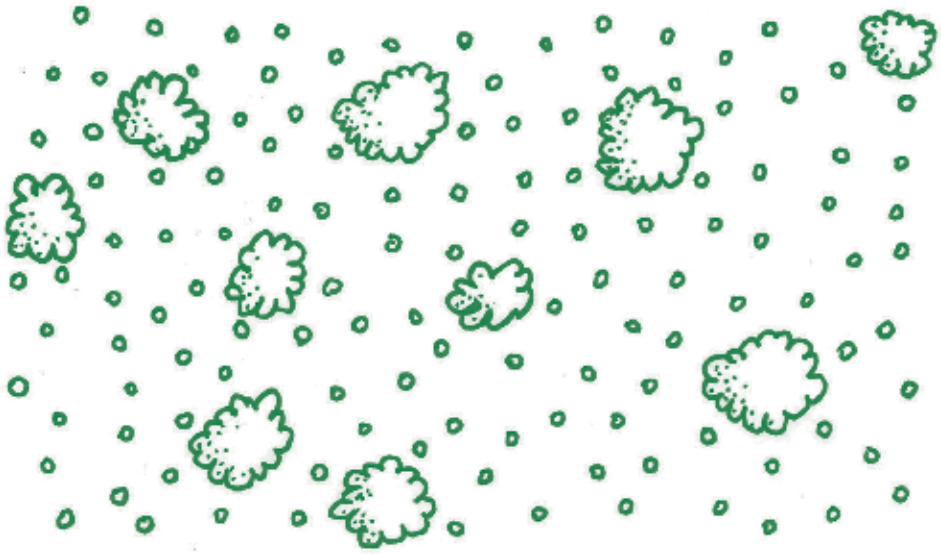


A clearcut removes most or all of the woody vegetation greater than 2 inches in diameter in a given area. Trees regenerate from stump sprouts, direct seeding, or replanting. Stump sprouts are the new growth that comes from the stump of a cut tree. A clearcut is one of the most efficient and easiest harvests 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 statewide 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.

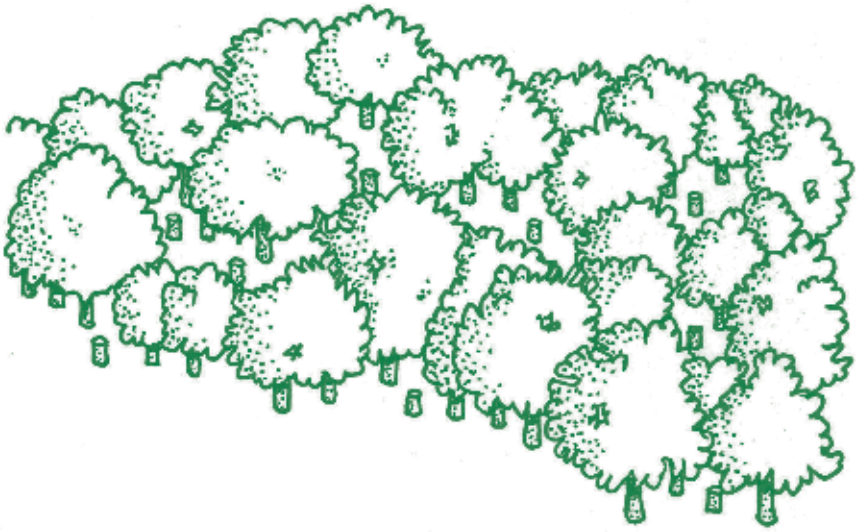


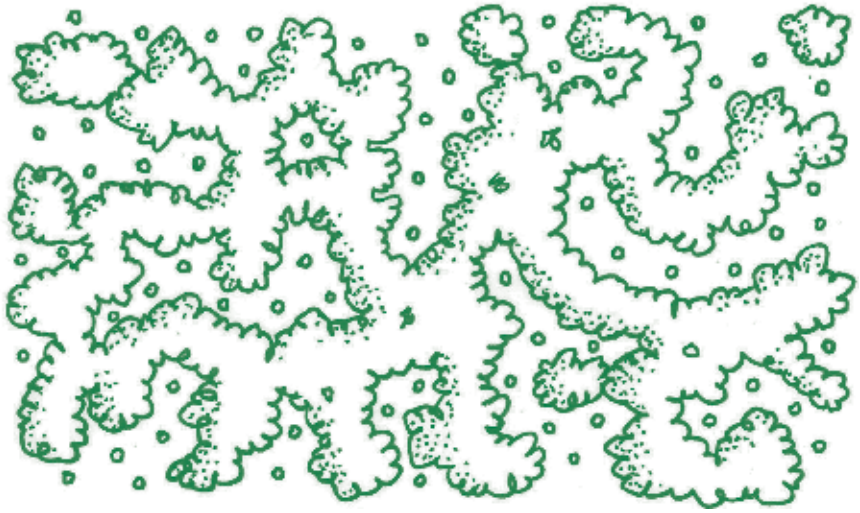
Seed Tree System

A seed tree harvest is similar to a clearcut 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.

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 hit northwest Wisconsin in 2011.

"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 silviculural systems as described in Section III, pgs. 23-24

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 United States. 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 page 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. Also visit ***http://wisconsinforestry.org*** to learn about voluntary best management practices to keep invasive species from spreading.

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

Garlic Mustard

Garlic mustard 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.

Invasive Tree Profile: Buckthorn

Why is it a problem?

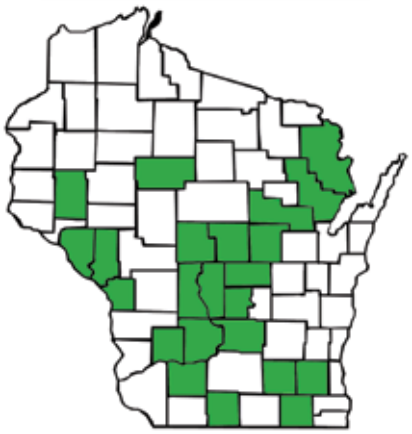
Buckthorn has been sold for years as a hedge; it has dense branches and grows new leaves early in spring and holds onto them late into the fall. In the woods, buckthorn thickets can prevent light from reaching wildflowers and tree seedlings for the entire growing season. Without light, these native plants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

Invasive Animal Profile: Emerald Ash Borer

Why is it a problem?

Emerald ash borer (EAB) 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. It is estimated that more than 50 million ash trees are dead or dying in the Midwest because of this insect. Wisconsin's woods contain more than 770 million ash trees, nearly 7% of all the trees in the state. For up-to-date information about EAB in Wisconsin, go to ***dnr.wi.gov*** (**Keyword: emerald ash borer**).

Invasive Fungus Profile: Annosum Root Rot



Confirmed counties in Wisconsin with annosum root rot (as of April 2013)

Why is it a problem?

Annosum root rot, 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 annosum root rot 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 annosum to move from tree to tree underground. Learn more at ***dnr.wi.gov*** (**Keyword: annosum**).

Honeysuckle

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.

Oak wilt

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 immediate 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.

See Appendix C for a list of Wisconsin's Threatened and Endangered species as of this writing.

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.

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 - No one is exempt from these laws, but an Endangered or Threatened Species "Scientific" Permit or an Incidental Take Permit can allow you to conduct certain activities under specified conditions. The Department of Natural Resources may issue these permits, if they meet certain criteria established by law.

Permit information and application are available from the Natural Heritage Conservation Bureau.

For more information:

Wisconsin Natural Heritage Conservation Bureau
Bureau of Natural Heritage Conservation
dnr.wi.gov **(Keyword:ER) • 608-267-2108**

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/***

Karner blue butterfly

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. The land management that has been practiced by the forest industry, corridor managers, and the state has ensured 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. Forty-two land managers participate as HCP partners, including representatives from the forest industry, utility companies, and roadway management authorities. This innovate 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/ForestPlanning/karnerHCP.html

Forests and Habitats of Special Significance

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 these species are called Forests with Exceptional Conservation Values (FECV).

If a plant, animal, or community is found to be very rare in the world and especially vulnerable to extinction, then it may be classified as imperiled or critically imperiled. This designation is similar to the threatened and endangered designations applied to species protected under the Endangered Species Act (ESA). It is not unusual for imperiled or critically imperiled species and communities with no protection under the ESA to be rarer than some of the species that are protected under the ESA. For example, the red-cockaded woodpecker is listed as a federally endangered species protected under the ESA, but is not classified as globally imperiled or critically imperiled. On the other hand, the Florida bog frog is globally imperiled, but is not protected under the ESA.

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

An FEVC may be a small part of a larger forest, for example, a riparian zone protecting a stream that is the sole supply of drinking water to a community, or a small patch of a rare ecosystem. In other cases, the FEVC 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.

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

If you are interested in knowing if you have threatened or endangered species or imperiled or critically imperiled species and communities inhabiting your land, visit Nature Serve at ***http://www.natureserve.org*** for local programs.

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 pro-

vincial laws requiring protection. For threatened and endangered species in Wisconsin, visit: ***dnr.wi.gov*** (**Keyword: etlist**)

Many times, threatened and endangered species and imperiled or critically imperiled species and communities can thrive in managed forests; however, other species may require management recommendations. At a minimum, when planning a harvest or other forest management activity where imperiled or critically imperiled species and communities occur, you should consider communicating the location and protection measures associated with these sites to your logger or contractor.

Characteristics of Special Sites

Your land may hold sites that have ecological, geological, cultural, or historical significance and that should be protected for future generations. Such sites may include cemeteries, waterfalls, Indian mounds and unusual plant communities or habitats. By preserving these special sites you can enhance, the biodiversity of your property for all who enjoy it including humans, plants, and animals while ensuring these sites will not disappear from the landscape. Your resource professionals can assist you in identifying and protecting these special sites.

Some examples of non-forested sites that you may want to consider protecting as special sites are caves, seepage slopes, rocky outcrops, riparian areas, water bodies (creeks, rivers, pools, and ponds), and natural openings in the forest such as prairies, glades, and dry sand hills. These sensitive sites harbor many of the critically imperiled aquatic and terrestrial species. Temporary pools that fill up with water in the spring are especially important features that contain rare, threatened, and endangered species. All of these areas are important and are often very easy to work around.

Definitions:

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 that is globally extremely rare or, because of some factor, is especially vulnerable to extinction or elimination.

Imperiled

A plant or animal or community that is globally rare or, because of some factor, is very vulnerable to extinction or elimination.

Threatened and Endangered

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

Photo by Brent Flint

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.

Photo by Brent Flint

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.

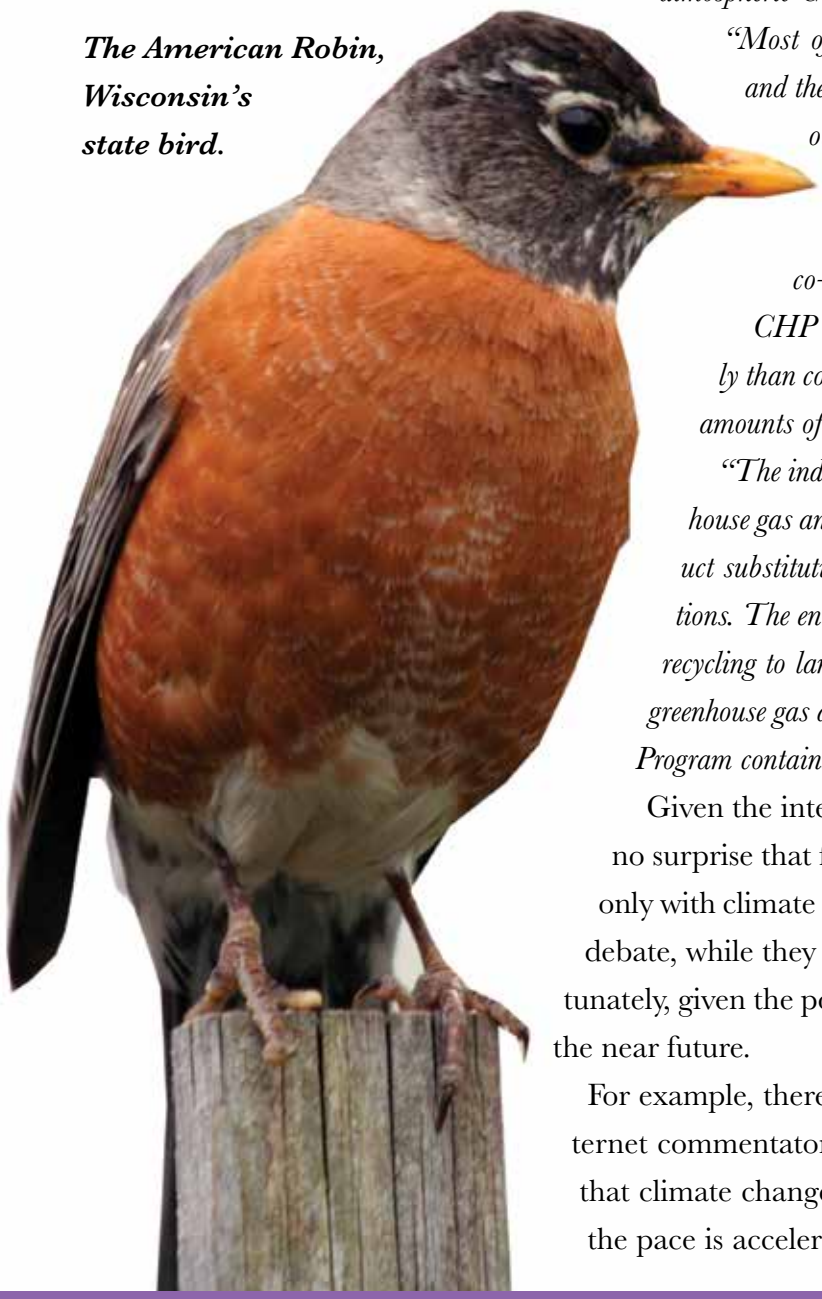
You can play a part in protecting biodiversity. For more examples, read Chapter 3 of Wisconsin's Forest Management Guidelines: ***dnr.wi.gov*** (**Keyword: Forest Management Guidelines**).

- ***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 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 dependent on downed logs and branches in turn provide food for mammalian carnivores and forest raptors. Amphibians such as wood frogs and 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 Change and Forestry

Climate change is currently and arguably one of the most dominant environmental issues. It has created controversy and strongly-held, contrary beliefs among experts, the media and the public. What are the implications for the forestry community? That question has been succinctly addressed by the National Council for Air and Stream Improvement (NCASI), the independent, non-profit, research institute that focuses on environmental topics of interest to the forest products industry:

"The potential implications of the climate change issue to the forest products industry are more complex than for any other industry. The forests that supply the industry's raw material remove carbon dioxide from the atmosphere and store the carbon - not only in trees, but also below ground in soils and root systems, and ultimately in forest products. These forests and their carbon sequestration potential are affected by management practices, climate, and by the rise in atmospheric CO_2.



The American Robin, Wisconsin's state bird.

"Most of the industry's manufacturing facilities require fossil fuels and these fuels generate greenhouse gases when burned. The industry obtains much of its energy, however, from biomass fuels that, unlike fossil fuels, add no new carbon to the atmosphere. The forest products industry is one of the leaders in using co-generation, also known as combined heat and power (CHP). CHP systems produce electricity while using fuels far more efficiently than conventional electricity generation systems, meaning that smaller amounts of fuel are required and fewer greenhouse gases emitted.

"The industry's products compete against products with different greenhouse gas and carbon attributes. As a result, market forces that cause product substitutions can have important greenhouse gas and carbon implications. The end-of-life management options for forest products, ranging from recycling to landfilling and burning for energy, have important but complex greenhouse gas and carbon implications. NCASI's Climate Change Research Program contains elements that address many of these issues and others."

Given the intensity of the national debate over climate change, it is no surprise that forest owners, loggers and foresters are concerned not only with climate change questions, but with the contentious tone of the debate, while they hope for a consensus path forward to emerge. Unfortunately, given the polarizing effects of the debate, that appears unlikely in the near future.

For example, there are scientists, academics, mainstream media and internet commentators who believe it is undoubtable and unchallengeable that climate change is occurring. They believe its magnitude is growing, the pace is accelerating, and the primary cause is anthropomorphic (at-

tributable to human activity). They sense time is running short before a tipping point is passed and a global disaster cannot be avoided. They are the majority and they cite research and computer models as irrefutable and conclusive.

However, other scientists, academics, and communicators voice questions about climate change assumptions and physics, past errors and misstatements by some experts, anomalies in historic records, modeling methodologies and their projections. Some note that Earth's climate is constantly changing (a factor likely contributing to the debate regarding the extent that human activity has on the climate). They also note that change in the climate appears to have halted in recent years and its impacts are uneven globally and inconsistent with predictions based on modeling. Some question whether its existence should be accepted as a "given" or a starting point in this discussion.

At the debate's low points, those most aggressive in their belief of dire environmental outcomes are labeled "alarmists" and may be seen as part of a hoax created to force paradigm changes in U.S. and world energy production and consumption; changes that may prove unnecessary, premature and unaffordable. Similarly, skeptics and critics of the majority perspective are dismissed as scientifically unqualified, labeled "deniers" and may be seen as promoters or unwitting pawns of fossil fuel interests. The political ideologies of "alarmists" and "deniers" alike are considered suspect. Attacks on each other – from discourteous to rude to inflammatory – have occurred. One image of the controversy might be of communication bridges being burnt, not constructed or maintained.

The debate can be frustrating to forest stewards who desire scientifically-sound, applicable answers. Which "side" will history eventually prove correct? Perhaps the larger question is how should the forestry community react? Trees are the basic raw material needed to manufacture the myriad wood-based products on which humanity depends. Without healthy forests there is no forest products industry. Thus, apart from the climate change controversy, if forest health is at risk, effective management strategies are needed and welcomed.

Climate change is described as a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes biotic processes, variations in solar radiation received by Earth, plate tectonics, volcanic eruptions, and human-induced alterations of the natural world.

Photo by Brenda Cooke

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:

- Maintain a cleared firebreak around your woodland.
- If more than 20 acres, consider establishing a road/trail system around and in your woodland to provide access to all areas.
- Create a pond as a source of water for fire suppression (and benefit wildlife)!

- Thin and prune pine and spruce-fir stands.
- Create buffer strips of hardwoods around conifers.
- After harvests, lop or chip slash so it lies close to the ground and decays quickly.

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.**

Photo by Brenda Cooke

- 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.**

Section IV:
Linking Your Forest with: Wildlife, Recreation & Aesthetics, Timber, Soil & Water Quality

Page 40 Linking Your Forest to Wildlife

Page 41 Linking Your Forest to Recreation and Aesthetics

Page 43 Linking Your Forest to Soil and Water Quality

Page 45 Linking Your Forest to Timber Production

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.

Photo by Brent Flint

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.

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).

Continued on page 41

Photo by Brent Flint

Habitat Chart

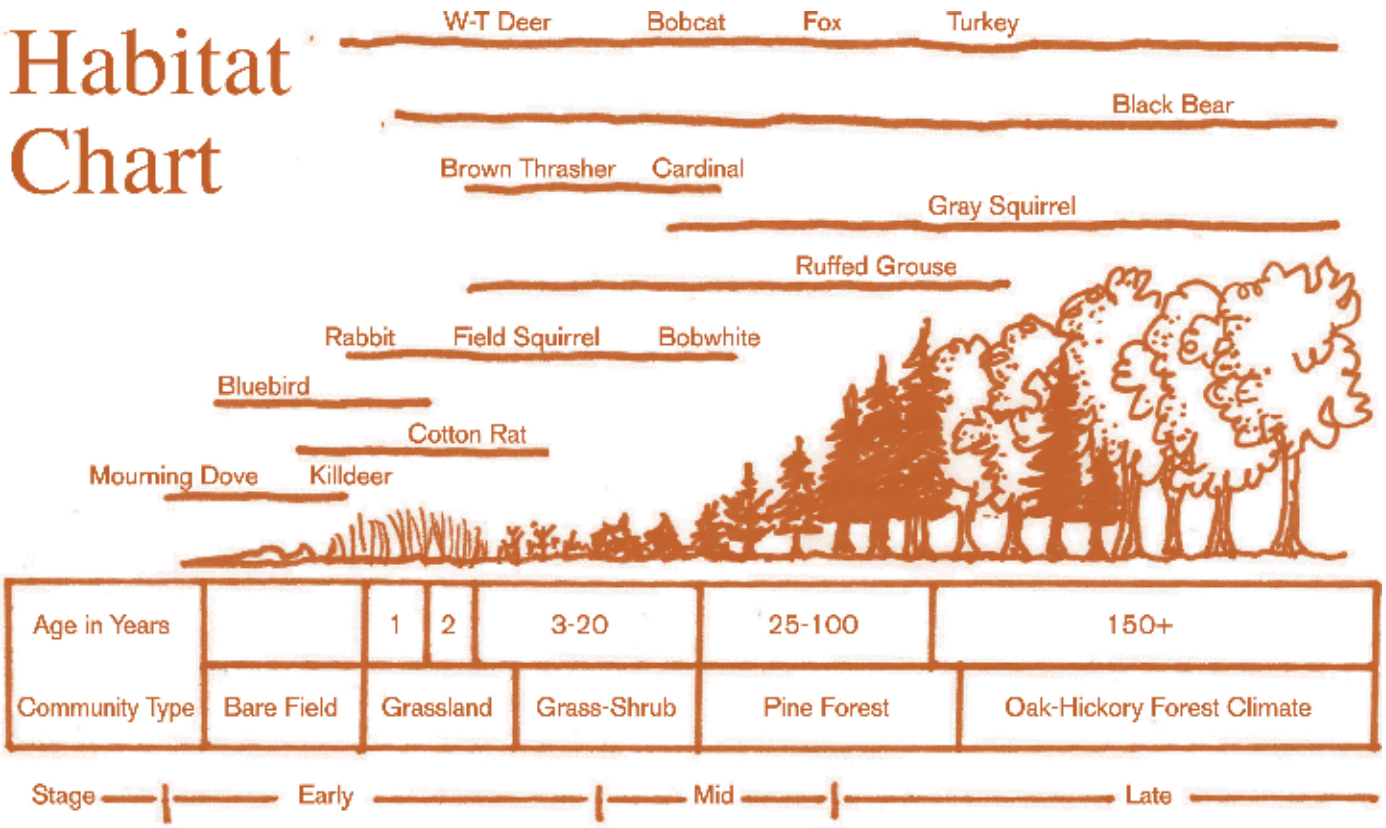


Photo by Brent Flint

Wildlife… *Continued from page 40*

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

Photo by Brent Flint

What are your recreation and aesthetic goals?

- ❑ Bike or hike on trails
- ❑ 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

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 ('daylighting') 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.

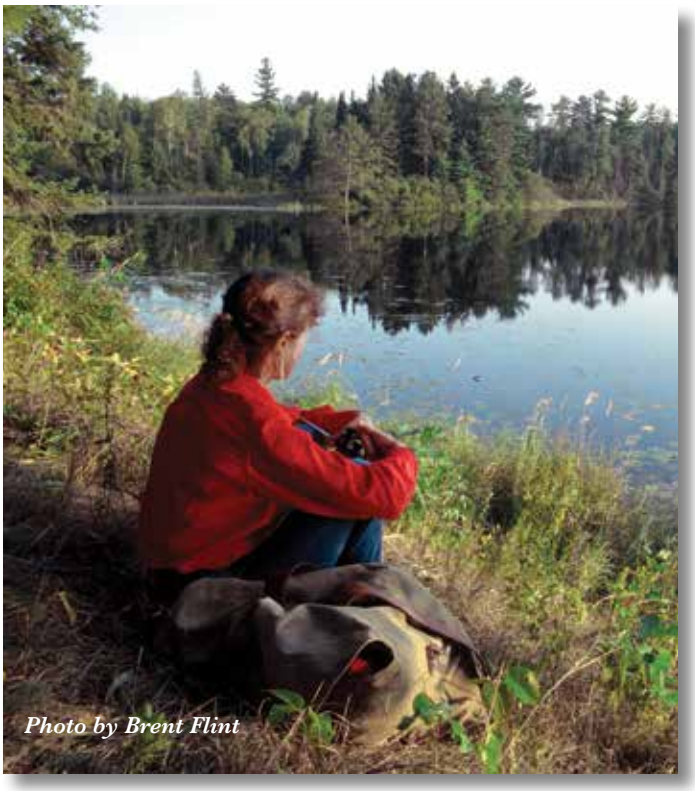


Photo by Brent Flint

- 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.

Linking Your Forest to Soils and Water Quality

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 damage.

Photo by Brenda Cooke

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

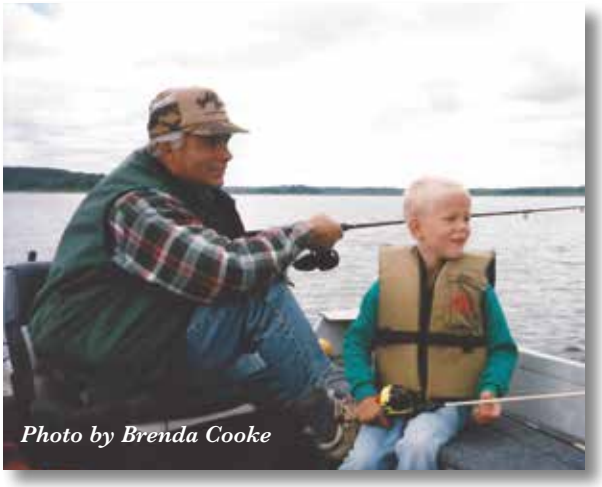


Photo by Brenda Cooke

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

Photo by Brenda Cooke

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.

These 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. They:

- 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 and may include one of the following: 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.

Several options can be used that relate to your forest regeneration planning strategy. Actual removal of trees can be by hand or machine felling; moving (skidding) of the stems to a loading area (deck); and the loading and hauling of the cut timber 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 and harvest contract and adequate oversight of the process to minimize environmental impacts.

Appendix A

Sample Private Forest Management Plan

Forest Management Inc.

Private Forest Harvest Plan

Landowner: Katy Smith	Logger: Charles Bubar	Loc.: Twp. 146 Sec. 30

SAMPLE

Unit Description

In the tall canopy are scattered mature red pine. Mid-story are scattered pole-size aspen and balm with some white birch, red oak, and bur oak. Lowe in the canopy are planted red pine, white pine, and white spruce along with jack pine, red oak, bur oak and sapling aspen and birch. Shrubs include hazelnut, gray dogwood, Juneberry, pin cherry, chokecherry. This is a forest regenerating after a timber harvest – aspen, oak, balm, ash, natural conifer regeneration, and planted conifers.

Stewardship Objective

Maintain diversity of the forest for wildlife, while improving health, financial value, and aesthetics of the stand.

Recommended Management Activities

Clumps of red and bur oak should b e thinned to the best one or two stems. Select the ones that originate lowest on the old stump as these will be less prone to interior decay. The stand can also be thinned to release red pine, white pine, and possibly oaks from overtopping trees.

Pruning can be started on the red and white pine. Remove no more than 1/3 of the live crown in any one year. All pruning and thinning should be done in the dormant season to limit any chance of spreading disease among oaks and also to limit the buildup of bark beetles in conifers.

Loc.: Twp. 146 Sec. 30
Forest County

Scale: 1" = 1/2 mile

Appendix B

List of Helpful Resources

Used with appreciation and permission of Wisconsin Woodland Owners Association publication: "Opening the Door to Resources."

ORGANIZATION	Fish & Wildlife	Woods	Water Quality	Prairies	Goods from the Woods	Legacy	Rural Living	Recreation
Gathering Waters 608/251-9131 www.gatheringwaters.org						✓	✓	
Invasive Plants Association of Wisconsin www.ipaw.org	✓	✓	✓	✓				
National Wild Turkey Federation 920/347-0312 www.nwtf-wi.org	✓							
Natural Resources Conservation Service 608/662-4422 x258 www.wi.nrcs.usda.gov	✓	✓	✓	✓		✓	✓	✓
The Prairie Enthusiasts 262/473-2956 www.theprairieenthusiasts.org	✓			✓				✓
Quality Deer Management Association 800/209-3337 www.qdma.com	✓	✓					✓	✓
Ruffed Grouse Society 888/564-6747 www.ruffedgrousesociety.org	✓	✓					✓	✓
US Fish & Wildlife Service 608/221-1206 x14 www.fws.gov/midwest/WisconsinPartners	✓		✓	✓				✓
University of Wisconsin-Extension 608/262-2655 www.uwex.edu/	✓	✓	✓	✓	✓	✓	✓	✓
University of Wisconsin-Stevens Point Forestry Outreach 715/346-4128 www.uwsp.edu/cnr/fop/		✓			✓	✓	✓	
Whitetails Unlimited 800/274-5471 www.whitetailsunlimited.com	✓	✓						✓
Wisconsin Association of Lakes 800/542-5253 (WI only) www.wisconsinlakes.org	✓		✓				✓	✓
Wisconsin Bird Conservation Initiative 608/264-8528 www.wisconsinbirds.org	✓							✓
Wisconsin Cities & Towns http://www.wisconsin.gov/state/core/wisconsin_ cities_towns_and_villages.html							✓	
Wisconsin Department of Agriculture 608/224-5012 http://datcp.wi.gov/	✓	✓	✓			✓	✓	
Wisconsin Department of Natural Resources 608/266-2621 http://dnr.wi.gov/	✓	✓	✓	✓	✓	✓	✓	✓
Wisconsin Foresters http://dnr.wi.gov/topic/ForestLandowners/locator/		✓	✓		✓			
Wisconsin Wetlands Association 608/250-9971 www.wisonsinwetlands.org/	✓		✓				✓	
Wisconsin Woodland Owners Association 715/346-4798 www.wisconsinwoodlands.org	✓	✓	✓		✓	✓		✓

Appendix C

Wisconsin's Endangered and Threatened Species List

Effective Dates of Listing

(A) October 1, 1972
(B) October 1, 1975
(C) May 1, 1978
(D) October 1, 1979
(E) November 1, 1981
(F) December 1, 1982
(G) April 1, 1985
(H) August 1, 1989
(I) August 1, 1997
(J) October 1, 1999
(K) June 1, 2011

Note: This is a partial list. Also included on Wisconsin's E&T Species List are Reptiles and Amphibians, Snails, Fishes, and Mussels. For a complete list, go to ***http://dnr.wi.gov/topic/EndangeredResources/documents/WiETList.pdf***

Mammals

ENDANGERED

(A) American Marten

THREATENED

(K) Big brown bat
(K) Little brown bat
(K) Northern long-eared bat
(K) Eastern pipistrelle

Birds

ENDANGERED

(D) Piping Plover**
(H) Yellow-throated Warbler
(I) Snowy Egret
(B) Peregrine Falcon**
(H) Worm-eating Warbler
(D) Loggerhead Shrike
(F) Red-necked Grebe
(H) Caspian Tern
(D) Forster's Tern
(D) Common Tern
(H) Bewick's Wren
(D) Barn Owl

THREATENED

(I) Henslow's Sparrow
(D) Red-shouldered Hawk
(D) Great Egret
(I) Yellow Rail
(I) Spruce Grouse
(H) Cerulean Warbler
(H) Acadian Flycatcher
(H) Yellow-Crowned Night-Heron
(H) Kentucky Warbler
(D) Greater Prairie-Chicken
(H) Bell's Vireo
(H) Hooded Warbler

Plants

ENDANGERED

(E) Carolina Anemone
(D) Hudson Bay Anemone
(D) Lake Cress
(G) Purple Milkweed
(D) Green Spleenwort
(D) Alpine Milk Vetch
(E) Prairie Plum
(G) Coopers Milk Vetch
(I) Prairie Moonwort
(E) Moonwort
(G) Goblin Fern Floating Marsh
(D) Marigold
(G) Wild Hyacinth
(E) Crow-spur Sedge
(I) Smooth-sheathed Sedge
(D) Hop-like Sedge
(D) Intermediate Sedge
(I) Schweinitz's Sedge
(E) Brook Grass
(D) Stoneroot
(D) Hemlock-parsley
(E) Beak Grass
(D) Lanceolate Whitlow Cress

(I) Wolf Spike-rush
(D) Angle-stemmed Spikerush
(D) Harbinger-of-Spring
(D) Chestnut Sedge
(E) Umbrella Sedge
(D) Northern Commandra
(G) Pale False Foxglove
(H) Bog Rush
(H) Prairie Bush Clover*
(E) Dotted Blazing Star
(D) Auricled Twayblade
(I) Fly Honeysuckle
(E) Smith Melic Grass
(D) Large-leaved Sandwort
(I) Mat Muhly
(I) Louisiana Broomrape
(H) Fassett's Locoweed*
(D) Small-flowered Grass-of-Parnassus
(E) Smooth Phlox
(E) Butterwort
(D) Heart-leaved Plantain
H) Eastern Prairie White-fringed Orchid*
(I) Western Jacob's Ladder
(D) Pink Milkwort
(G) Spotted Pondweed
(E) Rough White Lettuce
(D) Great White Lettuce
(D) Pine-drops
(D) Small Shinleaf
(E) Small Yellow Water Crowfoot
(I) Lapland Buttercup
(D) Lapland Rosebay
(D) Wild Petunia
(D) Sand Dune Willow
(I) Satiny Willow
(I) Hall's Bulrush
(G) Netted Nut-rush
(G) Small Skullcap
(E) Selago-like Spikemoss
(I) Fire Pink
(E) Blue-stemmed Goldenrod

THREATENED

(E) Northern Monkshood*
(G) Muskroot
(G) Roundstemmed False Foxglove
(D) Yellow Giant Hyssop
(G) Small Round-leaved Orchis
(I) Prairie Indian Plaintain
(G) Dwarf Milkweed
(E) Wooly Milkweed
(H) Prairie Milkweed
(G) Pinnatifid Spleenwort
(G) Forked Aster
(G) Kitten Tails
(I) Sand Reed
(H) Large Water Starwort
(H) Calypso Orchid
(D) Carey's Sedge
(H) Beautiful Sedge
(H) Coast Sedge
(G) Handsome Sedge
(D) Garbers Sedge
(E) Lenticular Sedge
(H) Michaux's Sedge
(H) Drooping Sedge
(D) Prairie Thistle
(D) Dune Thistle*
(D) Rams-head Ladys-slipper
(D) White Ladys-slipper
(D) English Sundew
(E) Linear-leaved Sundew
(G) Pale Purple Coneflower
(E) Beaked Spike Rush
(D) Thickspike Wheatgrass
(D) Western Fescue
(G) Blue Ash
(I) Yellowish Gentian
(G) Cliff Cudweed
(D) Round Fruited St. John's Wort
(H) Dwarf Lake Iris
(H) Slender Bush Clover
(E) Bladderpod Broad-leaved
(D) Twayblade
(E) Brittle Prickly Pear
(D) Clustered Broomrape
(E) Marsh Grass-of-Parnassus
(E) Wild Quinine
(D) Sweet Coltsfoot
(H) Tubercled Orchid
(E) Bog Bluegrass
(D) Braun's Holly Fern
(D) Prairie-parsley
(G) Algal-leaved Pondweed
(E) Sheathed Pondweed
(E) Seaside Crowfoot
(E) Bald Rush
(I) Hawthorn-leaved Gooseberry
(I) Flat-leaved Willow
(I) Tussock Bulrush
(I) Plains Ragwort
(D) Snowy Campion
(I) Dune Goldenrod
(E) Clustered Bur Reed
(D) False Asphodel
(E) Snow Trillium
(E) Spike Trisetum
(E) Marsh Valerian

*** also Federally Endangered*
** also Federally Threatened*

SFI IMPLEMENTATION COMMITTEE

SM

WISCONSIN

SFI-01149