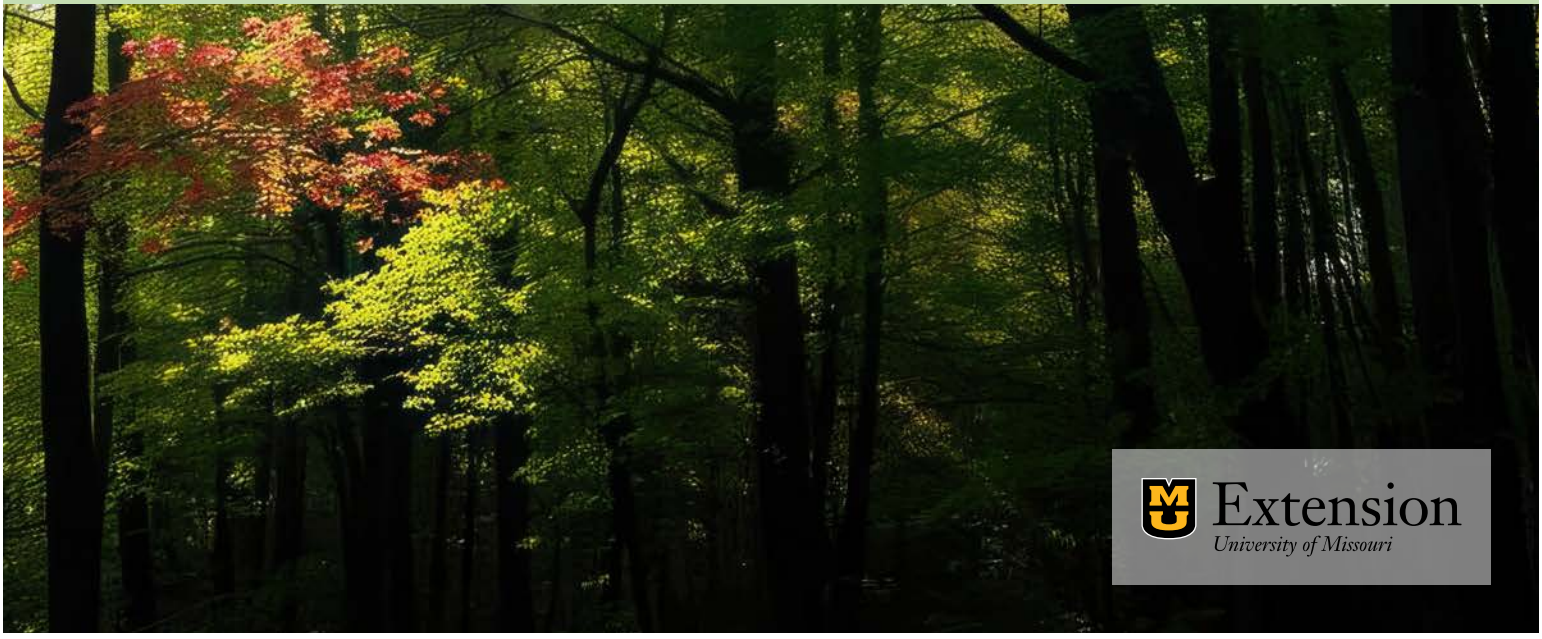
# Woodland Management

## *A Guide for Missouri Woodland Owners*



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# Preface

Landowners have many options for advice on how to manage their woods. Many choose online resources whereas others turn to University of Missouri Extension or the Missouri Department of Conservation. In addition, private consulting foresters are available for a fee to provide private land assistance. (See MU Extension publication G5999, Forestry Assistance for Missouri Landowners,[1] for more landowner assistance options.) However, even with all these options, the number of people available to assist the nearly 176,000 woodland owners who own more than 10 acres of woods is limited. The Missouri Woodland Mentor program is another avenue through which a landowner can gain a trusted source of advice in the form of a Missourian with similar property goals.

Woodland Mentors are landowners that have training and experience they can relate to others. Landowners can work with mentors to gain first-hand knowledge of how they have implemented management on their properties. Mentors may also conduct site visits at their discretion or host events to assist landowners with similar interest and needs.

This guide provides mentors and landowners with research-based tools to understand woodland management options. Through reading it, you will learn how management strategies can be blended with objectives and plans you have for your property.

Throughout this guide, the terms woods and woodland are used to describe land with tree cover. Research has shown that most landowners refer to such land as woods. Woods can take many forms, from closed canopy forest to a more open canopy.

# Acknowledgments

We are grateful to Jessica Holden, Holden Forests and Gardens community forester, for allowing us to use their *Small Woodlot Management Manual: A Guide for Northeast Ohio Landowners* as a framework for this publication. We are also grateful to Billy Beck, Ph.D., Iowa State University Extension forestry specialist; Lenny Farlee, Purdue University Extension forester; Angela George, NRCS state forester; and Robert A. Pierce II, MU Extension fisheries and wildlife state specialist, for their critical review of this publication.

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# Introduction

Whether you own 1 acre or more than 1,000 acres of woods, your land has environmental and economic value. The information presented in this guide can help you learn to manage a woodland of any size, but much of it is directed toward landowners with more than 10 acres of woods.

## *Land ownership in Missouri*

Of the state's 15.4 million wooded acres, 82% are considered family owned; in other words, it is owned by private individuals and groups (Figure 1). Landowners have many reasons for owning woods, such as for recreational use, as a woodland retreat, for nature viewing, to generate revenue from timber sales, for hunting. Many woodland landowners want to see their woods stay intact and healthy for future generations. However, managing these lands can be challenging.

## *About woodland management*

Woodland management is the purposeful stewardship of wooded land. It ensures the future of healthy productive trees and other plants to meet the needs of the landowner and society. Many different management activities can be prescribed for different goals and types of woods. Proper management can provide multiple benefits, including tree health enhancement, better water quality, recreational opportunities, aesthetics, improved wildlife habitat and income. To put it simply, woodland management is identifying goals and taking steps to achieve them — planning, doing and evaluating.

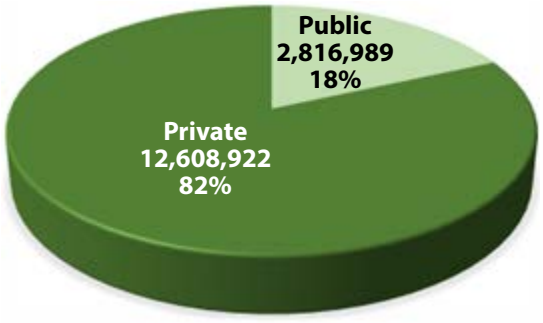



**Figure 1.** Woodland acre ownership in Missouri.

**Key takeaway**

Private landowners hold most of our state's wooded land and, thus, most forest stewardship rests in their hands. Most landowners have the best intent for their woods but, increasingly, Missouri forests are being left idle or mismanaged due to misunderstandings of proper forest management. Trees are a great renewable resource. It is important that we work together to ensure a future of healthy, productive woods.

Many landowners adopt a leave-it-alone mindset. This approach creates conditions that benefit a very specific suite of wildlife. It can also lead to an overmature, declining woods where tree health and species composition may deteriorate. Well-managed woods are:

- Populated with tree species consistent with your objectives
- Filled with healthier, higher-valued trees
- More attractive to a wide variety of wildlife
- Less vulnerable to pests, diseases and storms

# Purpose of this guide

Whatever your reason is for owning woods, this guide provides a shorthand to identifying and navigating available options, management planning, and potential steps you can take on your own or with the help of a mentor or forester. Here you will find resources most relevant to Missouri woodland owners.

Although this guide will not provide answers for everyone, or for every woodland, it provides a place to start or continue with your journey. It is intended to help you identify and achieve your landownership and management goals. Every landowner and woods are different. Use this guide in the way most helpful to you: Highlight, circle or underline the content that is most relevant to your situation. This guide is meant to be interacted with. Scribble, take notes and fill out worksheets if doing so will help you with your land stewardship journey.

If you are new to land management, it might be best to read this document in order. If you already have an idea of your management goals and interests, use the table of contents to locate the sections that are most relevant to you.

# Objectives, options and priorities

What do you love most about the woods you own? Peace, privacy and beauty? Wildlife viewing and hunting opportunities? Income potential through timber sales or alternative forest products? The first steps in managing your woodland are understanding what you have, stating what you value and identifying what you want (Figure 2). Your answers to these questions will guide you toward the management that is needed to maintain or achieve your desired goals for your woods. Your goals should include what you want now and what you want for your land in the future. This section and its worksheets will help you map your answers to these questions.

Many benefits come from a well-managed woodland. Some take minimal work; others may take some investment of time and money. Having goals will help you establish priorities and focus your time and effort on the greatest ones.


**Figure 2.** Well-managed woods provide many benefits.

# Objectives and priorities worksheet

## What is important to you about owning woods?

*Rank the reasons that owning woods is important to you in order of significance with 1 being most important.*

_____ Passed down in family
_____ Recreation
_____ It's an investment
_____ Beauty or peace
_____ Wildlife
_____ The privacy it offers
_____ Nature conservation
_____ Hunting
_____ Firewood
_____ Timber or periodic income
_____ I place little value in my woods
_____ Other forest products (maple syrup collecting, growing mushrooms, etc.)
_____ Other: _____

## What concerns you most about your land?

*Rank the concerns you have about your land in order of significance with 1 being most important.*

_____ Keeping my land intact
_____ Property taxes
_____ Invasive plants
_____ Insects/Disease killing trees
_____ Trespassing
_____ Vandalism
_____ Water pollution
_____ Storm damage
_____ Nearby development
_____ Off-road vehicles
_____ Drought
_____ Climate change
_____ Animal damage to trees
_____ Vandalism
_____ Other: _____

## What activities do you currently use the wooded property for?

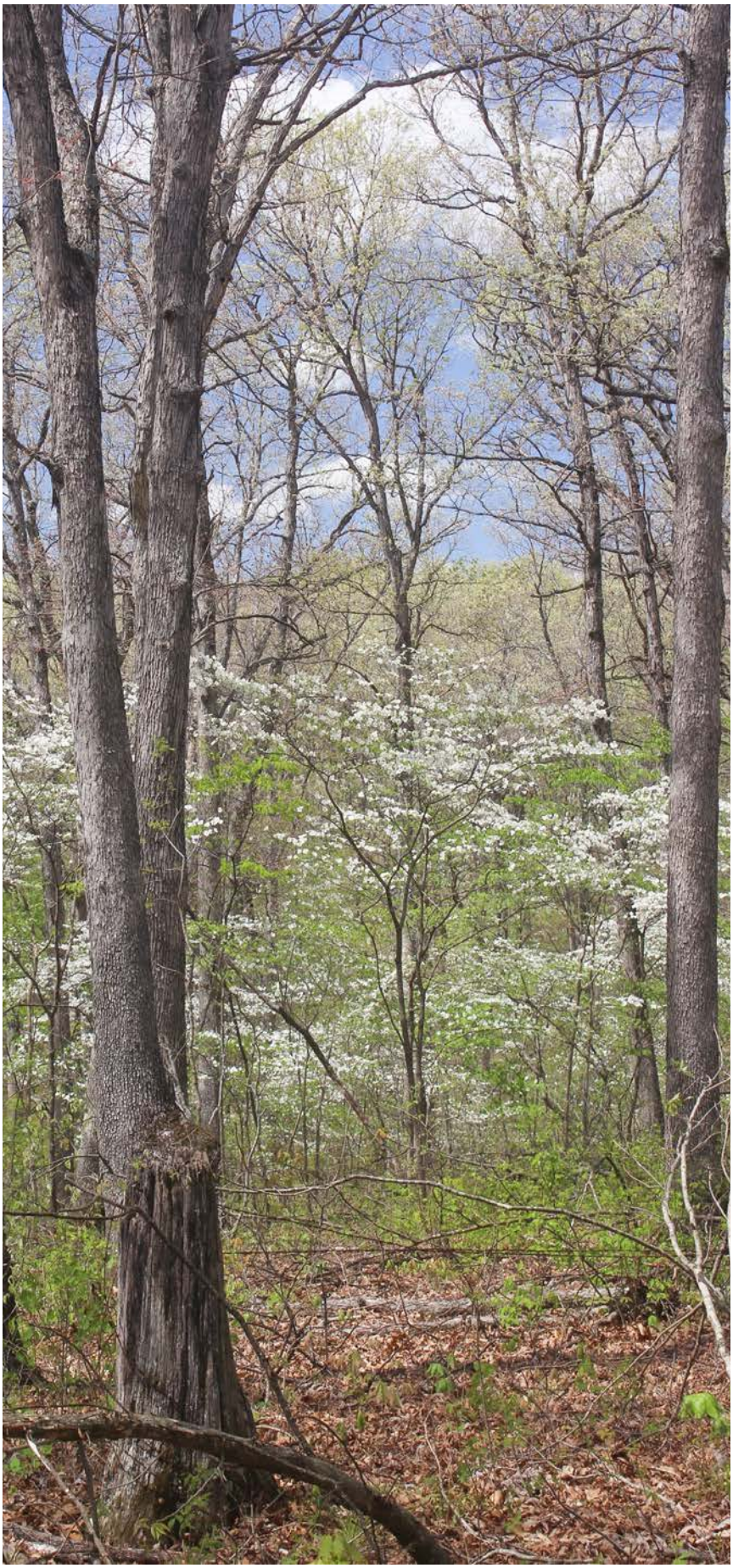
*Rank the activities for which you use your woods in order of significance with 1 being most important.*

_____ Homesteading, hobbies, etc.
_____ Residence
_____ Birdwatching
_____ Hiking or walking
_____ Hunting
_____ Wildlife viewing
_____ Firewood cutting
_____ I rarely spend time in my woods
_____ Generate income
_____ Other: _____

## What goals do you have for your woods?

*Rank the goals you have for your woods in order of significance with 1 being most important.*

_____ Make or keep the woods healthy
_____ Keep the land wooded
_____ Generate immediate income
_____ Pass it down in my family
_____ Improve it for future income potential
_____ Carbon sequestration
_____ Provide periodic income
_____ Manage native systems for biodiversity
_____ Stabilize existing erosion
_____ Maximize ecological benefits
_____ Provide pollinator habitat
_____ Improve it for deer and turkey
_____ Improve it for other wildlife: _____
_____ Making trails, ponds or other recreational improvements
_____ Other: _____



# *Determining realistic and achievable objectives*

One action may accomplish multiple goals, but some goals may compete rather than complement one another. Many landowners tend to have a generic goal like "to manage for wildlife." There is a saying that anytime you manage for one thing, you are managing against something else. For instance, if you want to maintain your woods in mature large timber, you can provide food and cover for wildlife that rely on that habitat type. Food for deer and turkey, or large cavity trees for pileated woodpeckers come to mind. But deer and turkey also benefit from thick brushy areas for foraging and escape cover, and some songbirds will not use mature forests and are found mainly in young forests. To successfully achieve your goals, you must decide which wildlife are most important to you.

The size of your land will also play a role in the achievement of your goals. Timber income may not be feasible on small tracts of, say, less than 10 acres. You may however be able to generate income from alternative forest products such as mushrooms and medicinal herbs. Wildlife of some sort can benefit on any acreage of woods, but the options to manage for a wider variety of wildlife increase with acreage.

To fully determine if objectives are realistic and achievable on your land, you must first assess the forest condition. Once you have done so, you may have to refine your objectives based on your findings. Then, management planning comes into play. At this point, you can blend three aspects of developing a plan:

- What is the condition of your woods?
- What uses of your woods are most important to you?
- What can you do to improve your woods to meet your objectives?

# Understanding your woods

## *Forest assessment phase*

You likely have some ideas of what you want to do with your woods. You probably already know your woods are good for some of these goals, but you may not be certain about others. Understanding what is growing on your property, the health and vigor of your trees, and the species that are present are crucial to management and long-term success. Don't worry if some of these concepts are unfamiliar to you. Assisting you with them is the purpose of this guide and other programs offered by MU Extension. In time, you will learn more about your woods and build an understanding and long-term relationship of stewardship with them.

### The nature of Missouri woods

Here is some general information about the history of Missouri woods and forest types you may encounter.

Missouri woods come in many forest types. On upland sites, oak-hickory forests are common. These woods, as the name implies, are dominated by a variety of oak and hickory species, including black oak, white oak, northern red oak and shagbark or mockernut hickories, just to name a few. As you head into the Missouri Ozarks, you may find oak-pine forests. These woods have similar characteristics to oak-hickory woods, but shortleaf pine becomes a major component in them. The Bootheel was once a vast expanse of bottomland forests. By some accounts, 91% of the Bootheel was forested. Today, it is about 10% forested. These forests included bald cypress, tupelo, cherrybark oak and many other species unique to the Bootheel. Bottomland forests exist outside of the Bootheel as well. The tree species of these forests depends in large part on the soil type present. On poorly drained soils, you will likely find silver maple and cottonwoods. On better drained sites, you may find eastern black walnut and a variety of oaks.

Trees have been cut for multiple generations in Missouri. The vast majority of the state is second-growth forest. Harvesting began in the early 1800s but picked up substantially after the Civil War. By the late 1800s and early 1900s, much of the Missouri Ozarks were cutover. As western expansion was underway, the Ozarks became a prime location due to its pine and oak forests. Pine was in demand for building materials and oak for railroad ties for the expanding rail system. This story was repeated throughout the state. Many cutover lands regenerated soon after harvest, and others were farmed and then abandoned and forests sprung back.

The Ozarks are the most densely forested areas of the state and lend themselves well to a robust forest products industry. But woods in central and north Missouri also support a solid forest products industry. Forest products fall in a few general categories. Missouri produces railroad ties, grade lumber, and flooring. Industrial lumber such as pallets and blocking are common. Missouri is well known for walnut lumber and veneer, and its white oak is highly sought after by makers of whiskey and wine barrels.

Humans have long had an effect on Missouri woods. Before European settlement, Native Americans used fire to shape the habitat and structure of the state's woods. Early settlers harvested, cleared and then abandoned many wooded areas. These actions have affected the species composition, age of trees and quality of the woods for both timber and wildlife. Today, many woods are left idle, and some woods are intensively managed for wood production and wildlife habitat. Landowners own 82% of the resource, and their actions can mean the difference between viable or declining wildlife, or a viable or declining forest products industry.

## Woods tell us their story: Reading the signs to understand your woods

Here are a few examples of how the trees tell us the history of a property.

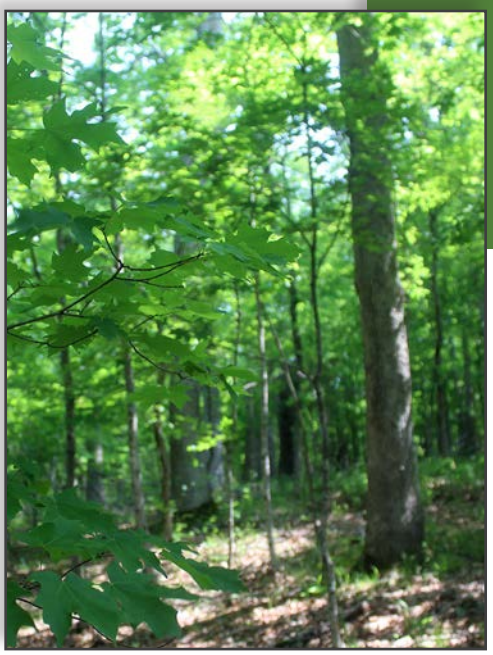


**Figure 3.** White oak with maple understory.

A distinct sign of an undisturbed forest is seen by the understory of sugar maple in this white oak sawtimber stand (Figure 3). As sugar maple invades, it shades the understory to where young white oaks cannot become established. Historically, periodic fire kept the sugar maple at bay. Other understory invaders may include ironwood or hickory. Management today may entail cutting the unwanted trees and then adding periodic fire.

When a tree grows in the open, it produces many low branches and has a large spreading crown. These trees are often referred to as wolf trees. This area was once managed as open land as this tree grew (Figure 4). Once the area was abandoned, a forest grew around the tree. Wolf trees can also be found around old home sites, especially walnut trees planted for their nuts by early settlers. Such trees are interesting relics of past management. Landowners may choose to keep these relics and kill competing trees so they have enough growing space. These trees offer food and cover for wildlife but have little economic value.

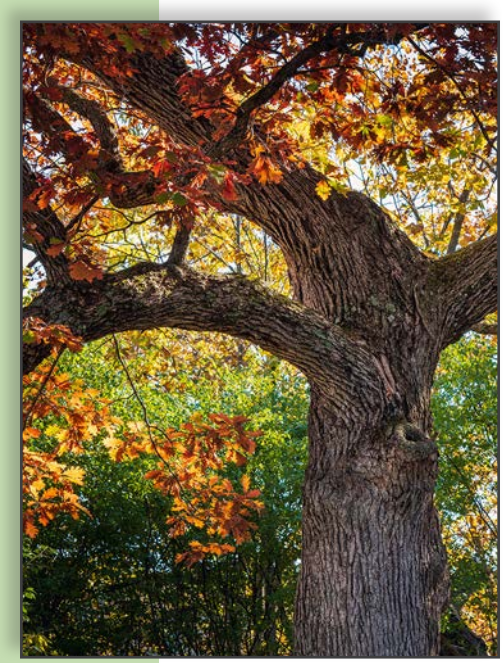


**Figure 4.** Wolf tree.

**Figure 5.** Bottomland walnut.

This small bottomland stand was likely cleared and farmed at one time (Figure 5). Once the site was abandoned, walnut regenerated from seed either from trees along the stream bank or seed that floated in on flood waters. Walnut is also an indicator of deep, well-drained soil. Similar sites with poorly drained soils are more likely to regenerate to cottonwood and silver maple. Bottomland forests are important for water quality and streambank protection. The roots of trees run deep and armor the bank. Leaves and woody debris on the forest floor filter runoff, keeping sediment out of streams. Properly done, selective logging can remove trees while maintaining water quality. Walnut seedlings may need to be planted to ensure a future stand of walnut as trees are harvested.

These oaks are 30 years old, resulting from a regeneration harvest (Figure 6). They are now 4 to 6 inches in diameter. This harvest removed most of the large trees from the area. Seedlings present at the time of the harvest were released and allowed to grow. This practice provided a diversity of ages and wildlife habitat. Thinning or crop tree release may be beneficial to provide growing space to desired trees.

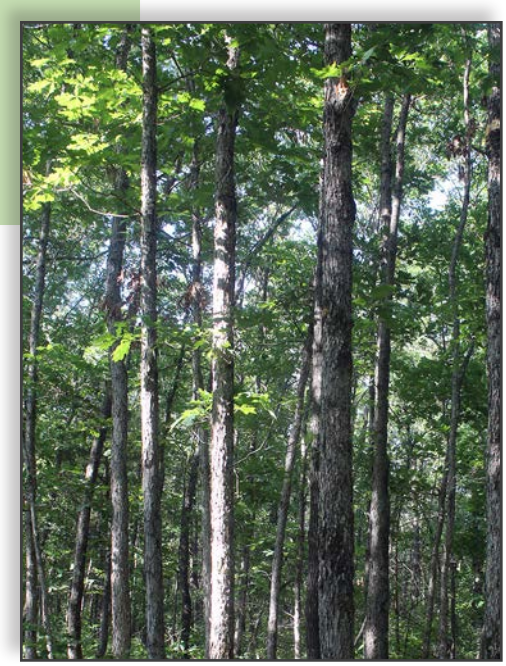


**Figure 6.** Young oak stand.

**Figure 7.** Oak-pine in the Ozarks.

Pine requires bare soil to regenerate. This bare soil may have resulted from ground disturbance during a harvest or fire (Figure 7). The Missouri Ozarks do not have the same concentration of pine as they did historically. South facing slopes that would have once been pine have regenerated to oaks once abandoned by early settlers. Some efforts have been underway to encourage more pine on these sites. Pine tends to live longer and can handle dry conditions better than oaks.

**Figure 8.** Oak overstory with hickory understory.

In these woods, hickory became established in the understory (Figure 8). The woods were likely grazed. Cattle would eat young oak seedlings and leave the hickory. Hickory can grow in some shade and will fill in this space. Hickory is a good source of nuts for squirrels and can be beneficial to certain bat species. If hickories are too abundant in the understory, it may be wise to kill some of them and make room for a wider variety of tree species.

**Figure 9.** Evidence of past logging.

Elm and ironwood are filling the space created by the removal of trees, signaled by rotted stumps (Figure 9). It is important that desirable seedlings are present prior to harvesting. Cutting the elm and ironwood and planting desirable species may be an option. Harvesting, when done properly, can help achieve goals and generate some revenue. Improper harvesting can release invasive species or other undesirable trees.

# Landscape characteristics worksheet

**How much wooded land do you have?** _____ acres

**What unique features or trees do you value about your property?**

**How long have you owned the land? Who owned it before you? What did they use it for?**

**Other indicators of past land use? Is there an old cemetery or home site on the property?**

**Describe the land.**

*Is it hilly, flat, rocky or bottomland ground that may be swampy or well drained?*

**Describe your trees.**

*What species do you have? What past management are you aware of?*

## Assessing your woodland's features

Look up, look down, look all around. Your woodland is not just about the kinds of trees growing there. It is also about the size of the trees, how densely they are growing, and the kinds of ground cover present.

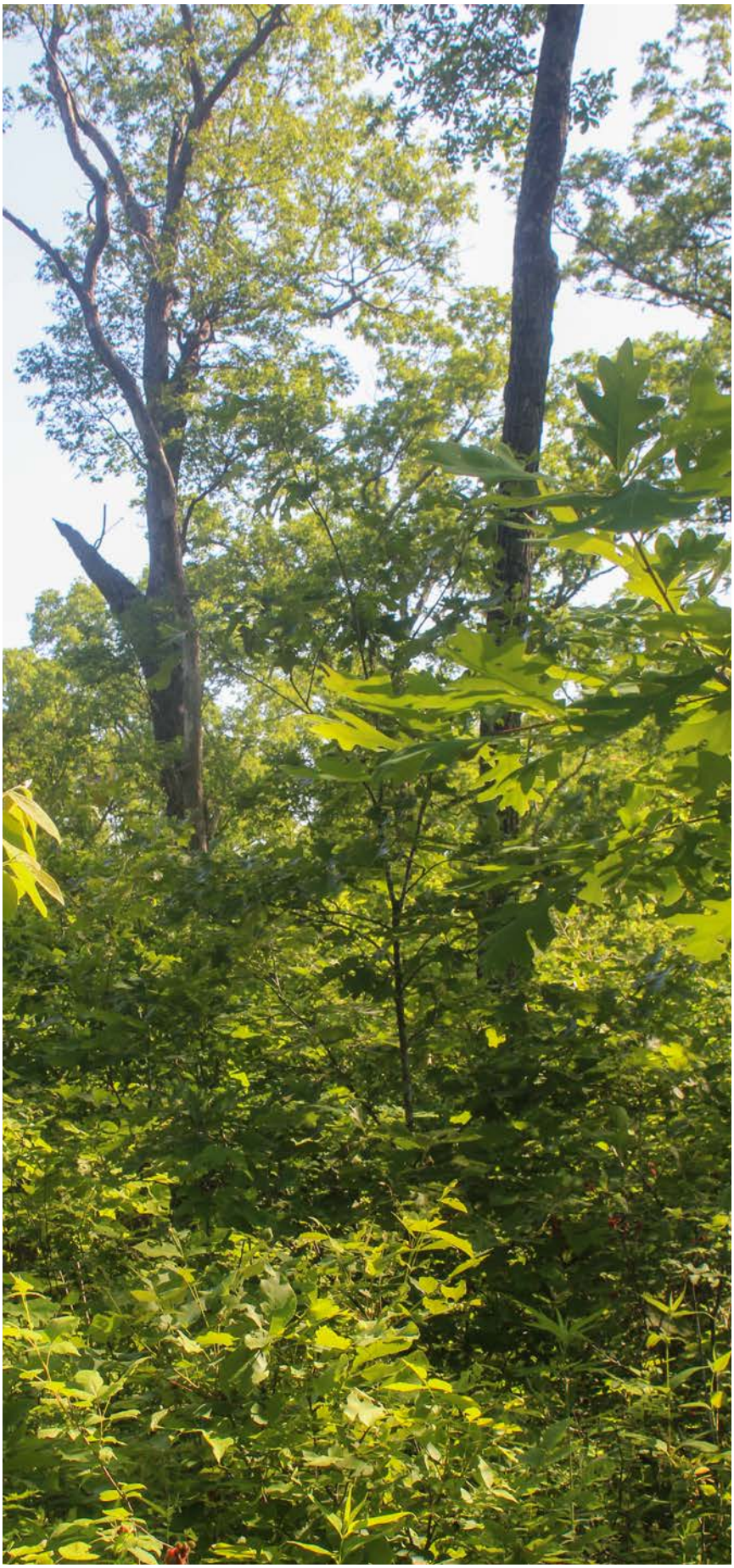
Look up. How much blue sky do you see? Are the trees' crowns so closely packed that no blue sky can be seen? If so, the forest might be too dense. Are the trees widely spaced, with blue sky visible between the crowns? If so, the forest might be poorly stocked.

Look down. What is growing below waist height. Are there shrubs? Are there invasive plants? Are there young oaks to replace old oaks?

Look all around. How big are the trees? How many different species of trees are present? Are the smaller trees a different species than the bigger trees? All of these aspects are part of a forest assessment.

Completing the "Forest assessment worksheet" will help you to better understand your woodland features. The assessment is almost as simple as taking a walk in your woods. For the best assessment, walk through your woods several times throughout the growing season, especially when assessing the forest floor. The worksheet asks a series of questions and provides advice based on your responses. It employs pacing to quantify the numbers and distribution of plants in your woods. A pace is defined as a single step, which is about 2.5 feet for the average adult.

You could also have a forester assess your woods. A forester could walk through your woods with you and provide some general advice, or conduct a detailed inventory and prepare a management plan for your and your woods.



# Forest assessment worksheet

As you complete this assessment, circle yes or no for each question. Also, feel free to take notes of the species and conditions present.

**Forest floor:** *A diverse, abundant herbaceous and seedling layer indicates health and the ability for the forest to regenerate after a disturbance or harvest. These plants may also be indicators of food and cover for wildlife.*

1. During the summer months, are lots of herbaceous plants growing? (Look at the forest floor. If you estimate that less than 25% is covered with native plants, then answer no.) **YES NO**

2. Can you spot at least five different native herbaceous plants within about 50 paces? **YES NO**

If you answered no to question 1 or 2, you may have a dense canopy that is shading the ground, preventing plants from growing. These conditions provide limited food and cover for wildlife.

Options: You may want to work with a forester to remove some trees so that more light will reach the ground and encourage growth of herbaceous plants.

3. Are there young trees, preferably of a desired species? (Look for tree seedlings that are from 6 inches to 5 feet tall.) **YES NO**

4. Can you spot at least four different desired young tree species within about 50 paces? **YES NO**

Finding desirable seedlings indicates you have regeneration that will grow and replace mature trees as they die or are harvested.

Options: Some thinning can benefit these seedlings to ensure they have sunlight to persist and grow.

**Understory:** *Diversity and abundance of shrubs and young trees can be a valuable indicator. Depending on species, it may indicate the next generation of trees in your forest. It also indicates browse and cover for wildlife.*

5. Is there an abundance of sapling-sized trees of desired species? Saplings are trees over 5 feet tall and up to 2 inches in diameter at breast height (dbh). **YES NO**

6. Can you spot at least five different desired sapling tree species within about 50 paces? **YES NO**

The presence of saplings can have a few meanings. There may have been a disturbance that released seedlings. The saplings may also be trees such as sugar maple that tolerate shade and will take over the understory. Presence of the right saplings is a good sign and means your woods will be more resilient if canopy trees die. These saplings will be your next forest.

7. As you look at the understory trees, can you identify any ironwood, flowering dogwood, eastern redbud or serviceberry? **YES NO**

It is good to have a variety of these understory trees in your woods. Some trees, such as ironwood, can become problematic if their numbers become too dense.

**Canopy:** *Canopy trees provide many benefits to the forest ecosystem. They are crucial for food and homes for many kinds of wildlife, insects and birds.*

8. Does your canopy consist of trees that are primarily 12 inches dbh or larger? (Trees over 12 inches dbh are referred to as sawtimber-sized trees.) **YES NO**

9. Are the sawtimber-sized trees an average of about eight paces apart or closer? (Walk from one sawtimber-sized tree to the next closest sawtimber-sized tree. Do this for 10 trees.) **YES NO**

A dominance of sawtimber in your woods indicates your stand is more mature than one with mostly smaller trees. If you answered yes to Question 9, this may indicate a very dense stand of sawtimber or what foresters might say is a high stocking. High stocking means trees may be growing slowly and could present a forest health issue. Work with a forester to determine if thinning is needed.

10. As you walk to 10 sawtimber-sized trees, are two or more of those trees larger than 16 inches dbh and perhaps one or more larger than 20 inches dbh? **YES NO**

Within a sawtimber stand, larger trees around 20 inches dbh mixed with trees at 12 inches dbh are not necessarily older. Quite possibly, they just grew faster but are roughly the same age.

An abundance of larger sawtimber trees of at least 16 inches dbh also indicates timber sale feasibility. Work with a forester to develop a sale plan if this is an objective of yours.

11. Do you have three or more species of sawtimber-sized trees in your stand? **YES NO**

Having a variety of canopy trees, especially oaks, can indicate a variety of food sources for wildlife. Some species may produce an abundance of food in some years and not much in others.

**Light gaps:** *Look up. Do you see gaps or blue sky between trees? Gaps can be beneficial. They indicate trees are getting sunlight not only on the tops but also on the sides.*

12. Do half of the large trees you visit have blue sky between them on three sides? (Ideally, trees will have sunlight on three sides, which helps with optimal growth.) **YES NO**

Trees grow faster and remain healthier when they have adequate sunlight.

13. Are there large canopy gaps up to 30 paces in diameter? (Such gaps can be due to a harvest or natural mortality.) **YES NO**

14. If there are large canopy caps, are desired native trees and shrubs growing in them? **YES NO**

When a large gap opens in the canopy, a flush of growth occurs to capture that sunlight. Unfortunately, if undesirable species are present, including invasive exotic species, they will take over the gaps and become your next forest.

Being proactive with your management is crucial to ensuring that when gaps happen, desired plants are in place to capture the sunlight.

**Invasive plants:** *If exotic plants are present, they often pose a threat to the future of your woods and native vegetation.*

15. Is your woods free of invasive plant species? (As you walk your words, do you see such a plant only about every 100 paces?) **YES NO**

16. If your woods has invasive plants, would you say the understory is full of them? (If density ranges from plants every few paces to every 50 paces, answer yes.) **YES NO**

Several examples of how invasive species may take control of your woods have been provided.

If your woods are free of invasives, that is great news, but be on the lookout for them.

A yes on 16 indicates a critical need to control invasive plants. If plants are spaced farther apart, monitoring and control may be critical to help reduce the spread. Consider attending an invasive species workshop, or work with a mentor or forester on a plan to control them.

**Tree health:** *Explore tree health concerns in your woods.*

17. Are there more than two sawtimber trees per acres that have died but are still standing? (These trees are called snags.) **YES NO**

A small number of standing dead trees, or snags, is natural and offers food and home for bats and woodpeckers. If you begin to see numerous trees dying, discuss this decline with a forester to see if there is an insect or disease issue that needs to be addressed.

18. As you look up at your trees in summer, do the leaves look sparse or do the crowns appear to be thinning? (Large dead branches in many trees is a sign to look for.) **YES NO**

A few dead branches is normal, but if you are seeing numerous large dead branches or the entire tops of trees dying back, this might be cause to bring in a forester and do some more investigating.

19. Are most of the trees straight trunked and well formed with few signs of rot? **YES NO**

Straight and tall is a good indicator that the trees have been free to grow with minimal issues. Rot, in many cases, is a sign of past damage to a tree. Some rotten and hollow trees can be good for wildlife that use those holes or cavities in the tree.

An abundance of tall straight trees may increase chances for a timber sale if there is enough volume. Work with a forester to develop a sale plan.

# Summary worksheet

Use this summary of your forest to initiate a discussion with your mentor or forester about any concerns you have and to determine what may need your attention first.

## How does the forest floor look?

*List any invasive species you found, and your perception of how dense they are. List the kinds of seedlings found.*

## How does the understory look? What species are present? Do you have any concerns or are there species you would have like to have seen but did not?

## How does the overstory look? What are the dominant tree species in your forest?

*You may break this up into sections on your property, such as upland and bottomland or the north 40 versus the 20 acres next to the barn. Provide a list of the top five most common species found in the different locations. You might also comment on your favorite trees or trees with special significance. Also, think about how diverse your property is. Are all the woods big trees, or do you have some areas with small trees or thick young growth.*

## How dense is your forest, and does it have any canopy gaps? Are crowns tightly spaced, or are there gaps between them?

## Did you uncover any forest health issues? Were there numerous dead or dying trees in your woods that you are concerned about?

# Management planning

Now that you have an idea of your goals and an understanding of your woods, you may want to consider working with a forester to formulate a management plan.

## *Woodland management plans*

A woodland management plan is a written document that reflects your intent to practice sustainable management in your woods. It identifies your goals and targeted actions to achieve them. The plan outlines actions over a given time, from five to 10 years. A typical forest management plan will contain the following information:

- **Your objectives.** List the objectives you have for your woods. These objectives will become the guiding force for your plan.
- **A map of your woods.** A detailed plan will divide your woods into stands. Stands are usually areas of similar topography, species and size classes of trees.
- **A detailed description of the kinds, quality and sizes of trees in each stand.** The plan should also include information on how dense the forest is.
- **Prescribed actions for achieving your objectives for each stand.** The recommended actions for each stand will be consistent with the management needs of the trees and your objectives.
- **Background information about your property from these sources:**
  - *A Natural Heritage Review.* The Nature Conservancy, Missouri Department of Natural Resources and Missouri Department of Conservation created the Missouri Natural Heritage Program[2] too identify species and natural communities of conservation concern in Missouri. This database provides information about any species or natural communities of concern that are on or near your property and warrant attention.
  - *Soils information.* The Web Soil Survey[3] is often referenced to produce a soils map and descriptions. This information provides added insights into the productive capacity of your woods.
  - *Other resources.* List other organizations and agencies that might have resources to help you implement your plan (see "Resources and contacts" on page 29).

## *Importance of a plan*

A woodland management plan provides a big-picture view of what is needed to keep your woods healthy and meet your objectives. It is a wise investment to help guide management of your woods.

## *Developing a plan*

Remember that this is your plan and should reflect your needs and interests concerning your land. Knowing what you want to achieve and working with a professional forester is typically the best approach to developing a plan. This manual is intended to give you a good start in developing that relationship.

Foresters have the education and experience to help landowners develop and implement their management plans. They can play an important role in the process.

A forester can inventory your woods to determine the sizes, quality and distribution of trees on your property; develop stocking and volume estimates; and make management recommendations based on the art and science of growing trees. Your forester may also be able to help you with implementation.

## *Professional help resources*

Foresters who assist landowners might work for state or federal government or be private consulting foresters. Details about four key sources of forester assistance are provided below.

### Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) provides education programs, technical expertise, resources and financial assistance. NRCS manages the Environmental Quality Incentive Program (EQIP), which

provides financial assistance to fund management plans and conservation practices to address resource concerns you have for your property. These concerns may include invasive species control and other practices to improve forest health.

NRCS is a federal government agency paid for by taxes. To contact them, go to the NRCS website,[4] scroll to "Find your local service center," select your state and, on the next page, select your county.

## Missouri Department of Conservation

The Missouri Department of Conservation (MDC) provides education programs, technical expertise, resources, site visits from private lands biologists and foresters, and financial assistance. Foresters and biologists are available to meet with and provide management advice to landowners. Planning assistance may be available. Department staff can also assist in navigating state and federal financial assistance programs for landowners.

MDC is a state government agency paid for by sales tax and federal grants. To find your local MDC contacts, go to the MDC website,[5] select "Contact and engage" and then the county where your property is located.

## Private consulting foresters

Consulting foresters work for you. They can be hired to write and implement your plan. Their services include invasive species control, thinning to improve tree health and growth, and guiding you through the timber sale process. Foresters are not loggers. Their role is to help you mark and sell trees to get the best price, and to help ensure the timber sale proceeds as smoothly as possible. Many foresters have also developed specialized skills to assist in wildlife management through techniques such as prescribed fires and habitat restoration.

Private consulting foresters work independently or for a business and are paid by landowners to serve and represent their interests. To find a consulting forester, go to the Missouri Consulting Foresters Association website[6] and select "Find an MCFA consulting forester."

## University of Missouri Extension

MU Extension provides educational events, technical assistance and publications on wildlife and woodland management. Extension specialists develop and hold field days and online education events. Programs such as Missouri Woodland Steward and Master Naturalist are managed through MU Extension.

Extension is funded by the Missouri state government through sales tax and by federal grants. To learn about the woodland programs, events and resources offered through MU Extension, visit the Forest Ecology and Management program.[7]

# *How to proceed*

How you proceed depends on your interests. If your primary interest is a timber sale, you may want to contact Call Before You Cut.[8] This program will put you in touch with a consulting forester for a free site visit and advice. If you have some general concerns about your woods, having a conversation with an MDC forester may be the best way to start. The services of MDC foresters are free, though not as broad as what consultants may offer; however, this initial conversation can get you going in the right direction. Depending on your needs, the MDC forester may be able to either assist or help you connect with a consulting forester and NRCS services.

# Management actions and activities

You have taken the first steps: You have learned about your property, including the kinds of trees and other plants on it; you have developed some objectives to help guide your planning; and you probably have an idea of practices to implement. This section takes an objective-driven approach to determining the practices that may benefit your land management interests.

Management needs can be very specific depending on your objectives and the condition of your woods. Review your objectives and compare them to the ones described below. Provided here are common actions that can be taken to accomplish the sample objectives and references to additional resources if you want to learn more. If you have an objective not mentioned, reach out to your local forester to discuss options.

## *Sample objective 1: Manage for specified wildlife*

Many landowners own woodland acreage for the purpose of enjoying recreational opportunities such as hunting white-tailed deer and wild turkey, for example, but also proactively manage it for many species of songbirds and furbearers. Providing a variety of habitat types is key for landowners interested in attracting a diversity of wildlife.

Understanding the biology and habitat requirements of each species of interest is an important first step for successfully implementing management practices. Using this knowledge, you can tailor management to address the habitats that may be limiting, or in short supply, on your property — such as food and cover — that benefit a particular species of interest. Be specific as to what wildlife are most important to you to ensure the desired species' needs are addressed.

Refer to MU Extension's Wildlife Ecology and Management Program[9] for more information on managing for a variety of wildlife species of interest.

### Woods for wildlife

Forest ages have been divided into three stages for habitat discussions (Figure 10).


**Figure 10.** Oak forests of all ages are important to wildlife.

- ***Young forests*** provide short brushy cover for wildlife to hide and forage in. These forests are also known as early successional forests.
- ***Middle-aged forests*** tend to be dense stands of immature trees. Oaks may begin producing acorns, but ground cover may be minimal due to the dense canopy cover.
- ***Mature forests*** can provide diverse sources of food, such as acorns and browse, and cover in the understory.

Studies have shown that Missouri forests are maturing. This means plenty of habitat for wildlife that use older mature forests but not as much for wildlife that use early successional forests. A variety of management practices can be implemented for the different stages to improve conditions for wildlife. For example, consider leaving snags and den trees on the area as these benefit tree squirrels, woodpeckers and many species of songbirds that forage on insects.

Young forests usually result from a major natural disturbance or timber harvest. In larger mature woods of 20 acres or more, small, ½-to-2-acre openings can be created. These would be considered temporary forest openings because they would be allowed to regrow, creating early successional habitat and thus bring diversity of cover to the interior areas of your woods. These brushy areas will benefit rabbits, yellow warblers and brown thrashers along with deer and turkey. Creating this early successional habitat provides not only cover but also food sources. Before creating these openings, be sure to control invasive species; otherwise, they will dominate your openings. Also consider working with a forester. Under some conditions, these openings may be created through a timber sale. A forester can guide you through the process. Once created, these areas need little management until they become middle-aged forests.

Middle-aged and mature woods may benefit from thinning. Thinning the woods removes poor quality trees or trees of undesirable species. In a middle-aged forest, this practice is called timber stand improvement (TSI) or forest stand improvement (FSI). It may also be referred to as a precommercial thinning because the trees being cut are typically too small to sell. This practice allows more sunlight to reach the forest floor and encourages growth of shrubs and herbaceous plants, which will provide more browse and cover for deer and turkey. In a more mature forest, thinning may be completed through a timber sale.

## Woodland edge and fields for wildlife

Landowners with a mix of woods and fields have opportunities to manage the edges where these two habitat types meet. Edges are often abrupt changes from tall trees to open fields. These areas are often referred to as "hard" edges. They can, however, be the most diverse places for wildlife, birds and pollinators.

To soften hard edges, don't mow all the way up to the edge of the woods. Instead, kill invasives and cool-season grasses, such as fescue, and allow shrubs to grow in the area. Continue to monitor and control invasives. You may also consider planting trees or shrubs.

See the power foods table on the next page for plants to encourage for their food source, which may be hard mast, such as acorns, or soft mast, such as berries.

Edge feathering is another practice that can provide a transition zone of diverse habitat types. Edge habitat provides escape cover along with food-bearing shrubs and small trees. Bobwhite quail and other wildlife already mentioned that prefer early successional habitat will use these edges. Cut undesirable trees 30 to 50 feet into the woods along the edge. Create brush piles for an immediate effect. The area will quickly fill in with young trees and shrubs, creating a brushy zone before entering open woods. Monitor for invasive species along the edge. They, too, will take advantage of the sunlight and should be controlled when found.

## Other woodland practices

- Integrate plants beneficial to native pollinators into your plantings.
- Install nest boxes: Chickadees, bluebirds, wrens, owls and great crested flycatchers are all birds that use boxes in open field environments.
- Plant trees and shrubs that produce soft mast, such as fruit and berries.
- Remove invasive understory plants from woods and open areas.
- Create brush piles when performing thinning or tree-cutting practices.
- Leave standing dead trees, or snags, to serve as homes for bats and other animals.

For more detailed information, refer to MU Extension publication G9415, Integrating Woodland and Wildlife Management Practices on Your Property.[10]

## Power foods list: Beneficial native shrubs and trees for birds and wildlife.

| Tree species | Food type | Fun facts* |
|---|---|---|
| Wild plum (*Prunus* spp.) |  Soft mast | A small thicket forming tree. One of the first trees to bloom in the spring. Produces a bright red edible fruit. Provides excellent food and cover for wildlife. |
| Blackberry/Raspberry (*Rubus* spp.) |  Soft mast | Found throughout the state in woods, open fields, and glades. Provides food and cover for many wildlife species. Edible fruit ripens in July. Stems have thorns. |
| Black cherry (*Prunus serotina*) |  Soft mast | A large native tree found throughout Missouri. Showy white clusters of spring flowers turn to dark pea-sized fruits in summer. Fruit is consumed by a variety of wildlife. |
| Eastern black walnut (*Juglans nigra*) |  Hard mast | The "black gold" of Missouri. Valued for its lumber and nuts, it is extensively cultivated statewide. Grows rapidly on deep, rich, alluvial soils. Growth rates decline rapidly in poor soils. Wildlife consumes the nuts. |
| Deciduous holly (*Ilex decidua*) |  Soft mast | Also called possumhaw, this small-to-medium-sized tree produces regular crops of brilliant red fruit on the female plant. The male and female flowers are borne on separate plants, so several trees should be planted near each other. After the leaves fall, the fruit is visible for long distances and helps feed birds in winter and early spring when other foods are depleted. |
| Dogwood, flowering, rough leaf (*Cornus* spp.) |  Soft mast | Flowering dogwood is the Missouri State Tree. For best results plant in shade, not direct sunlight. Rough-leafed dogwood is a thicket-forming shrub found statewide on a wide variety of soils. Leaves are rough textured. It does not have large white flowers like flowering dogwoods, but small white flowers appear in May. The shrub has white berries and purple-to-red fall color. |
| Elderberry (*Sambucus canadensis*) |  Soft mast | Found throughout the state in open woods, fencerows, roadsides, and along borders of streams and ponds. The flowers are large, showy, flat-topped white clusters that appear in late May to June. The dark purple berries are edible when cooked and make an excellent jelly. Many species of birds and mammals eat the fruit, and deer browse the leaves and branches. Will tolerate both wet and dry sites. |
| Hackberry (*Celtis occidentalis*) |  Soft mast | Common bottomland species found statewide. Does very well in prairie regions. Birds eat the fruit. |
| Pecan (*Carya illinoensis*) |  Hard mast | Most noted for edible nuts but also is valued for wood. Does best on moist, well-drained river bottoms. Nuts are readily eaten by wildlife including waterfowl in wetland areas. |
| Hickory (*Carya* spp.) |  Hard mast | Numerous species of hickories grow in Missouri including shagbark, shellbark, bitternut, and mockernut. All produce nuts of varying sizes depending on species. All can be found statewide. |
| Hazelnut (*Corylus americana*) |  Hard mast | Also called American filbert, this thicket-forming shrub is found throughout the state on a wide range of soils and sites. The nut is consumed by people and wildlife. |
| Eastern red cedar (*Juniperus virginiana*) |  Soft mast | Eastern red cedar's aromatic wood is valuable for closet lining and novelties. Excellent for wildlife cover and windbreak plantings. |
| Northern red oak (*Quercus rubra*) |  Hard mast | Northern red oak is one species in the red oak group. Others include black oak, shingle oak and pin oak. Pin oaks grow naturally in bottomland areas while the others are more common on upland site. They are found statewide. Acorns are consumed by many wildlife species. |
| Eastern redbud (*Cercis canadensis*) |  Hard mast | A small-to-medium understory tree with showy pink flowers in early spring. This legume is an attractive addition to wildlife or windbreak plantings. |
| Serviceberry (*Amelanchier arborea*) |  Soft mast | The showy white flowers of this large shrub/small tree are the first to appear in Missouri woods each spring. Reddish sweet-tasting fruits are edible but quickly consumed by wildlife. Fall color varies from yellow to orange to red. Found statewide, grows best in partial shade along the edges of woods. |
| Sumacs (*Rhus* spp.) |  Soft mast | Thicket-forming shrub found statewide in old fields, prairies, woods borders, and road rights of way. Was widely used by Native Americans and early settlers for medicinal uses. Provides excellent wildlife food and cover. Dark-green summer foliage is followed by scarlet fall color and red berries. |
| White oaks (*Quercus alba*) |  Hard mast | White oak is one of several species within the white oak group. Others include post oak, chinkapin oak, and bur oak. They are found statewide. This important hardwood lumber tree is also an excellent acorn producer. They can be found on a variety of sites. Slow growth rate but may live for hundreds of years. Acorns are readily eaten by wildlife. |

* Summarized from Missouri Department of Conservation seedling order form when listed.

## *Sample objective 2: Manage for a healthy forest and healthy trees*

Healthy forests and healthy trees are in many ways the same but also different. You might define a healthy forest as one that meets your objectives. This would be a human-centered approach. Habitat for game animals, wood products, or foraging for food are a few examples. Another approach might define a healthy forest as one that provides an array of environmental benefits, which could include preserving biodiversity, carbon sequestration, erosion control or preserving habitat for rare or declining wildlife. Healthy trees are a component of a healthy forest but, keep in mind, so are dying and dead trees (Figure 11). Excessive mortality, however, is an indicator of a problem affecting your woods.

Standards for healthy sustainable forests have been developed through certification systems, sometimes referred to as green certification. One program sponsored by the American Tree Farm System is readily available for landowners. The Tree Farm Program provides standards of sustainable forestry and can be used as an all-encompassing guideline to a healthy forest. These are some example standards:

- Landowners have a management plan to demonstrate their commitment to practicing sustainable forestry.
- Landowners ensure reforestation with desired species following disturbance or timber sale.
- Landowners protect air, water and soil during their forestry operations.
- Landowners manage for fish, wildlife and biodiversity, including known occurrences of endangered species.
- Landowners protect special sites such as human burial sites and other cultural resources.

Certification goes beyond healthy trees to include human history and needs from the forest along with preserving biodiversity.

There are many threats to the forest from insects, diseases and invasive species. Direct human threats include forest conversion, inappropriate harvesting and livestock in the woods. One of the greatest threats, however, is a do-nothing or let-it-grow-naturally mentality. This approach allows invasives to take hold and trees may become overcrowded. As trees get older, insect and disease issues can develop. Desirable regeneration may also be lacking due to a dense midstory of undesirable trees.

There are myriad approaches we can take in defining and promoting forest health. For simplicity, we will focus on three primary indicators of forest health.

- How are existing trees doing? Do they appear to be vigorously growing and healthy and how do we keep them healthy for as long as possible?
- What will the future forest look like? If trees die from a natural or human events, will desired trees replace the ones that have died?
- Are your woods diverse with desired native trees, shrubs and herbaceous plants, and do they support a variety of wildlife including rare or declining species?

**Figure 11.** These trees were mature red oaks that suffered wind damage due to weakened stems and root systems.

## The existing forest

One goal of forest management is to intentionally disturb the woods in a way that leaves the remaining trees with more growing space. The residual trees remain healthier and live longer. A common practice is forest stand improvement (FSI) — the same FSI mentioned as being of benefit to wildlife. Essentially, trees are cut to benefit the trees that are allowed to remain. Killing trees to make a forest healthier — it just sounds wrong. Let's look at the logic.

Trees, like any living organism, need growing space. When trees are young, they are small, and an acre of woods can support many of them. As trees grow bigger, their crowns expand, and the same acre can support fewer but bigger trees.

Think about the basic parts of a tree. The crown, consisting of branches and leaves, is the energy-producing factory of the tree. The roots gather nutrients and water. The trunk provides structure and support for the tree. Now, consider that the primary limiting factors to growth are sunlight, water and nutrients. An acre of land can support only so many trees. For trees to gather sunlight, they must have adequate crown space. When a woods has too many trees, crowns are diminished, and tree growth slows. If it has too few trees, crowns can expand to their maximum potential, but there may be unused growing space. With the right number of trees, crowns expand near to their potential and touch or come close to touching one another.

Most unmanaged forests are overcrowded. We can not easily change the amount of water and nutrients available for trees, but we can manage the number of trees growing in the woods. Thus, we can ensure tree crowns have access to sunlight and that the limited supply of water and nutrients is sufficient for the remaining trees. This is why we kill trees to benefit the remaining trees. You can assist this process by deciding which trees die and which ones remain. Many refer to the practice as weeding the woodland garden. Foresters call it FSI.

Here is a brief explanation of FSI:

- Based on your objectives, trees are selected for removal. Thinning allows enough light to promote the health and growth of desired trees, and retains enough trees to maintain a healthy, productive forest. Trees to keep may be species that benefit wildlife or have forest product potential, such as oaks and walnut. Trees to cut may be overabundant elm, honey locust and sugar maple.
- Selected trees are felled or girdled. Girdling is the act of cutting completely around the tree with a chainsaw, through the bark and into the wood an inch or so (Figure 12). This cut severs the cambium layer, which moves water and nutrients from the roots to the top of the tree. You may choose to use a herbicide application to control resprouting.

**Figure 12.** Girdling trees such as this honey locust can improve forest health by removing undesirable species from the stand that are competing with preferred trees. New understory growth will initiate, adding a wildlife benefit.

- FSI is designed to cull trees whose size or quality makes them difficult to sell. Trees are typically left standing to die in place, or felled and allowed to decay on the forest floor.
- Remaining trees are healthier and grow faster, putting on more wood. They are more vigorous and likely to withstand threats from storms, pests and diseases.

Besides retaining healthy trees in the stand, many other benefits result from this practice:

- Girdled trees allowed to die in place create snags that are beneficial to wildlife. Those that fall will create structure on the forest floor and provide nutrients as they decompose.
- By providing more sunlight to trees, thinning also provides more sunlight to the forest floor. The resulting growth of shrubs and herbaceous plants will provide food and cover for wildlife.
- Some of the wood from the thinned trees may be reclaimed for firewood or other personal use.

*Cautionary note: Before thinning trees, be sure invasive plants are under control. Their growth response can be staggering if given sunlight.*

There are many ways to thin a forest. The FSI described earlier is called precommercial thinning, because the culled trees are not big enough or of sufficient quality to sell. Crop tree release is a similar to FSI, but instead of selecting trees to remove, you select certain desired trees to retain and thin around them. A thinning process can be commercial if the trees being removed are large enough to sell. This practice is called an intermediate harvest.

## The future forest

The future forest begins with seedlings in the understory of the existing forest. Natural regeneration, in which seeds from overstory trees sprout naturally, is preferred. It has been said that it takes 10,000 acorns to produce one mature oak tree in the woods. Why so many? Acorns are also food for wildlife, and not all seedlings survive to maturity. Seedlings in the understory are called advance regeneration, and determining if you have sufficient numbers and size of seedlings is crucial for your future forest.

Oaks are a cornerstone species in Missouri. Oak advance regeneration needs to be present in sufficient numbers and size in your forest if you want a future stand of oak trees. Your forest might have a lot of seedlings that are less than a foot tall and some that are over 3 feet tall. The small seedlings are not big enough to compete with other species present, but the taller ones are. In such a case, a forester's advice is crucial — especially if you are planning a timber sale.

Seedlings may be lacking due to dense shade. Thinning can help. You may have a dense understory of maple, elm or ironwood, which, in combination with the overstory, can create dense shade in which few oak seedlings can grow. Midstory removal might be required. The undesirable midstory trees would be cut and treated with herbicide to allow sunlight to reach the forest floor to give seedlings a chance to establish.

Prescribed fire is another tool to aid oak regeneration. Oaks develop roots first and top growth later. This strategy has enabled them to resprout after a fire. Many other species do not resprout as well or grow as vigorously as oaks after a fire. Fire gives oaks the competitive advantage and helps set back competing vegetation. This is another case in which a forester's advice is crucial. A forester can create a burn plan and advise you on timing and how often to burn.

A last resort would be to plant seedlings. If your forest has a midstory, it would need to be removed to allow sunlight to reach your planted seedlings. This process is labor intensive and costly but may be crucial if you want oaks in your future forest.

Oaks eventually need full sunlight to thrive. Once seedlings are established, continued management in the form of thinning and perhaps a timber sale is needed to provide adequate sunlight.

## Diversity of your woods

Although trees are the foundational structure, your woods are more than trees. Your woods support a web of life. Any action you take in your woods will benefit some plant and animal species but may be detrimental to others. Different ages of woods benefit different wildlife species. The amount of sunlight that reaches the forest floor influences the diversity of native ground flora present. Your woods might even be home to endangered species, such as Indiana bats.

Knowledge of what plants and wildlife are on your property can be a key influencer of your management approach. The Missouri Department of Conservation and partners maintain a listing of species of conservation concern. These species can be as varied as declining plants and endangered fish, mussels and bats. Conducting a Natural Heritage Review is an important component of a forest management plan. The review informs you of known occurrences of documented species of concern in your area. It may also indicate species that are not known but may be present on or near your property. It is a good tool to help landowners make informed management decisions.

It is important to remember that, for many wildlife species, the home range — the area that wildlife use for their life history requirements — will be larger than the habitats that your property provides. Work with neighbors and adjoining landowners that have an interest in wildlife to accomplish similar management objectives.

## *Sample objective 3: Generate revenue from the woods*

Woodland owners have several revenue-generating options, a few of which are mentioned here. The most common way to generate revenue is through a timber sale. The National Woodland Owners Survey indicates that 20% of Missouri landowners have had a timber sale in the past five years and 10% intend to have one in the next five years. Other income-generating options include lease hunting and the sale of nontimber forest products, such as mushrooms.

Timber sales are the single action that can have the greatest effect on your woods. If done properly, a sale can benefit your woods as well as your bottom line. Many of the wildlife practices discussed in this guide may be achievable through a timber sale. If trees are large enough, you could thin the woods through a timber sale, achieving the same wildlife benefits as FSI. Temporary forest openings could also be created, achieving the same benefit. But a poorly planned or exploitive timber sale could degrade your woods. For example, taking the best trees and leaving the worst, a practice known as high-grading, will reduce the future value of your woods and may not give you the wildlife benefits you want. It is best to work with a forester on a sale. A mentor who has conducted a sale could also provide guidance and perhaps tours of sale areas so you can see the results.

A timber sale should always account for the three primary measures presented earlier for forest health:

- Will the trees remaining be of desired quality and species to provide continued wildlife benefits and future revenue?
- Are conditions set to allow desired advance regeneration to grow? Oaks require adequate sunlight, which may entail creating openings to release the regeneration.
- Has the sale been conducted in a manner that protects species of concern and biodiversity present in the woods?

One additional consideration is to ensure the sale is conducted in a manner that limits erosion and rutting of trails in your woods.

The following steps are encouraged if you are thinking about a sale.

1. Contact Call Before You Cut.[8] You will receive a free packet on conducting a timber sale. Missouri Department of Conservation (MDC) also funds an initial site visit by a consulting forester. Landowners can get this free, no-obligation consultation to inform them of their opportunities for a timber sale.
2. Develop a plan for your property.
3. Determine what you have to sell. A forester can mark the trees to be sold so you and the buyer know exactly what is being offered.
4. Work with your forester to get the best price for the trees. Two common methods are used to sell timber: lump sum sale or cut on shares. In a lump sum sale, your list of marked trees and their estimated volume is sent to several buyers, the buyers bid on your standing timber, and the successful bidder pays you up front for the trees to be cut. Cutting on shares is an agreement between the landowner and a chosen buyer wherein the buyer harvests trees and pays a percentage of the mill price as trees are cut and delivered. Each method has its pros and cons, which your forester can explain in greater detail.
5. Enter into a contract with the buyer. The contract is a written agreement that explains the details of the sale. It is designed to protect your interests, and it ensures the buyer access to the timber for the price and conditions set in the contract. Sample contracts are available from your consulting forester and the MDC.

For more about timber sales and contracts, see MU Extension publications G5051, Selling Timber: What the Landowner Needs to Know,[11] and G5057, Basic Elements of a Timber Sale Contract.[12] You may also want to check out the National Timber Tax website[13] before your sale.

## *Ongoing management*

Landowners have many management options for their property. This chapter touched on a few that your mentor and forester may be able to assist with. Continue your education on management options through field days and farm tours. These events are excellent ways to hear from professionals and see the results of active management. Maintain a relationship with your forester, who you should contact when you have questions. Remember that not all questions can be answered in one place, and it takes time to develop an understanding and ability to implement the management needed for your property.

# Long-term success


**Figure 13.** Landowners who attended MU Extension field days expressed these sentiments about their woods.

Landowners undertaking efforts to improve their woods often comment that they are a work in progress. Caring for the woods is not a one-and-done, but an ongoing process. Woods are dynamic, living systems. Change is slow, and modern challenges of invasive species have made management increasingly difficult. Landowners choose to undertake woodland management for many reasons. Landowners who have attended MU Extension field days and events expressed these sentiments about their woods (Figure 13):

- Improve — Landowners had a strong interest in making their woods better, healthier and more productive.
- Retreat — For many, the land serves as an escape from daily life, a place to relax.
- Appreciation — Landowners expressed their gratitude and joy of owning land.
- Nature/Conserve/Wildlife — Landowners felt the importance of conserving and preserving nature.
- Consumptive/Hunting — The land offers income potential and a place to forage or harvest firewood and to hunt.
- Enjoyment — The woods offer enjoyment opportunities through hiking and nature viewing.
- Legacy — Landowners saw their woods as a resource to pass down to the next generation.

As you commit to your land management goals, keep the following principles in mind.

***Be patient.*** Learn to see the big picture of your management goals. You are stewarding a long-term investment on which the returns will take time to accrue. Results are not immediate, but in time, you will see them.

***Think about the landscape.*** Your woods are only a small part of the overall landscape. Wildlife, water quality, climate change and other challenges do not know boundaries. What you do can make a difference. Keeping your woods healthy and productive is one of the most important things you can do to affect these environmental concerns. Your healthy, diverse woods will conserve soil, sequester carbon, provide habitat, support pollinators and perhaps encourage others to follow your lead. Be encouraged that your efforts can profoundly influence the landscape.

***Stay connected with your woods.*** Take regular trips through your woods and take time to enjoy them. Your

stewardship is not just about doing work to improve them. Don't get burned out thinking of all the things that could be done. The list could be endless. Make sure enjoyment of your woods is as high of a priority.

***Stay committed.*** Managing your woods is often compared to gardening. It takes time and commitment to see your projects through. The timescale to managing your woods stretches out for years. The commitment you give will extend to the next generation of owners. Observe your work to assess if it is meeting your needs. Woodland management can be a satisfying experience but also a frustrating one if things don't go as planned. You can always adjust your approach.

***Be willing to adjust.*** As you implement your plan, you may face unexpected challenges. Nature can be predicted to some degree, but unpredictable events happen. A windstorm or disease concern may occur that forces changes in your approach. You may also implement a practice and not get the response you desired. Reach out to your forester for some alternatives and keep moving forward.

***You are not alone.*** Always remember that help is available. Resource professionals are available to ask for advice. You can access landowner networks, such as the Missouri Woodland Mentor Program and the Forest and Woodland Association of Missouri. Your woodland-owning peers can also be an excellent source of practical information. Be sure to check out the resources and contacts mentioned in this guide to see who might be able to assist you in your management journey.

# Resources and contacts

## *MU Extension publications*

G5057, Basic Elements of a Timber Sale Contract[13]
G5999, Forestry Assistance for Missouri Landowners[1]
G5054, Forestry Terms for the Woodland Owner[14]
G9415, Integrating Woodland and Wildlife Management Practices on Your Property[10]
G5051, Selling Timber: What the Landowner Needs to Know[11]

## *Sources of professional assistance*

Missouri Consulting Foresters Association[6] is an organization of foresters who provide services for a fee to landowners. These services include plan development, timber sale assistance, invasive species control and many others.

Missouri Department of Conservation[5] offers planning and technical assistance to landowners. Select "contact and engage" to find your local forester or private land conservationist. MDC staff may also be able to guide you through a variety of cost-share programs for plan implementation.

Natural Resources Conservation Service[4] may be able to provide technical advice and cost-share funding to help with resource concerns you have for your property.

## *Landowner organizations*

Forest and Woodland Association of Missouri[14] (FWAM) is your connection to landowner networking. FWAM manages the Missouri Tree Farm Program and the Call Before You Cut program and arranges several landowner events throughout the year.

Missouri Prescribed Fire Council's Prescribed Burn Associations[15] are groups whose members help each other conduct prescribed burns on their property. Landowners wanting to use prescribed fire on their land can join a Prescribed Burn Association.

## *Financial assistance programs*

Environmental Quality Incentives Program, managed by the Natural Resources Conservation Service, offers cost-share funds to implement forest and wildlife management practices. Inquire with your local MDC forester or the NRCS.

Landowner Assistance Program, managed by the MDC, offers help implementing forestry and wildlife management practices on private land.

Call Before You Cut[8] offers assistance to landowners wanting to meet with a consulting forester. Funded by MDC and managed by FWAM, the program reimburses consulting foresters for the initial site visit with landowners.

Conservation Reserve Program (CRP), administered by the Farm Services Agency, provides a long-term incentive for agricultural cropland to be removed from production and used for conservation purposes, including conversion to woodlands, prairie and wetland. To be eligible for the CRP, land must have been cropland (e.g., corn and soybeans) four of the past six crop years. CRP provides participants with rental payments and cost-share assistance in exchange for long-term conservation of land.

## *Carbon sequestration programs*

Missouri forests play a significant role in carbon cycling and mitigating climate change. They absorb carbon dioxide ($CO_2$) from the atmosphere and store it in trees and wood products. However, factors such as forest age, disturbance events (e.g., wildfires and insect outbreaks) and management practices influence how much carbon forests store and release.

A 2024 report from the University of Missouri School of Natural Resources, Carbon and Biomass Dynamics in Missouri Forests and Implications for Climate Change (PDF),[16] examines these dynamics and discusses sustainable forest management strategies that enhance carbon sequestration and promote forest health in the face of a changing climate.

Forest carbon markets allow landowners to sell carbon credits, representing the carbon sequestered by their forests, to businesses and other entities seeking to offset their greenhouse gas emissions. These credits can be generated through activities such as planting trees and managing forests sustainably. Participating landowners enter into agreements with purchasers, often for extended periods, and receive payments for the carbon stored.

Carbon markets are very complex, and contracts can be for up to 100 years. Be sure to carefully read the standards and methodologies that a carbon project developer publishes to fully understand the commitment as a landowner.

## Resource and contact web addresses

1. extension.missouri.edu/publications/g5999
2. mdc.mo.gov/your-property/responsible-construction/missouri-natural-heritage-program
3. websoilsurvey.nrcs.usda.gov/app
4. nrcs.usda.gov
5. mdc.mo.gov
6. missouriforesters.com
7. extension.missouri.edu/programs/forest-ecology-and-management
8. callb4ucut.com/missouri
9. extension.missouri.edu/programs/wildlife-ecology-and-management
10. extension.missouri.edu/publications/g9415
11. extension.missouri.edu/publications/g5051
12. extension.missouri.edu/publications/g5057
13. extension.missouri.edu/publications/g5054
14. forestandwoodland.org/treefarm
15. moprescribedfire.org/pba-locations-contacts
16. extension.missouri.edu/media/wysiwyg/Extensiondata/Pro/WoodlandSteward/Docs/carbon-climate-report-2024.pdf

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