

Develop your vision for your backyard woods

In Your Backyard Woods

Why should I plan?

Your backyard woods is like a garden that needs to be tended to get the best results. By weeding, adding new trees and shrubs, managing insects and diseases, and harvesting products, you'll help nature create the backyard woods that meets your needs and wants.

Even if you are contented with your backyard woods today, it will change over time. As trees and the associated plants sprout, grow, and die, other plants and wildlife will replace some of the trees and wildlife you currently enjoy. Brush will fill in the trails. Trees will invade your favorite berry-picking spots or obscure your favorite view. Your trees may become over-crowded, lose their vigor, and become susceptible to insects and diseases.

Caring for your backyard woods can take a lot of time and money. A master plan will help you focus on what is important to you and your family. It will help you organize the work so that it is manageable and fits your budget and available time.



How do I get started?

The first step requires a pencil and paper, and some time to think. You may want to sit down with your family and talk about your backyard woods.

Answers to questions such as these will help you to develop a vision for your backyard woods:

- Why do we have this land?
- What do we like about it?
- What words describe the feelings we have for this land?
- What do we want it to produce?

- What do we want it to look like in 5, 10, and 20 years from now?

What are my objectives for my woods?

The most common objectives for backyard woods are to improve wildlife habitat, aesthetics, and recreation. Other objectives include tree value and special forest products. You can have more than one objective. Maintaining a healthy woods and a safe environment should always be included among your objectives.

To reach your vision for your backyard woods, develop specific objectives that will help you identify the actions you need to take. Here are a couple of examples:

- It is not enough to say you want more wildlife. You need to decide which animals are most desirable, and whether improved bird watching, hunting, or just a greater variety of animals is your objective.
- Perhaps natural beauty is what you want. Your objectives may be to improve the view from your house or possibly to add some color or different shapes to your backyard woods by planting a variety of trees.

With backyard woods management, achieving several objectives at once is usually easy. For example, when you are cutting firewood, which of these would you say you are doing: producing fuel, providing space for your favorite trees to grow, making brush piles for rabbits, or enjoying yourself? Many backyard woods owners would answer, "All of these!"

Talk with your neighbors and ask them about their plans for their woods. Working together on similar objectives can make the task easier and greatly increase the impact on wildlife and other values you share.

What do I have on my property?

The trees you have or can grow on your property are determined by climate, soils and the previous landowner's activities. You may not be able to develop specific objectives and activities to reach your objectives until you know more about your property.

Temperature and precipitation are the main climate factors affecting the types of trees and their growth on your property. Each type of tree has a minimum and maximum temperature that limits its growth, and an optimum temperature for growth. Trees need at least 15 inches of annual precipitation to grow, but they can use much more.

Depth and texture are soil factors that control the amount of moisture and nutrients available to trees and other plants. Deep soils are generally better than shallow soils because they have the potential for greater nutrient supply and water-holding capacity.

Soil texture refers to the size and shape of the sand, silt, and clay particles in your soil. Sand particles are relatively large and irregularly shaped. Silt particles are very small sand particles. Clay particles are extremely small and flat. Soils are named based on the percentage of sand, silt, and clay they contain. Loam is the name for soils with various mixtures of sand, silt, and clay particles. Sandy soils have large spaces between the particles enabling water to move through it quickly, so less water and nutrients are available to plants. Clay soils hold a large amount of water and nutrients but the spaces between particles are so small that roots have a difficult time reaching it. Silt soils are similar to clay soils. Loams are the most productive soils because they have the best qualities of sand and clay without their undesirable characteristics.

Talk with your neighbors and visit the local Soil and Water Conservation District to find out the previous uses of your property.

Climate, soils, and previous uses are beyond your control. The best way to work within these conditions is to maintain and plant native trees and plants. They have adapted to the climate and soils in your backyard woods, and need the least amount of your time and work for them to grow.

Refining your objectives and activities requires you to find out what is on your property. Walking your property and sketching a map is a good way to inventory your woods. The sketch map can be developed using different materials, such as one of the following:

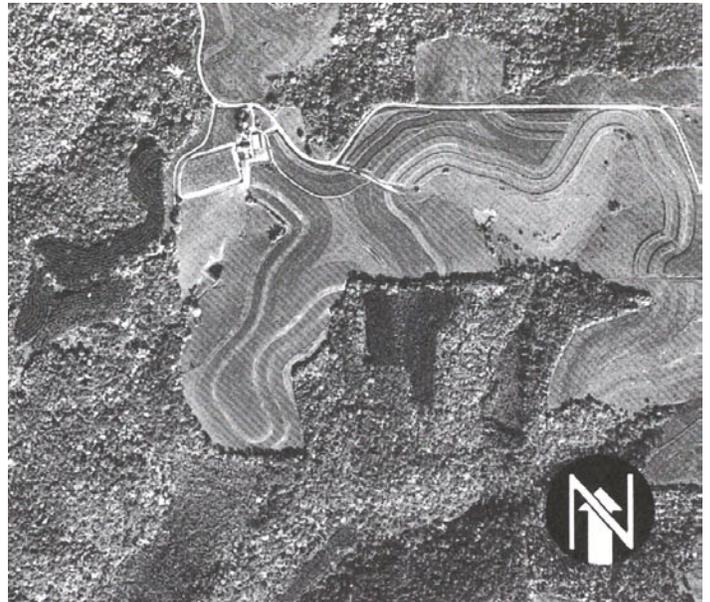
1. **An aerial photograph.** A “birds-eye-view” of your backyard woods may help you locate different vegetated areas, property boundaries, streams, ponds, roads, and trails before you walk through your woods. Aerial photographs are available in black and white or color prints in a variety of scales and sizes. (One or more of these offices should have the photos you need: USDA Natural Resources Conservation Service,

Farm Service Agency, or Soil and Water Conservation District; U.S. Department of Interior, Bureau of Land Management; State forestry agency, Department of Revenue, Department of Transportation; and County assessor and surveyor.) Make a photocopy and draw your sketch map on it, or use clear acetate overlay and transparent markers to sketch your map.

2. **A photocopy of the plot map for your property.**

Enlarge the map to a size that’s easy to work with. The plot map is available from your county assessor’s office.

3. **A sheet of graph paper.** Sketch your map to scale on the graph paper by designating each inch on the graph paper equal to a set number of feet on the ground, such as 1 inch equals 100 feet.



An aerial photograph helps you identify land uses and variations in your backyard woods.

As you walk through your property sketch tree-covered areas, treeless areas, unique features like rock outcrops, streams, ponds, swamps, wet spots, stone fences, and colorful foliage, roads, trails, house, other structures, and yard. Be sure to walk your boundary lines, and if they are not evident, locate them and mark them.

Where does my backyard end and my backyard woods begin? There is no exact, defined line, but generally your backyard woods is at least as far away from your house or other structure as the height of a mature tree in your area. In other words, if a mature tree on your property would be cut and would fall on your house or other structure, you are in your backyard, not your backyard woods.

Look for variation in tree-covered areas. Variations in your woods occur because of changes in elevation, proximity to water, differences in soil, and activities of previous landowners. Identify patches with distinct tree type, size, or tree grouping, or all of these. For example, you might identify medium-sized broadleaf trees that are evenly spaced, a crowded patch of small needleleaf trees, and a group of large needleleaf and broadleaf trees widely spaced.

Record tree conditions and clues to wildlife uses for each patch you identify. Look for full healthy foliage or discolored or shredded leaves, caterpillars on trees, dead branches in the tops of trees, odd growths on stems or branches, or dead trees. Clues to wildlife use could be a nest in a tree, a den, beaver pond, animal tracks, or dead tree with a large hole in the trunk.

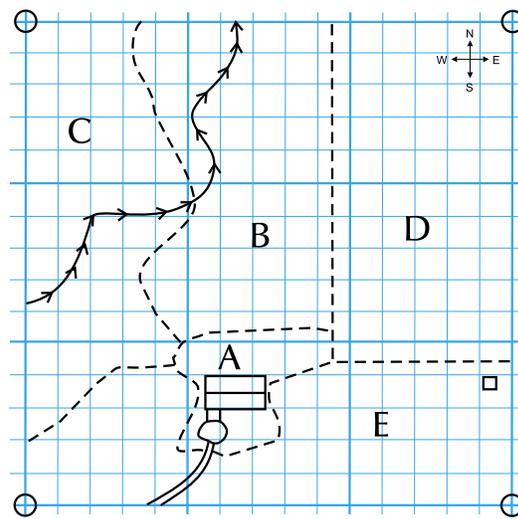
Walking your property and reviewing your map and descriptions at different times of the year will help you identify seasonal features like wet spots, channels that carry water periodically, flowering plants, and colorful foliage.

As you make your map, also look at what's on the other side of your property line. Features on your neighbors' properties can affect what you do on yours, so sketch in their significant features such as ponds, streams, pastures, or woods of various kinds.

The example property is located in plant hardiness zone 5 with 35 inches of annual precipitation. A soil map identified the soil as a sandy loam, on 12 to 18 percent slopes, and with a depth greater than 2 feet. Soil interpretations recommended pine and oak as trees suited for the soil.

The description recorded by the landowner for each area on the map is as follows:

- A. Home, lawn, and yard trees. One yard tree near area C. has several dead branches. A nice lawn on the south has a large turnaround. The north has a great view of the neighbor's pond and a beautiful lawn. The woods is close to the house on the east and west providing morning and evening shade.
- B. Treeless area with grass and some flowering plants, and numerous small trees and shrubs. The small stream has some eroding banks because the previous owner used the surrounding area as a pasture. The water in the stream gets cloudy after a rain. This is a good place to see deer and birds.



A - E Different areas and tree covered patches

- ⊕ Boundary corner
- Area and patch boundaries
- Stream
- ▭ Home
- == Driveway
- Turn-around in driveway
- Viewpoint

After you inventory your backyard woods you can draw your own map on graph paper.

- C. Several large broadleaf trees. It's shady under the large trees, with a few small trees and shrubs. The trees next to the stream are a different type than the trees in the rest of the area with more shrubs and other plants. The woods continues into the neighbor's property. A small opening with stumps indicates tree cutting. The stream contains clear cool water.
- D. Small needleleaf trees with thin foliage close together in rows. Plants are growing between the rows of trees. The former owner tried to grow Christmas trees, but chose trees not suited to the soil or the climate.
- E. Mixture of medium-size needleleaf and broadleaf trees. All the tree's branches are growing together and most of the needleleaf trees have dead branches. There is a good view from the hill near the east boundary. A large tree on the hill is mostly dead.

What will I do?

Compare your objectives and inventory, and make adjustments if needed. In the example, the objectives of the landowner and his family were to keep the property natural, watch wildlife, and enjoy the view from their home. After they talked with their neighbors, attended a university extension service workshop on living on a few acres, and surveyed their property, they changed their

Ten-Year Activity Plan

Year	Area	Activities	Help Needed
1.	All A A B	Learn more about plants, animals on land, and take chainsaw training. Conduct fire audit. Hire someone to inspect unhealthy tree, and remove it and protect other trees if needed. Explore methods to remove trees and shrubs from area.	Arborist Contractor
2.	D All B A	Cut three rows of needleleaf trees next to area B and make wildlife brush piles among adjacent rows of trees. Add birdhouses in various places. Remove trees and shrubs. Expand lawn to at least 30 feet on east and west sides of house, remove some trees with branches touching, and remove branches on trunks up to 10 feet.	Contractor
3.	D D D	Plant mixture of trees and shrubs for wildlife and aesthetics as border between area B. Control weeds in planted area. Do nothing on the rest of the area and see what grows.	
4.	D All E B	Continue weed control on wildlife planting. Design, lay out, and construct trail for hiking, truck use, and fire break. Construct bridges at stream crossings. Remove the top of old tree on top of hill, and leave trunk for wildlife use. Remove a 30-foot strip of vegetation along both sides of stream for tree and shrub planting.	Contractor Contractor
5.	D C B	Continue weed control on wildlife planting. Work with neighbor to share costs of cutting 2-3 oak trees. Purpose: lumber and firewood, wildlife opening, and space for young oak to grow. Hire portable sawmill operator to saw logs into lumber, and stack boards to dry. (See the Backyard Woods Tip Sheet on Generate Wood Products for more information.) Plant trees and shrubs along stream to cool the water, reduce bank erosion and improve wildlife habitat.	Neighbor Logger Operator
6.	D-B C E E	Continue weed control on planting sites. Check opening to be sure young oaks have room to grow. Remove any competition. Select individual trees that you want to keep for aesthetics and wildlife uses. Cut or girdle some trees for the next several years that are touching selected trees' crowns. Use cut trees for firewood or leave on ground, and leave girdled trees standing for wildlife. Prune branches on trunks of selected trees for wildfire safety and aesthetics.	
7.	C E B E	Continue to check on oaks in opening. Continue to remove trees competing with selected trees. Continue weed control on streamside planting. Place oak bench on overlook.	
8.	C B	Cut 2-3 oaks using the same method if young oaks are growing in the first opening. If they are not growing find another method. Continue weed control on streamside planting.	Logger Operator
9.	C E B	Check opening for young oak growth. Continue removal of trees competing with selected trees. Remove trees and shrubs from area.	
10.	C E D All	Check opening for young oak growth Finish removal of trees competing with selected trees. Check the kinds of trees and shrubs replacing the needleleaf trees, and decide if need to change tree types. Obtain information on how to grow ginseng and shiitake mushrooms.	

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National Association of
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www.arboday.org/backyardwoods

Danger—Always think safety

In Your Backyard Woods

As you begin to implement your backyard woods plan (See the Backyard Woods Tip Sheet on Make a Master Plan for more information) you may want to remove some trees to give a favorite tree room to grow, or cut some firewood or fence posts, or remove a tree with a hazardous defect. A chain saw is the tool used most often to cut down trees. Cutting down a tree is one of the most difficult and dangerous activities you can do in your woods. In 2000, chain saws caused 40,000 injuries and deaths in the United States—and most could have been prevented (About, Inc. 2002). From the moment you take a chain saw out of storage to the time you put it back, you can be hurt by it or by whatever you are cutting. To work safely in your woods you need knowledge, skill, and safe working habits.

What do I need to know?

Learn how to use a chain saw before you take it into your woods. Books, Web sites, and videos can provide you the information needed to cut down a tree up to 8 inches in diameter that has very little lean, remove the branches, and cut the trunk into pieces. To become skilled enough to safely drop a tree in a desired direction, however, requires hands-on chainsaw training.

Skill and safe working habits are developed by training and practice. One way to obtain training is to learn from someone experienced with a chain saw. There are also hands-on chain saw training courses available. The local Cooperative Extension Service or local chainsaw dealer are a couple places to find training opportunities.

Never work alone in your woods with a chain saw. In the event of an accident or emergency, you have to have someone who can help or bring help. You can quickly get into trouble when working alone in the woods with a chain saw.

When you are in the woods where someone is operating a chain saw observe the safety zone rule: Never approach within 200 feet of a person using a chain saw until he or she sees you, stops work, and signals you forward. A person using a chain saw tends to be unable to hear anyone approaching or calling to them because of the high noise

level and their hearing protection. They tend to be concentrating on their work and not looking for other people. This rule also applies to two people operating chain saws in your woods. If you ignore this rule you are in considerable danger of being hit by a falling tree or flying debris.

Knowing your limitations and that something is beyond your capabilities is essential. If you are not sure you can do something, don't do it. **Hire a professional to do it for you.**

How do I choose a chain saw?

Your local chain saw dealer should be able to advise you on the chain saw that will meet your needs. Before you select a chain saw—as a minimum—consider horsepower, bar length, chain type, and safety features.

Horsepower—Use a saw with a power head rated at 3.8 cubic inches or less.

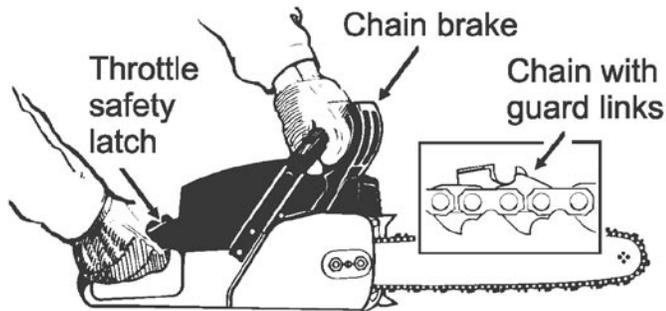
Bar length—Use the shortest bar possible to accomplish your tasks, to reduce the hazards involved. Finding a bar length that is suited for all your woods work means you can avoid adjusting your thinking and physical movements for different bar lengths, which should help you avoid mishaps. You should be able to perform all your tasks with a bar length between 16 and 18 inches.

Chain types—learn how to choose the right chains for your saw and how to sharpen and maintain them. This knowledge will improve your productivity and help you avoid wear and tear on your body and the saw. Some chain styles may reduce cutting time, which in turn may reduce your fatigue and result in fewer accidents. A dull chain saw will not cut straight, if it cuts at all.

Safety features—Chain saw safety features include these three:

- Chain brake—activated with a flip of the wrist to prevent the chain from moving.
- Throttle safety latch—mounted on the top of the throttle handle, it must be depressed by your thumb before the throttle can be engaged.

- Chain with guard links—designed to reduce the incidence and severity of kickback.



All chain saw safety features should be in good working order.

What personal protective gear do I need?

You need to protect your head, hearing, eyes, face, hands, legs, and feet.

A hardhat outfitted with earmuffs and a screen type full-face shield is the best protection for your head, hearing, eyes, and face. Not only does it protect you from saw injuries and hearing loss, but also from getting particles in your eyes. You can use a hardhat, earplugs, and eye goggles, but a hardhat provides the added face protection and all the safety features in one piece of equipment.

You need to wear gloves or mittens when you operate a chain saw. You may want to consider additional protection by wearing gloves or mittens constructed with chain saw protection for the left hand if you're right handed or for the right hand if you're left handed.

Leg protection is absolutely necessary. Leg injuries account for nearly 40 percent of all chain saw injuries. Chaps, leggings, or protective pants are options. If you choose chaps, be sure to purchase a wrap-around style and a length that will protect the ankle. Pants provide greater comfort and avoid the problem of twigs catching behind the chaps.

Leg protection options are made with different types of fibers. Purchasing those with washable ballistic nylon fibers makes it easier to keep them clean, which is necessary for the fibers to do their job. Long-term protection depends on the types of fibers used. Oil soaked fibers will not explode and stall a rotating chain, which is how the protection occurs.

Chain saw protective boots or at least an above-the-ankle leather work boot is a must to protect your feet.



Wear all of your safety equipment every time you use your chain saw.

What other equipment do I need?

Assemble these other necessary tools and supplies: wedges, ax, large hatchet or maul, properly mixed fuel, bar oil, bar wrench, chain file with protective handle, small screwdriver with magnetic head, minor maintenance tools, and a first aid kit.

What should I do before I start cutting?

Carry the chain saw to the cutting site by holding it at your side with the bar pointing back. This will prevent you from falling on the bar if you trip.

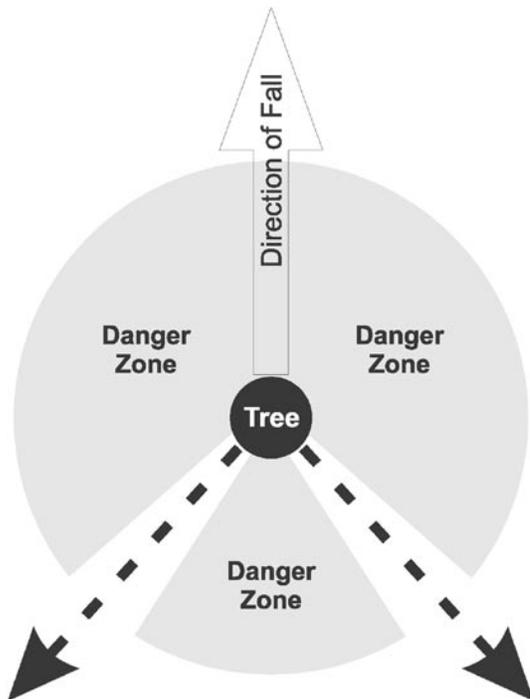


Carry the chain saw at your side with the bar pointing back and with the engine off or the chain brake set.

Be aware of weather conditions and your surroundings, the terrain, buildings, vehicles, power lines, livestock, and

other people. Always look carefully at what is around you and the condition of the tree, to develop a clear picture of what you intend to do. Determine the wind direction and approximate speed. Look at the tree from several directions to determine its lean, any excess branches on one side, broken or lodged material in the tree, and ice or snow in the branches. Look for tall dead tree trunks, leaning trees, and trees hung up in other trees within a distance equal to two tree lengths from the tree you are cutting, because they may fall at the same time as the tree you are cutting. Also look for vines, other tree branches, and other trees that may affect the direction in which the tree you are cutting will fall.

Based on these observations, you should be able to estimate the most likely direction the tree will fall, and be able to plan two escape routes. Be sure the escape routes are free from obstructions. Never move directly opposite the direction of tree fall, because the tree branches hitting the ground can cause the trunk to jump back. Never turn your back completely on the tree as you retreat. Before returning to the tree, wait at least 30 seconds after the tree hits the ground to allow debris to settle. If you can't easily remove the chain saw from the tree, leave it behind.



Plan and clear two escape routes (dashed arrows) before you begin cutting a tree.

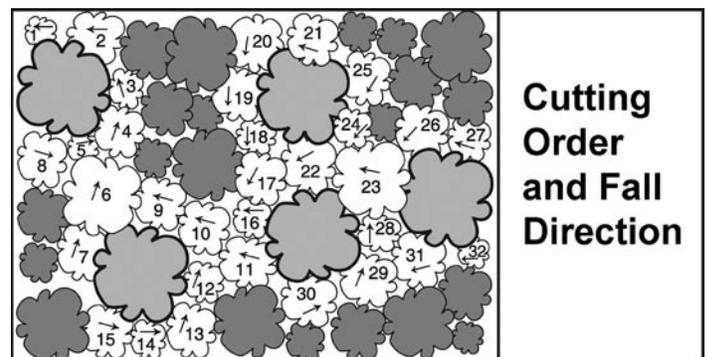
Finally, check to see if the tree you are cutting could land on a building, fence, power line, or your neighbor's property. It is not advisable to try to control the direction a tree will fall in order to miss hitting something. If you

have any doubt about hitting an object, use the following steps to determine how far the top of the tree will land from its stump.

1. Using your ax handle or a straight stick, place the end under your armpit and hold your arm straight and grab the handle or stick. Mark the point you grasp with a piece of tape.
2. Position yourself in a line between the tree and the object, such as a building, that potentially will be in the path of the falling tree.
3. Grasp the handle and, with your arm extended in front of you, raise or lower your arm until the bottom of the ax or stick lines up with the bottom of the tree or the place on the tree where your cut will be made.
4. Moving your eyes, but without moving your head, look at the place on the tree that is in line with the tape on the handle. That part of the tree will land where you are standing.
5. Go forward or backward until your mark is sighted on the top of the tree. This is the spot the top would reach if the tree falls in that direction.

If objects that can be damaged by the tree are within the range of its fall in any direction, give serious consideration to having a professional logger or tree removal service cut down the tree.

When you need to remove several trees in close proximity, develop a plan of action. Locate an open space for the first tree to fall. Mark an arrow on the tree showing the direction of fall. With each tree you drop, you are opening a new hole in which another tree can fall. Next to your directional arrow, place a number indicating the tree cutting order. This appears to be a lot of work, but the time and energy saved by not having a falling tree hang up in the branches of a standing tree will more than compensate you for the planning time.



To be safe, take the time to plan the direction of fall and cutting order for every tree you cut.

How do I safely operate the chain saw?

Follow these safety procedures:

1. Always engage the chain brake at these times:
 - When you start the saw.
 - When you take one hand off the saw to do something.
 - When you take more than two steps with the saw running.
2. Start the saw safely by using one of the following two techniques:
 - Place your left hand on the front handle. Hold the back of the saw tightly between your legs. Pull the start cord (after engaging the choke, if necessary) using a fast but short stroke.
 - Place the saw on the ground. Place the toe of your boot through the back handle to hold the saw down. Hold the front handle with your left hand. Pull the start cord using a fast but short stroke.



Both starting methods are safe, but the leg lock method (a) is so fast and easy that it allows you to turn the saw off and restart it even when you walk a short distance.

3. Focus on the forces of the saw. Anytime you use a chain saw you need to be aware of the reactive forces created. When you cut with the bottom of the bar, the rotating, cutting chain can pull you into the work. When you cut with the top of the bar, it can push you away from the work. Your body stance and grip are determined by which part of the bar you are using to start your cut so you are physically prepared for the reactive forces that may occur.



Hold the chain saw with two hands anytime it is running and the brake is not on. Keep the thumb of your left hand wrapped under the forward handle so that the saw cannot easily be pushed back out of your grasp.

4. You can experience a kickback almost every time you use a chain saw. Most are mild and easy to control. A severe kickback can cause one of the worst accidents you can experience working with a chain saw. Most kickback accidents—in which the chain saw is suddenly thrown violently back towards the operator—occur while removing limbs from a tree that is on the ground and while cutting the trunk (bucking). Kickback occurs when the chain is suddenly forced to stop. The most common way this happens is when the upper tip of the bar touches a tree, log, or branch. Another way the chain can be stopped suddenly is when a log or a limb pinches the top of the bar and chain while cutting from below with the top of the bar. Kickback can be prevented by:
 - Making sure the upper tip of the bar touches solid wood
 - If you have to cut a log from below, do it in two stages: first cutting from above, then making another cut from below to meet the first cleanly
 - Holding the chain saw with both hands
 - Gripping the handle by putting your thumb around it

- Keeping your elbow locked
- Never cutting above shoulder height
- Keeping the saw close to your body and not reaching out with it
- Using a saw equipped with a chain brake
- Starting every cut under full throttle
- Keeping the chain sharp.

In the Forest

Trained professional loggers cut trees in public and private forests. Cutting the tree is probably the most difficult and dangerous part of the logger's job. To emphasize this point, the following quote was taken from the Ontario Forestry Safe Work Place Association handbook "The Cutting Edge":

"To achieve the goal of working safely, you need three things: knowledge, skill and safe working habits.

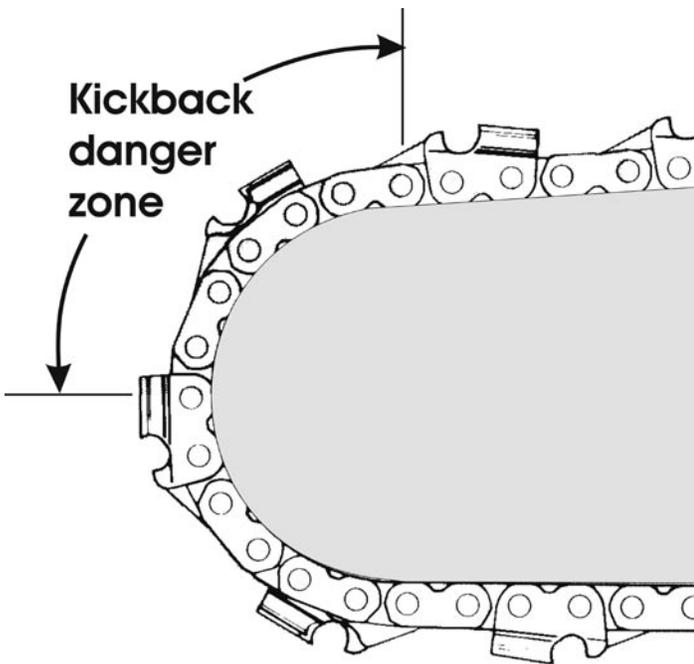
"Knowledge: You need to know what each task consists of, you need to know how to do it and you need to know what hazards are involved.

"Skill: you need to have the ability to physically perform the task in the right (safe) way.

"Safe Working Habits: Most of all, you need to have (or to develop) safe working habits that means you automatically do the job right—every time—without having to think about it.

The Cutting Edge is designed to give you the first of those three ingredients for chainsaw safety. You can gain knowledge and understanding by studying this book. You can gain skill by practicing the techniques and procedures described. But to acquire the safe working habits you need, you have to make a conscious effort to make yourself do every task the right way. After a relatively short time—if you do every task the right way every time—doing it that way will start to become automatic.

That is when your knowledge and your skill will add up to the safe working habits you need to protect yourself."



To avoid kickback, don't let the upper tip of the chain saw blade come in contact with solid wood.

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Acknowledgments

Some of the information included in this tip sheet was obtained from hands-on training experiences in the Soren Eriksson Game of Logging Program.

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National Association of
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www.arboday.org/backyardwoods

Prepare before wildfire strikes

In Your Backyard Woods

Every year many families lose their homes and possessions to the ravages of wildfire; however, losses can be minimized. As a backyard woods owner, you play a key role in wildfire protection. How you maintain your woods can reduce the occurrence, size, and intensity of a wildfire.

Understanding wildfire

Fire requirements

Fire needs oxygen, fuel, and heat to burn. To prevent fire, you need to eliminate or reduce the availability of these ingredients. Since oxygen is always present in the air, the focus of fire prevention is on fuel and heat sources.



Fuel can be living or dead material that will ignite, carry fire, and burn. In your backyard woods, fuel includes standing and fallen trees, shrubs, and ground cover. Your home and outbuildings are also fuel. Fuels on the ground allow fire to spread more easily along the ground. Fuels above the ground allow fire to spread upwards and even climb into the crowns (tops) of trees, where it can spread rapidly from tree to tree.

Heat can be generated naturally by lightning or by people through sources such as chimneys, barbecue grills, and incinerators. Heat from a fire radiates in all directions, particularly upward. Sparks and embers can be carried aloft by air currents and deposited up to 1 mile away from a fire.

Fire behavior

When the essential ingredients for fire are present, weather and topography affect how fire will behave. Weather is the more important factor because it affects the moisture content of fuels. High temperatures dry and preheat fuels. Low relative humidity and wind also dry fuels out. Dry preheated fuels require less added heat to start a fire. Wind also affects how large a fire will become, by affecting the direction and speed at which the fire will move.

Topography or slope of the land also affects how fast a fire will spread. Fires tend to spread much faster uphill. In general, fire can spread 1½ to 2 times faster up a 45 percent slope than it does over flat terrain. Fires spread fastest on hillsides facing west or south because they are exposed to more direct sunlight, which causes the fuels to be drier.

Protecting your home and property

An untreated wood shake roof is the number one cause of home loss from wildfires. Wind blown sparks easily ignite these roofs, and roof sprinklers do not provide adequate protection. Consider class-A asphalt shingles, slate or clay tile, metal, concrete products, or terra-cotta tiles when constructing or replacing the roof on your home.

One of the most important things that a backyard woods owner can do to protect their home and other structures from wildfire is to create a safety zone or area of defensible space around them. This zone should be at least 30 feet wide on level or gently sloping ground and 100 feet or more on slope grades 30 percent or greater downhill from any structures.

A well-maintained (green) lawn makes a good safety zone, as long as it is kept clear of all leaves, twigs, and other debris that could catch fire. Trees within the 30-foot safety zone should have all bottom branches removed to a height of 6 to 10 feet, and should be spaced so that the crowns are at least 10 to 16 feet apart. Outside the 30-foot safety zone, one should prune branches away from power lines and outbuildings; and remove low hanging limbs, dead branches, undesirable small shrubs, and dead trees.



Your landscape doesn't have to be barren to be safe. Many common plants naturally resist fire.

Fire-resistant plants

Many common plants naturally resist fire and can help keep fire from spreading. Generally, well-watered green plants will burn slowly. Certain types of plants have low oil and resin content or produce less litter and will burn slowly.

Examples of fire-resistant ground covers are these:

- Bugleweed (Ajuga)
- Lilly of the valley (Convallaria)
- Japanese spurge (Pachysandra)
- Spotted lungwort (Pulmonaria)
- Stonecrop (Sedum)

Examples of fire resistant shrubbery are these:

- Native bearberry (Arctostaphylos)
- Bearberry (Cotoneaster)
- Lilac (Syringa)

For more information on Firewise landscaping, visit the National Fire Protection Association Firewise Web site: <http://www.firewise.org>.

Storing materials safely

Items that can easily catch fire should be stored at least 30 feet away from any structure, including wooden fences and outbuildings. Some items to consider are these:

- Fuel (leaves, twigs, dry grass, garden waste)
- Firewood
- Oil and or propane tanks
- Brush and slash (tree limbs, branches)
- Gasoline
- Paints and solvents

Brush and limbs should be hauled to local refuse recycle centers or dispersed outside your safety zone.

Providing emergency access to your property

Despite your efforts to minimize the likelihood of fire in your backyard woods, fire is always a possibility. In the event of a fire firefighters need to be able to find and access your property quickly, and you can help make it easy for them.

At the entrance to your property, be sure to display your house number or street address so it can be read from the main road. It is best to use large, easy-to-read lettering and numbers.

Narrow, winding driveways increase privacy, but can hamper access of larger fire engines. Be sure your access road is wide enough to accommodate them.

Bridges may prove to be a barrier. If you have any bridges in your driveway, make sure that they are strong enough and wide enough to allow large fire engines to cross.

Turnarounds may be required at the end of your drive or road, in order for fire engines to be able to be positioned properly and to allow for quick exit if necessary.

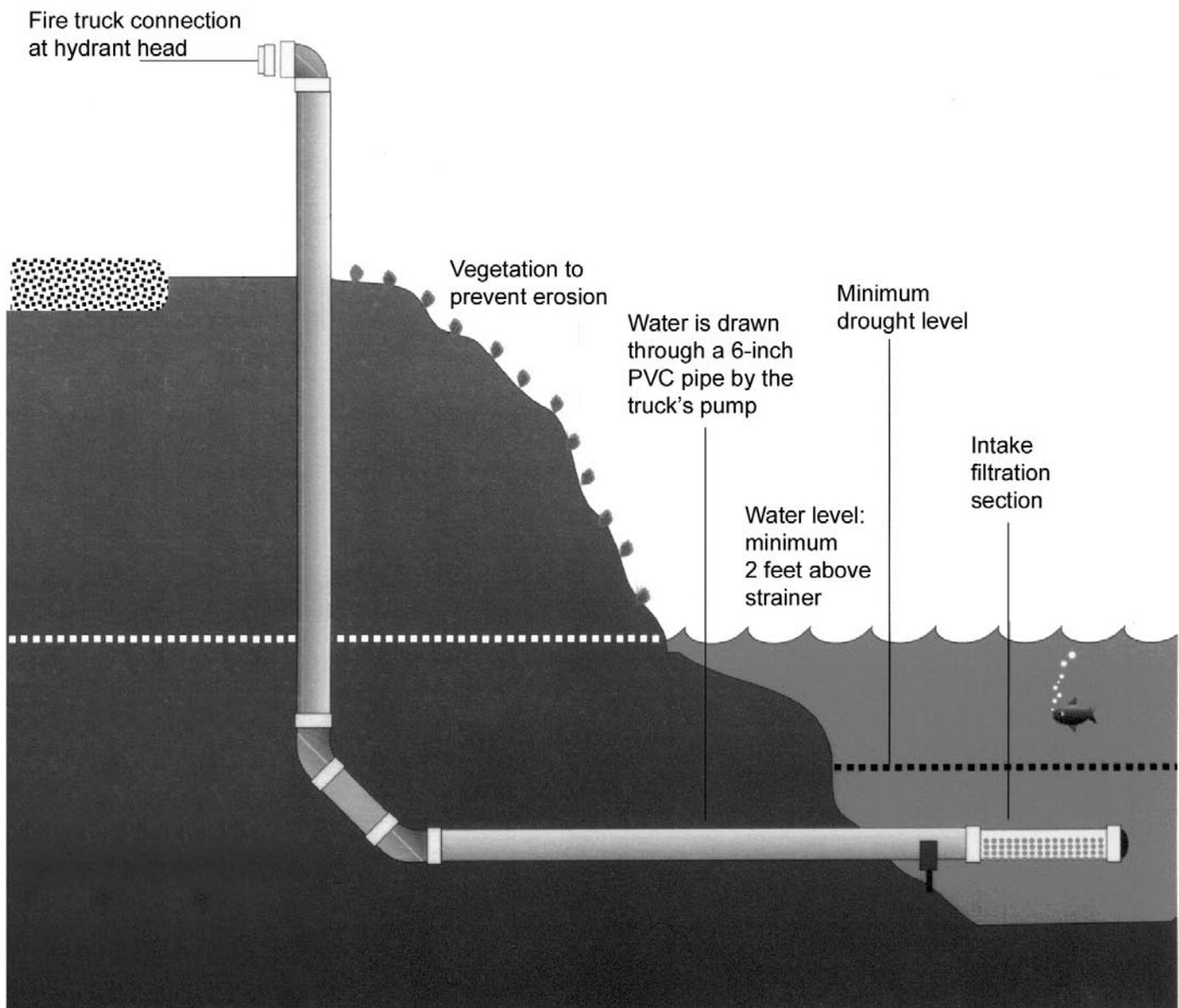
Contact your local fire department for specific information on easy to read lettering, and on access roads, bridges, and turnarounds.

Ensuring a water supply: dry fire hydrants

When a fire department responds to a fire in a rural area, access to domestic water supplies may not be readily available. This situation can impair a fire department's ability to protect life and property. You can minimize the distance fire trucks must travel to municipal water supplies or draft sites, by installing a dry hydrant on your property. Ponds, lakes, streams, canals, and irrigation wells can become sources of water for firefighting.

A dry fire hydrant is a nonpressurized pipe system permanently installed in an existing water source to provide easy access to water from the main road. The dry hydrant can be made of any hard, permanent material (steel, iron); however, PVC (polyvinyl chloride) is most commonly used due to price, accessibility, and low friction-loss performance. The other elements of the system include an intake filtration section, and a hydrant head with suction screen and cap. Besides improved fire protection, benefits of having a dry fire hydrant include lower property insurance rates.

For more information on dry hydrants, contact the Soil and Water Conservation District to find your local Resource Conservation and Develop Council, the State Forestry agency or local fire department.



A dry fire hydrant is simple in design, but provides improved fire protection and lower insurance rates to you and your neighbors. It must be installed on a road that provides easy fire truck access.

Are you prepared?

Proper maintenance of your home, outbuildings, and backyard woods will help you and the local emergency responders considerably in protecting your property from wildfire.

Reduce your risk of loss to a wildfire by applying these guidelines now. Meet with your family to decide what to do and where to go if a wildfire threatens your property. Here are some additional things that you can and should do:

- Contact your local fire department, health department, or forestry office for information on fire laws.
- Be aware of hazardous weather and fuel conditions that could cause a wildfire.
- Teach your children about fire safety.
- Post fire emergency telephone numbers.
- Plan several escape routes from your home and property.
- Talk with your neighbors about wildfire safety.

In the Forest

The heart and soul of firefighting on most forest fires in the United States are provided by the 26,000 volunteer rural fire departments across the country. Through partnership with the USDA Forest Service and the States, these local fire departments receive necessary training, fire equipment, and personal safety items, and new fire departments are organized in unprotected communities. One program that provides assistance to States and local volunteer fire departments is the Federal Excess Personal Property Program. Excess personal property is acquired from various Federal agencies by the Forest Service and loaned to State forestry agencies and rural fire departments for use in providing forest and rural community fire protection.

Suggested Reading

FIREWISE: www.firewise.org. This Web site contains educational information for people who live or vacation in fire-prone areas of the United States.

A Cooperative Project of:



USDA Forest Service
NORTHEASTERN AREA
State and Private Forestry
www.na.fs.fed.us



National Association of
Conservation Districts



www.arboday.org/backyardwoods

Identify and Manage Hazardous Defects in Your Trees

Prevent personal injury and property damage

In Your Backyard Woods

Trees are key to the enjoyment of your backyard woods. Structurally defective trees; however, can fail and cause personal injury and property damage. A tree with structural defects that are likely to cause failure is considered a “high risk or hazardous tree” if it could strike a target. A target can be a vehicle, building, or a place where people gather such as a bench, picnic table, trail, or fire pit.

Many structural defects that contribute to tree failure can be prevented through proper tree planting and pruning practices. (See Backyard Woods Tip Sheets on Plant Trees and on Prune Your Trees for more information.)

To ensure your family and friends have a safe environment in which to enjoy the beauty and many benefits of your backyard woods, you can learn to recognize hazardous defects in trees and take corrective actions. At the same time, you can increase wildlife habitat, aesthetic value, and recreational opportunities within your backyard woods.

A professional forester or arborist should undertake many of the suggested corrective actions. Because of the natural variability of trees, the severity of their defects, and the different sites on which they grow, evaluating trees for hazardous defects can be a complex process. The following are guidelines, not absolute rules, for recognizing and correcting high-risk tree defects. When in doubt, consult a professional forester or arborist.

Inspecting Trees

Trees that are in high use areas and within striking distance of a target, should be inspected every year and after severe storms. This usually includes all trees within your immediate backyard, and along trails, near picnic areas or fire pits, or campsites within your backyard woods. These inspections will allow you to detect defects and correct them before they pose significant risks to personal safety and property. Tree inspections can be done at any time of year, with or without leaves present. Inspect trees carefully and systematically. Examine all parts of the

tree, including the roots, root or trunk flare, main stem, branches, and branch unions. Be sure to examine all sides of the tree. Use binoculars to see high branches. Consider the following factors:

Tree condition

Trees in poor condition may have many dead twigs, dead branches, or small, off-color leaves. Trees in good condition will have full crowns, vigorous branches, and healthy, full-sized leaves; however, green foliage in the crown does not ensure that a tree is safe. Tree trunks and branches can be defective and still support a lush green crown.

Tree species

Certain tree species are prone to specific types of defects. For example, some species of maple and ash in the Northeast often form weak branch unions, and aspen is prone to breakage at a young age (50-70 years) due to a variety of factors, including decay and cankers.

Tree age and size

Trees are living organisms subject to constant stress. Pay particular attention to older trees, which may have accumulated multiple defects and extensive decay.

Defects to Look For

High-risk defects are visible signs that a tree is failing. Look for these seven main types of tree defects: dead wood, cracks, weak branch unions, decay, cankers, root problems, and poor tree form. These seven main types of tree defects are described below. Remember: a tree with defects is not hazardous unless some portion of it is within striking distance of a target.

Dead wood

Dead trees and branches are unpredictable and can break and fall at any time. Dead wood is often dry and brittle and cannot bend in the wind like a living tree or branch. A dead branch and treetop that is already broken off (“hanger” or “widow maker”) is especially dangerous.

Act immediately if . . .

- A broken branch or treetop is lodged in a tree.
- A tree is dead.
- A branch is dead and of sufficient size to cause injury. Typically this is a branch larger than 4 inches in diameter, but this can vary with branch height. Even smaller branches, falling from high in the tree, can cause serious personal injury.)



Dead branches can break and fall at any time.

Cracks

A crack is a deep split through the bark, extending into the wood of the tree. Cracks are extremely dangerous because they indicate that the tree is already failing.

Act immediately if . . .



This weak branch union has developed a crack, creating a highly hazardous situation.

- A crack extends deeply into, or completely through the stem.
- Two or more cracks occur in the same general area of the stem.
- A crack is in contact with another defect.
- A branch of sufficient size to cause injury is cracked (typically larger than 4 inches in diameter).

Weak Branch Unions

Weak branch unions are places where branches are not strongly attached to the tree. A weak union occurs when two or more



A weak branch union with included bark and a crack.

similarly sized, usually upright branches grow so closely together that bark grows between the branches, inside the union. This ingrown bark (included bark) does not have the structural strength of wood, and the union is much weaker than one that does not have included bark. The included bark may also act as a wedge and force the branch union to split apart. Trees with a tendency to form upright

branches, such as elm and maple, often produce weak branch unions. Weak branch unions also form after a tree or branch is tipped or topped, that is, when the main stem or a large branch is cut at a right angle to the direction of growth leaving a large branch stub. The stub inevitably decays, providing very poor support for new branches (“epicormic” branches) that usually develop along the cut branch.

Act immediately if . . .

- A weak branch union occurs on the main stem.
- A weak branch union is associated with a crack, cavity, or other defect.

Decay

Decaying trees can be prone to failure, but the presence of decay alone does not indicate that the tree is hazardous. Advanced decay (wood that is soft, crumbly, or a cavity where the wood is missing) can create a serious hazard. Evidence of fungal activity including mushrooms, conks, and brackets growing on root flares, stems, or branches are indicators of advanced decay.

A tree usually decays from the inside out, eventually forming a cavity, but sound wood is also added to the outside of the tree as it grows. Trees with sound outer wood shells may be relatively safe, but this depends upon the ratio of sound wood to decayed wood, and other defects that might be present. Evaluating the safety of a decaying tree is usually best left to trained arborists.

Act immediately if . . .

- Advanced decay is associated with cracks, weak branch unions, or other defects.



This tree should have been evaluated and removed before it failed. Detectable signs of wood decay were present including a main stem cavity with soft, crumbly wood.

- A branch of sufficient size to cause injury is decayed.
- The thickness of sound wood is less than 1 inch for every 6 inches of diameter, at any point on the stem.

Cankers

A canker is a localized area on the stem or branch of a tree, where the bark is sunken or missing. Cankers are caused by wounding or disease. The presence of a canker increases the chance of the stem or branch breaking near the canker. A tree with a canker that encompasses more than half of the tree’s circumference may be hazardous even if exposed wood appears sound.



The canker and associated wood decay have seriously weakened the stem of this birch tree.

Act immediately if...

- A canker or multiple cankers affect more than half of the tree’s circumference.
- A canker is physically connected to a crack, weak branch union, cavity, or other defect.

Root Problems

Trees with root problems may blow over in windstorms. They may even fall without warning in summer from the weight of the tree’s leaves. Many actions can cause root problems such as severing or paving-over roots; raising or lowering the soil depth near the tree; parking or driving vehicles over the roots; or extensive root decay. Soil mounding, twig dieback, dead wood in the crown, and off-color or smaller than normal leaves are symptoms



This tree has a severe lean and much of the root system has been recently exposed.

often associated with root problems. Because most defective roots are underground and out of sight, aboveground symptoms may serve as the best warning.

Act immediately if . . .

- A tree is leaning with recent root exposure, soil movement, or soil mounding near the base of the tree.
- More than half of the roots under the tree’s crown have been cut or crushed. These trees are dangerous because they do not have adequate structural support from the root system.
- Advanced decay is present in the root flares or “but-tress” roots.

Poor Tree Form

Poor tree form is a growth pattern that indicates weakness or structural imbalance. Trees with strange shapes are interesting to look at, but may be structurally defective. Poor tree form often results from many years of damage from storms, unusual growing conditions, improper pruning, topping, and other damage.

A leaning tree may be a hazard. Because not all leaning trees are dangerous, a professional arborist should examine any leaning tree of concern.

Act immediately if . . .

- A tree leans excessively.
- A large branch is out of proportion with the rest of the crown.



This tree has multiple defects present (advanced wood decay with fungal conks, and a large crack) and should be removed.

Multiple Defects

The recognition of multiple defects in a tree is critical when evaluating its potential to fail. Multiple defects that are touching or are close to one another should be carefully examined. If more than one serious defect occurs on the tree's main stem, you should assume that the tree poses a very high level of risk.

Corrective Actions

Corrective actions begin with a thorough evaluation. If a high-risk situation exists, there are four recommended options for correcting the problem: move the target, prune the tree, convert the tree to a wildlife tree, or remove the tree.

Move the Target

Moving the target is often an inexpensive, effective, and simple treatment for correcting a high-risk tree. Easily moved items like play sets and swings, vehicles, and picnic tables can be placed out of the reach of the hazardous tree with little effort and expense.

If the target cannot be moved and a high-risk situation exists, consider blocking access to the target area until the hazard can be eliminated.

Prune the Tree

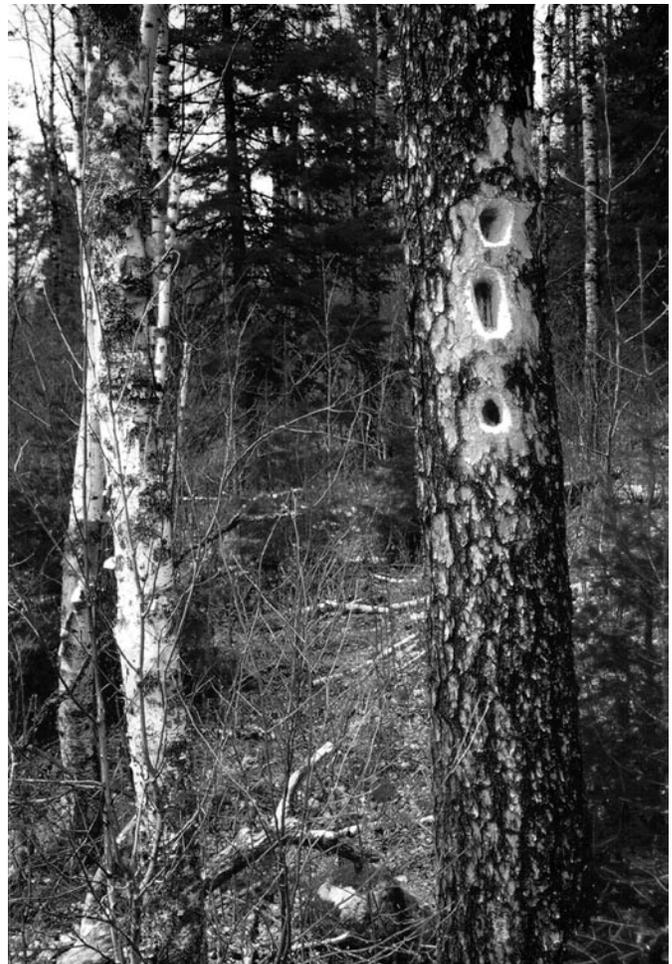
A defective branch or branches may cause a high-risk situation, even though the rest of the tree is sound. In this case, pruning the branch or branches solves the problem.

Practicing proper tree pruning is excellent "preventive medicine" for reducing the occurrence of defective, high-risk trees. By pruning properly, early in a tree's life, you can prevent or correct many of the problems that cause trees to fail as they mature.

Improper pruning techniques can worsen the problem, and may ultimately result in the formation of cracks, decay, cankers, or poor tree architecture that lead to very high risk situations. (See the Backyard Woods Tip Sheet on Prune Your Trees for more information.)

Convert the Tree to a Wildlife Tree

Creating wildlife habitat is a corrective action that is often overlooked. Corrective actions should be selected with safety first and foremost; however, options exist that can



Leave this wildlife tree if it will not endanger a target, the target can be moved, or the tree can be reduced in size to prevent damage to a target.

successfully reduce safety risks and also leave at least a portion of the tree intact to provide wildlife habitat. One option is to reduce the height of a tree to the point that it would no longer strike a target if it should fail. Removing major branches that are structurally defective, and leaving a portion of the tree intact for wildlife habitat may also be possible. For valuable wildlife trees, consider redirecting a trail or walkway so that it is located outside the striking distance of the tree. If a tree must be removed for safety reasons, consider leaving the tree on ground to create wildlife habitat.

Remove the Tree

Before cutting a tree down, carefully consider the alternatives. The effects of removing a tree are often pronounced in landscape situations and may result in reduced property values. Tree removal should be considered as the final option and used only when the other corrective actions will not work. Tree removal is inherently dangerous and is even more serious when homes and other targets are involved. Removal of very high-risk trees is usually a job for a professional arborist.

Cabling and Bracing

Cabling and bracing do not eliminate all the safety risks associated with a highly defective tree, but when done correctly by a trained arborist, it can extend the time a tree or its parts are safe. Done incorrectly, it creates a more serious hazard. Cabling or bracing is not recommended for a high-risk tree unless the tree has significant historic or landscape value, the cabling or bracing is done by a trained arborist, is regularly inspected, and properly maintained.

Conclusions

Evaluating and treating high-risk trees can be a complicated process, requiring a certain level of knowledge and expertise. This publication outlines some of the basic problems that may alert you to a hazardous situation, and suggests some possible ways to correct them. A professional forester or arborist should undertake many of the suggested corrective actions. When in doubt about how much risk a defective tree poses, or how to best treat it, consult a professional forester or arborist. You may wish to contact the local Cooperative Extension Office for educational assistance and to inquire if a listing of qualified consulting foresters or arborists is available for your area. Otherwise, consult your phone book under “Arborists” or “Tree Service.”

Remember that trees do not live forever. Design and follow a backyard landscape plan that includes proper tree selection, and a cycle of tree maintenance and replacement. (See Backyard Woods Tip Sheet on Make a Master Plan for more information.) For backyard woodlot management, see the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for information on how to select trees with the greatest potential to accomplish your goals, whether they include improving wildlife habitat, enhancing the beauty of the woods, increasing recreational opportunities, or improving timber quality.

In the Forest

The USDA Forest Service and the U.S. Department of Interior’s National Park Service manage developed recreational areas within the National Forests and Parks to help ensure public safety. Both Federal agencies have established hazard tree management policies and standards, requiring periodic, thorough, and documented tree inspections of developed recreation sites. Many State Forests and parks have similar tree risk management plans. Just as the management practices of National and State Forests and Parks help to ensure public safety, your backyard woods should be properly managed to ensure a safe environment for your family and friends.

Suggested Reading

- Albers, J.; Hayes, E. 1993. How to detect, assess and correct hazard trees in recreational areas, revised edition. St. Paul, MN: Minnesota DNR; 63 p.
- Bedker, P.J.; O'Brien, J.G.; Mielke, M.E. 1995. How to prune trees. NA-FR-01-95. Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry; 30 p. Also available at: <http://www.na.fs.fed.us>.
- Fazio, J. 1989. How to hire an arborist. Tree City USA Bulletin No. 6. Nebraska City, NE: National Arbor Day Foundation; 8 p.
- Fazio, J. 1989. How to recognize and prevent hazard trees. Tree City USA Bulletin No. 15. Nebraska City, NE: National Arbor Day Foundation; 8 p.
- Robbins, K. 1986. How to recognize and reduce tree hazards in recreation sites. NA-FR-31. Radnor, PA: USDA Forest Service, Northeastern Area; 28 p.
- Shigo, A. L. 1986. A new tree biology. Durham, NH: Shigo and Trees, Associates; 595 p.

Acknowledgments

Information in this tip sheet is a modified version of the publication entitled How to recognize hazardous defects in trees. NA-FR-01-96. Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry; 19 pp. The publication is also available at: <http://www.na.fs.fed.us>.

A Cooperative Project of:



USDA Forest Service
NORTHEASTERN AREA
State and Private Forestry
www.na.fs.fed.us



National Association of
Conservation Districts



www.arboday.org/backyardwoods

Help your woods resist pest outbreaks

In Your Backyard Woods

In your backyard woods, insects and microorganisms abound, both in number of individuals and number of species. Native insects and microorganisms are key components in many ecological processes, such as nutrient recycling, decomposition, plant succession, natural pest control, and wildlife habitat. A woods devoid of insects and microorganisms would not be healthy; in fact, it would be nonfunctional!

A healthy woods is a functioning ecosystem with young, mature, and dead trees. Key qualities of a healthy woods are high diversity, resiliency to stresses, and sustainable benefits (for example: recreation, wildlife habitat, clean water, and timber).

Preventive measures

Epidemics of native forest insects and pathogens occur as part of natural fluctuations in ecosystems. During these epidemics, tree mortality and growth reduction may be localized or widespread. Some forest management practices may cause more frequent and more severe outbreaks. Such practices include planting a single species, planting a species beyond its natural range, delaying harvest beyond tree maturity, excluding fire, and harvesting only the biggest and best trees. To promote a healthy woods and to prevent pest outbreaks, take steps to ensure diversity and vigor in your backyard woods.

Increasing species diversity

Woods with a mix of tree species are often less susceptible to pest outbreaks than woods with a single species. As tree diversity increases, the diversity of all the associated organisms also increases, which leads to a more complex and stable environment. Therefore, do not retain just one or two tree species and remove the other species when selecting your preferred trees. If your woods has only a few tree species, you can add diversity by planting appropriate species that are currently lacking or by using harvesting techniques that will encourage more species to establish naturally.

Increasing age diversity

A diversity of tree ages reduces the risk of pest outbreaks. By having trees of various ages—young, juvenile, and mature—along with species diversity, the entire woods is less likely to be favorable to pests. As with species diversity, age diversity also increases the complexity and stability of the ecosystem. A natural balance of organisms is more likely to develop as age diversity increases. For example, potential pests of young trees could be regulated by parasites and predators already well established on older trees. Age diversity can be increased by the timing and location of harvests.

Increasing stand vigor

A healthy woods is less susceptible to pest outbreaks and is more resilient if an outbreak does occur. The vigor of your woods is related directly to tree density. When trees are overcrowded, competition for light, water, and nutrients results in lower growth rates for all the trees. These stressed trees are more likely to be attacked by pests, which can lead to pest outbreaks. A vigorous backyard woods with rapidly growing trees is resilient to stresses (drought, flooding, defoliation, and air pollution) and it can withstand these stresses longer and with less impact than one with less vigorous trees. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.)



This vigorous woods is not overcrowded and has good regeneration.

Identifying a tree health problem

Often the first visual clues of a tree health problem are symptoms like red needles, yellowing leaves, or wilting foliage. These problems may arise from a multitude of causal agents including insects, pathogens, other organisms, tree disorders, soil factors, weather events, pollution, and herbicide injury. The pattern of these symptoms on individual trees should be noted; for example, only old needles, only top of tree, only one side, or only inside the crown. Also, any pattern throughout your woods is important for identification. Are the affected trees randomly scattered, or in a group that is expanding? Are the affected trees in valleys or on ridge tops, or on the edge of a stand? Is only a certain size or age or species of tree affected?

Closer examination of the affected trees may reveal signs of the causal agent, such as the insect, fruiting body of the pathogen, a characteristic-shaped canker on a stem, insect tunnels under the bark, or a pattern of missing or discolored leaf tissue. Signs of the causal agent may be found on a different part of the tree than where the symptoms appeared. For example, red needles in the crown may be due to bark beetle attack on the lower trunk. Collection of these signs is invaluable in determining the causal agent; however, not all forest health problems will have readily identifiable causal agents; for example, herbicide injury, air pollution, girdling roots, root disease, and soil compaction. Other problems will have multiple signs from secondary insects and pathogens, and the actual causal agent may be missed. Some problems are the result of multiple factors. For example, oak decline is the result of a number of tree stresses (drought, root damage, gypsy moth defoliation, and early frosts) that weaken the tree. Then secondary insects (two-lined chestnut borer), or pathogens (armillaria root rot), or both may invade these weakened trees. Usually the dieback and decline progress slowly over several years.

Once you observe the symptoms and signs, consult reference materials to see if you can identify the causal agent. Forest insect and disease guidebooks and fact sheets may be available from your local library, county extension office, or State forestry office. Also, many web sites provide substantial information on forest pests. You may wish to contact the local Cooperative Extension Office for educational assistance and to inquire if a listing of qualified consulting foresters or arborists is available for your area. Otherwise, consult your phone book under “Arborists” or “Tree Service.”

Introduced pests are a major threat to the health of your backyard woods. Introduced pathogens, such as chestnut

blight, Dutch elm disease, white pine blister rust, and butternut canker, have dramatically and permanently altered forested ecosystems in the United States. Many introduced insects are impacting U.S. forests, including the gypsy moth, beech scale, hemlock woolly adelgid, Asian longhorned beetle, smaller European elm bark beetle, introduced basswood thrips, larch sawfly, and European pine shoot moth.



The gypsy moth caterpillar (*Lymantria dispar*) has distinctive rows of red and blue spots along its back.



Large silken webs are symptoms of the fall webworm (*Hyphantria cunea*). Though the defoliation may look severe, trees do not sustain significant growth loss, since the defoliation is late in the growing season.

Treatment options

When you expect that pest epidemics may cause significant damage to your woods (based on your objectives), action to protect your backyard woods is warranted. Once you have identified the causal agent, then you can consider treatment options. Silvicultural (from “silviculture”—the science and art of producing and tending a woods) and biological treatments tend to be longer-term solutions and modify conditions that allowed the pest population to reach outbreak proportions, though the treatments may take months or years to effectively reduce the pest population. Physical and chemical treatments reduce pest numbers quickly, but do not modify the factors that led to the outbreak, thus pest populations are likely to rebound.

Silvicultural treatments

Silviculture is best used in the preventive measures described earlier. In outbreak situations, timely removal and destruction of infested trees can greatly reduce a pest population and keep other trees from being attacked. The remaining trees are more vigorous and less susceptible to further outbreaks.



This pine plantation was thinned to increase growth of the selected trees and was pruned to increase the future timber value. Plantations need intensive management to prevent severe pest problems that can occur due to the lack of species and age diversity.

Biological treatments

Biological treatments use the natural enemies (predators, parasites, and pathogens) that control pest populations. In your backyard woods, it is important to conserve and enhance these natural enemies, so the natural balance is not disrupted. Therefore, limit the use of broad-spectrum pesticides (insecticides, fungicides, and herbicides), promote a diverse flora (to provide a wide range of



This parasitic wasp is a natural enemy of the introduced pine sawfly. It is laying an egg inside the cocoon of the sawfly, and the wasp larva will kill the developing sawfly.



The red-bellied woodpecker (*Centurus carolinus*) is feeding on woodborers under the bark.

natural enemies and nectar sources for parasites), and ensure nesting sites for insect-feeding birds. Introduced species often become pests because they do not have natural enemies in their new environment. Importation and colonization of natural enemies from the native range of the pest has provided effective control, especially for many insect pests. Projects to introduce new biological control agents are conducted by Federal and State regulatory agencies. Once established, these natural enemies reproduce and disperse throughout the range of the introduced pest.

Physical treatments

Physical methods can be effective, particularly on the small scale of your backyard woods. For insects, various traps, barriers, and mass collecting have been successful. Insect traps generally use an attractant (a chemical scent, bait, light, or color) to lure the insect into the trap.



A Lindgren funnel trap is baited for mountain pine beetle (*Dendroctonus ponderosae*). The attractant is synthetic sex pheromone specific to this bark beetle species.



Pruning the lower branches of white pines in zones with high incidence of white pine blister rust (*Cronartium ribicola*) can reduce damage from this introduced pathogen.

With enough traps, the pest population can be significantly reduced. Barriers on the trunks of trees can be effective for some caterpillars that migrate daily from the ground to the canopy to feed. Removal of insects by hand can be effective. For example when only a few host trees are present, gypsy moth can be controlled by placing a burlap band around the trunk of the host trees, then daily collecting and destroying the caterpillars that congregate under the burlap. For pathogens, removing and destroying the diseased tissue can be successful. For example, pruning the infected lower branches of white pines can reduce damage by white pine blister rust. Also, cutting barriers through root systems between infected and uninfected trees can stop the spread of oak wilt and Dutch elm disease.

Chemical treatments

Pesticides can be useful in protecting valued trees from damage during pest outbreaks. There are many ways to apply pesticides—from root injections to aerial sprays. With any pesticide, follow the label directions and apply it only for the pests for which it is registered. Pesticides that specifically target the pest should be favored over broad-spectrum pesticides that may impact nontarget organisms. Also formulations and application methods that have minimal impacts on other organisms should be used. Opportunities to participate in cooperative treatment projects with other backyard woods owners and government agencies should be sought. For example, the Cooperative Gypsy Moth Suppression Project assists in monitoring local populations, and aerially applying selective insecticides only to areas that are likely to be defoliated. You will pay much less per acre for the cooperative treatment than if you contract the treatment on your own.



Aerial application of a biological insecticide is used to control gypsy moth defoliation during a Cooperative Suppression Project.

In the Forest

Forest pest management on private and public forests protects their economic, ecological, and social values. Through proper forest management practices, many potential pest problems are avoided. Forest health is promoted through practices that allow forests to recover quickly from natural or human-caused stresses and that provide for ecosystem stability. When serious pest problems are discovered, suitable treatments are applied to reduce the pest populations with minimal impacts on nontarget organisms. Through this holistic, ecological approach to forest management, the long-term productivity and health of the forested ecosystem is sustained.



Pesticide Precautionary Statement:

Pesticides used improperly can be injurious to humans, animals, and plants. Follow label directions and heed all precautions on the label. Store all pesticides in original containers and out of reach of children. Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. After handling a pesticide, do not eat, drink, or smoke until you have washed. Dispose of empty pesticide containers properly.

NOTE: Registrations of pesticides are under constant review by the Federal Environmental Protection Agency. Consult your local county agricultural agent or State extension agent about restrictions and registered uses of particular pesticides.

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**The National
Arbor Day Foundation®**

www.arboday.org/backyardwoods

Woods provide food, water, shelter, and space

In Your Backyard Woods

Like you, wildlife requires food, water, shelter, and space. Your backyard woods has all of these things and is likely already home to a host of wildlife species. But not all woods are created equal. In some, wildlife merely survives, in others it thrives.

No matter how large or how small your backyard woods, there are choices you can make and actions you can take to increase the number and variety of wildlife species. Getting to know the local wildlife and the capabilities of your land, setting clear objectives, and understanding your options will help you maximize the appeal of your backyard woods to wildlife.

Planning is key. Remember that every piece of land has its limits, and all the things you want may not be possible. Sound planning will help you avoid disappointments down the road.

Get to know the local wildlife

Learning the types of wildlife in your area will clue you into the possibilities for your woods. Next, hone your expectations—it's important to be specific. Consider whether you will be viewing, photographing, trapping, hunting, or just appreciating the wildlife in your woods. Keep in mind that not all wildlife will make your woods their permanent home. Some will come to raise their young, while others may simply pass through on their way to other places. Still others will visit regularly, but be unable to meet all their needs in your woods alone.

Learn the lay of your land

The more you know about your land the better able you will be to enhance its value for the wildlife you desire. Explore your woods and discover what makes it unique. Also visit others' woods to help you identify what sets yours apart. Here are some things to consider:

- Are the trees all of one type, or are there lots of different types?
- Are there trees and shrubs of varying heights?
- Are the trees needleleaved or broadleaved?

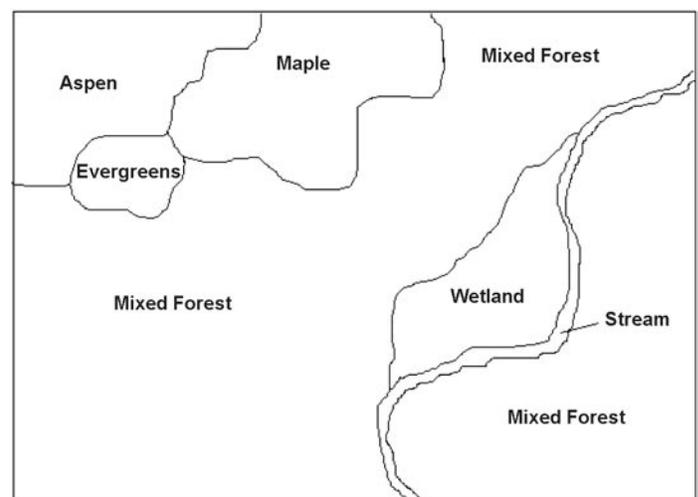
- Are the trees large or small, old or young?
- Are there lots of trees close together, or fewer trees farther apart?
- Is your woods dark and shady, or relatively sunny?

Wildlife habitat can take many forms. That isn't to say all habitats are equal. There are a number of key habitat features that are especially valuable to wildlife. As you walk through your woods look for these features:

- Streams, ponds, or other wetlands
- Openings without trees
- Trees and shrubs that produce nuts, berries, or other fruits
- Standing dead trees and fallen logs
- Fencelines and hedgerows
- Rock outcrops and caves.

The more often you visit the woods and the more carefully you look, the more you will learn. Be sure to keep a record of what you find.

If you have not already made a master plan, draw a map of your woods that displays its prominent features. (See the Backyard Woods Tip Sheet on Make a Master Plan for more information.) A map, like this one, is a



handy way to record what you learn, and a useful tool in identifying backyard woods improvement projects.

Understand your options

Once you know your land, and the kind of wildlife you want to attract, you are ready to identify those things you can do for wildlife in your backyard woods. Food, water, shelter, and space are the cornerstones of any wildlife habitat. Changing the amount or distribution of one or more of these can make your woods a more welcoming place for wildlife.

Food—the backyard woods buffet

Food attracts wildlife, and your backyard woods buffet is open around the clock. A variety of native trees, shrubs, and herbs will satisfy even the most finicky eaters. Providing a smorgasbord is the surest way to draw the wildlife you desire. Now is the time to revisit the map and records of your woods, and become familiar with the wildlife foods found there.

Deer, rabbits, and mice are drawn to openings where they can find leafy trees and shrubs, as well as grasses and forbs. Small treeless openings that provide breaks in the tree canopy are popular with wildlife. Whether openings are created through chance by a windstorm or deliberately by your removing trees for firewood or lumber, openings add variety to your backyard woods.



An opening in the woods creates habitat for white-tailed deer.

If soil and light conditions are right you can plant trees or shrubs, particularly ones that flower and bear fruit. If possible select plants that bloom and fruit at different times to assure a well-stocked buffet that is always ready for guests. Choose native species—those that occur naturally in your area. They are best suited to local conditions and often fare better than nonnatives. Flowers offer nectar and pollen, and will attract butterflies, bees, and humming-

birds. Berries and other fruits may bring birds and bears. Dozens of wildlife species are known to feed on nuts such as acorns.

Sometimes your efforts to entice may prove a little too successful, and wildlife may begin sampling your favorite vegetable garden or prized ornamentals. It is up to you whether to take action to deter wildlife or simply accept their unscheduled visits as one of the benefits of your backyard woods.

Of course not all wildlife are vegetarians; some are predators—animals that feed on other animals. Coyotes, foxes, weasels, hawks, and snakes are among the predators that may be looking to dine in your woods. The larger predators are typically few in number and wary by nature. If you glimpse one in your woods you are lucky indeed.

You may unknowingly introduce an unwanted predator into your backyard woods. Some statistics identify house cats as major predators of migratory birds. A free-roaming cat can prey on birds and baby mammals. Keeping cats indoors protects your wildlife.

Water—wet 'n wildlife

If you have a stream, pond, lake, or wetland within or bordering your woods, count yourself fortunate. Wildlife is drawn to water. This is all the more reason to treat it



A stream provides water and habitat for all kinds of animals.

with great care. Leave at least a 30-foot wide undisturbed strip next to the water to provide space for wildlife and to protect the water from other activities in your woods. Don't risk spoiling a major wildlife attraction.

The absence of open water in your woods does not mean it will not attract wildlife. Animals meet their water needs in various ways. Some get all they need from the foods they eat, and others drink dew or raindrops that cling to plants.

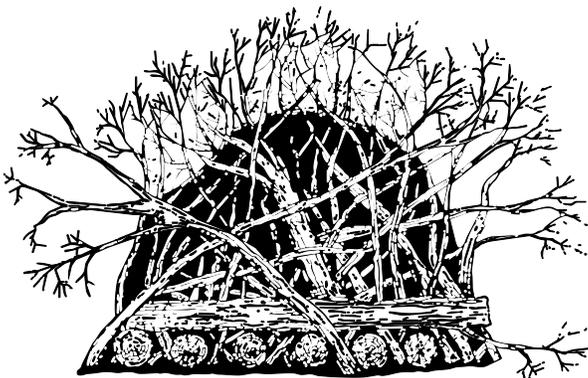
Sometimes wildlife will create wet habitat. Beavers are famous for their ability to dam streams. The ponds they create are bonanzas for other water-loving wildlife as well. If there are no beavers in your backyard woods don't despair. In some circumstances it may be feasible for you to create a pond. Seek help from local conservation agencies. They can help determine if your woods is suited for a pond, and may even be able to cover some of the project costs.

Shelter—the creature comforts

Shelter is critical to wildlife. It offers protection from the elements, safety from predators, a place to raise young, or simply a resting place. Fortunately, wildlife requires minimal accommodations, such as a leaf, fallen log, or hole in the ground.

The clean look you may enjoy in your lawn is not well suited to your backyard woods and the wildlife found there. Piles of brush or rocks are wonderful hiding spots for squirrels, chipmunks, rabbits, snakes, and other small animals. Next time you are cutting brush or pruning trees, consider piling the cut branches in your woods. Be careful not to overdo the cutting; however, wildlife need plenty of living shrubs and other vegetation. Caution: Brush piles should be created only outside the fire safety zone

Brush Pile



Brush piles are easy to construct, and they provide homes for small animals.

around structures. The zone should be at least 30 feet wide on level or gently sloping ground and 100 feet or more on slope grades 30 percent or greater down hill from any structure. (See the Backyard Woods Tip Sheet on Protect Your Property From Wildfire for more information.)

Planting shade-tolerant (able to survive in partial shade) needleleaf trees within an otherwise broadleaf woods will increase its appeal to wildlife. Needleleaf trees, especially those in dense clumps with branches near the ground, give all-season protection.

Vibrant, healthy trees are the dominant feature in most woods and are certainly important to wildlife. Dead and dying trees—whether standing, leaning, or fallen—also play a vital role. Trees weakened by age, disease, or injuries attract insects, which in turn attract insect-eating animals. Through decay and the work of woodpeckers and other wildlife excavators, cavities eventually appear in many dead and dying trees. You want an abundant supply of cavities in your backyard woods. Scores of birds and mammals from wrens to raccoons take shelter in such cavities. Birdhouses and other types of nest boxes are another popular and effective way to add cavities. You can buy or build a variety of sizes and shapes aimed at accommodating various species; however, don't be discouraged if nest boxes attract unintended occupants!



A den tree is home to different animals at different times.

Once dead and dying trees fall, other wildlife, such as rabbits, toads, and worms take advantage of their shelter. You and the wildlife don't have to wait for trees to die. Girdling—removing bark from a 3-to 5-inch ring completely around the tree—will hasten its demise. Start

slow and monitor the results before girdling too many trees in your woods. Seek the advice of an arborist or consulting forester before girdling a tree. Some trees are better to girdle than others.

Space—in three dimensions

You probably know the number of acres your woods covers, but that only includes two dimensions. The space available for attracting wildlife is much greater. Like a high-rise hotel your woods extends vertically from the roots and soil to the treetops. Adding rooms to your wildlife hotel may be easier than you think. Vegetation of varying heights is what provides a full range of suites.



A mix of needleleaf and broadleaf trees of various heights provides living space for animals.

The good news is that many of the same practices used to increase sunlight and add food and shelter encourage plants to grow, and increase vertical structure. Grasses and forbs, shrubs and vines, and small and tall trees allow wildlife to abound.

As your woods grows more diverse vertically, you can expect new visitors. Wildlife that climb and fly will benefit most from the extra layers. Many warblers and other long distance migrants seek out a richly layered woods

and will nest in nothing less. Even the smallest backyard woods can burgeon with space for wildlife when you plan for the third dimension.

Going vertical is not the answer for all wildlife—some simply need more room to roam. Your woods may not be large, but if it adjoins other woods, you can join forces with other landowners to multiply the area available to wildlife. Strike up a conversation with your neighbor and share your enthusiasm for wildlife. A number of state programs exist to help landowners work together and cooperatively manage lands that reach well beyond their own backyard woods. Seek more information at Cooperative Extension Service, Soil and Water Conservation District, or State Forestry agency offices.

In the Forest

Forest managers do their best to balance the needs of wildlife with the growing demand for wildlife-related recreation opportunities. And they do it using many of the same practices applied in your backyard woods. Harvesting timber, creating small openings, protecting wetlands and other water resources, placing nest boxes, and cooperating with neighboring landowners are all part of managing forests for wildlife.

Diverse and abundant wildlife is an indicator of a healthy forest and in many places is an indicator of a healthy economy. Many communities count on teeming wildlife populations to lure hunters, anglers, and wildlife watchers. Forest managers monitor some species of wildlife to track trends in their numbers. Dramatic shifts in wildlife populations can warn of important changes in the health of forests, which may warrant changes in management practices.

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Provide a living filter

In Your Backyard Woods

Water is one of the most important products your backyard woods produces. Even if a stream doesn't flow through your woods, some of the rain and snow that falls on your land will reach a stream sooner or later. The path water takes through your woods determines how fast it moves, how much of it is available to the trees and other vegetation, and how clean it is when it reaches a stream.

Rain and melting snow can flow over the soil surface or through the soil. Overland flow travels fast and can carry soil with it. Water moving through the soil moves slower and does not transport soil. The structure of the soil determines the path water takes through your woods.

Woodland Soils

The soil beneath your feet is more than a place for the growth of plants and a provider of physical support, moisture, and nutrients. The soil is a dynamic system that serves as home for countless organisms, a disposal area for nature's "wastes," a filter of toxic substances, and a storehouse for nutrients. The soil is a product of its environment, but its quality is a function of trees that grow in it. Woodlands customarily occupy a site for many years,

sending a portion of their roots deep into the subsoil. During this period considerable amounts of organic material are returned to the soil in the form of leaves, branches, and decaying roots. This organic material has a profound influence on the physical, chemical, and biological properties of the soil.

The layer of organic material on the soil surface (litter layer) is incorporated into the top layer of the soil by soil animals, such as worms and millipedes. The mixing of organic material with the soil particles creates structure in the soil. Soil structure is the arrangement of individual soil particles into aggregates or clumps.

The soil clumps increase the size and the amount of spaces in the soil. The soil spaces contain both air and water. The amount of water or air depends on the length of time since the last rain or snow melt. Soil spaces improve water and air movement into and through the soil and increase the amount of water and air the soil can hold. The amount of soil spaces, in most woodland soils, varies from 30 to 65 percent of the soil volume. Soils supporting a variety of tree species have a higher percentage of soil spaces than soils supporting a single tree species.

Infiltration

The movement of water into the soil is called infiltration. When the rainfall intensity exceeds the infiltration capacity, water will run over the soil surface. By virtue of the sponge-like action of the litter layer and the high infiltration rate of the soil below, overland flow is extremely rare in your backyard woods.

The litter layer in your woods is especially important in maintaining rapid infiltration rates. This layer not only absorbs several



times its own weight of water, but it breaks the impact of raindrops, which would otherwise loosen soil particles and clog soil spaces and reduce infiltration rates.

Woodland soils also have a high percentage of larger channels through which water can move rapidly. Most of these channels develop from decayed roots or from burrows and tunnels made by insects, worms, or other animals.

The presence of stones increases the infiltration rate. The differences in expansion and contraction between stone and the soil result in channels and large spaces. However, stones reduce the water storage capacity of the soil.

If snow covers the soil before prolonged freezing temperatures, it protects the soil from freezing, thus favoring continued infiltration during the spring. But if the soil freezes before snow cover, a snowfall covering the frozen soil will delay thawing in the spring, reduce soil infiltration, and increase overland flow.

Producing Quality Water

Soil particles carried off your property by overland flow and deposited in a channel is the primary pollutant that your woodland can produce. Many woodland activities have the potential to cause soil erosion. Your goal is to keep eroded soil on your land, and not let it reach a road ditch, gully, or stream. Once the water reaches one of these channels, it will eventually be carried to a lake, reservoir, or the ocean where it will be deposited. Along the way it can harm stream fish habitat, fill stream channels, and increase water treatment costs.

Water is a product of your backyard woods and everything you do or do not do in your woods can impact it. Backyard woods management practices, such as protecting your property from wildfire, keeping your woods healthy, attracting wildlife, helping your preferred trees grow, planting trees, harvesting wood and special forest products, building and maintaining roads and trails, providing access to livestock, and doing nothing in your woods are some



No matter how hard it rains, water always enters the soil under trees.

of the practices that can impact water production. Each practice can have either a negative or positive impact on water depending on how it is used or not used. Potential practice impacts on water quality are:

- Wildfires burn the litter layer and can increase erosion.
- A healthy woods produces more leaf litter, which protects the soil from rainfall impact.
- Helping preferred trees grow produces more litter on the ground and reduces fire risk.
- Large numbers of wildlife (deer, as an example) can impact tree growth, which reduces the litter layer.
- Planting trees expands your woods, and more acres of woods produce more clean water.
- Harvesting products may require machinery in your woods that can compact soil and remove litter layer.
- Constructing and maintaining roads and trails remove litter layer and compact the soil.
- Unrestricted livestock access compacts the soil and removes vegetation.
- Doing nothing may increase fire risk and reduce tree health.

Litter layer removal begins the erosion process. As raindrops fall on unprotected soil, soil particles are loosened and fill soil spaces on the surface, reducing infiltration. The water collects on the soil surface and begins flowing over the surface in a sheet. As the rain continues, sheet flow increases and forms tiny channels and these combine to form larger channels. Given enough slope and bare soil, water will reach a road ditch, gully, or a stream.

Soil compaction reduces water infiltration by reducing the number and size of soil spaces. Driving vehicles in your woods compacts the soil. Compaction can occur by driving one pickup truck of firewood over the ground under your trees. As the number of pickup passes increase, over the same area, the compaction becomes severe and can take many years to recover. Wet soils are more susceptible to compaction than dry soils, and clay and loam soils are more susceptible than sandy soils.

Uncontrolled livestock access can cause more serious compaction than periodic vehicle use because it covers a greater portion of your woods and for a longer period of time. Water infiltration rate is lowered in compacted areas and surface runoff will occur. The distance the water trav-



The undisturbed layer of leaves prevents soil erosion.

els overland depends on the extent of the compacted area. If the overland flow reaches an area with no compaction, the water will infiltrate. Soil erosion is scattered across the grazed area, but normally does not leave your land except when livestock trails end at gullies and streams.

Uncontrolled livestock access can cause serious impact to some woods, altering water movement. Compacted soils hinder root growth and reduce tree health. The majority of tree root systems are within 3 feet of the soil surface and most of the fine roots are within 8 inches of the surface. Long-term uncontrolled livestock access damages these roots, killing young trees first, but eventually killing all the trees, converting your woods to an open pasture. Infiltration rates are reduced and overland flow rates increase in the overgrazed pasture.

Roads and trails that cross a stream or even a channel that only contains water periodically are primary entry points for soil into streams. The bare compacted soil in the road, trail, or road ditch is like a channel carrying water and its load of soil into a stream. The solution for this problem is to remove the water from the road or trail before it

reaches the stream, and turn it into the undisturbed litter layer where it can slow down, spread out, and sink into the ground, depositing its soil onto the litter layer.

Many states have developed practices that will help you control road and trail overland flow, and build a gully or stream crossing. They are called Best Management Practices for Water Quality, and information on how to install them can be found at local Cooperative Extension and Soil and Water Conservation District offices.

Controlled livestock access is the best way to solve compaction and litter layer problems caused by livestock. Methods vary by location and tree type. In some tree types, it is best to eliminate access. In other tree types, trees and grass can be produced on the same area in a managed system. Seek information from your local Cooperative Extension Service and Soil and Water Conservation District office.

Riparian Area

The riparian area is the transition between water and the land at the edge of streams, rivers, lakes, springs, and wetlands. It is the zone of soil and vegetation that feeds the stream energy in the form of leaf litter and dissolved nutrients, and houses soil organisms at densities and diversities nearly 3 times those found in soil farther away from the water. A riparian area dominated by trees is especially important on small streams where intense interaction between land and water ecosystems occurs. These small streams comprise nearly three-quarters of the total stream miles in the United States. Wooded riparian areas are important because they do the following:

- Leaves and other debris fall into streams and provide food for insects, amphibians, crustaceans and small fish, all critical to the stream food chain.
- Wooded riparian areas provide diverse habitats for birds and other wildlife.
- Fallen trees (large woody debris) create pools and shelter for fish and preserve stream habitat.
- Fertilizers and other pollutants in water coming from other land uses (crop fields, lawns, etc.) sink into the soil, where tree roots and bacteria remove them before they reach the stream.
- The leafy canopy provides shade that cools the water enabling it to hold more oxygen, which helps fish and other organisms grow.

- Overland flow from other land uses (crop fields, roads, etc.) slows down, spreads out, and sinks into the ground, depositing the soil it carries on the surface.
- Tree roots stabilize stream banks and reduce bank erosion.
- Riparian areas are travel corridors for wildlife between wooded patches.

The riparian area is an extremely important ecosystem in your backyard woods. Different parts of the riparian area have different functions and require different management practices. Trees next to the water help maintain lower water temperature, provide leaves and debris to the water, and keep banks stable. Trees next to the water are usually not removed. Eventually, these trees will fall into the stream and improve fish habitat.

Trees farther away from the bank provide filtration, deposition, and plant nutrient uptake that removes sediment, nutrients, and toxic substances from water moving through the riparian area soil. Periodic removal of trees is acceptable in this area because it removes nutrients stored in tree stems and branches, and it increases nutrient uptake by younger, more vigorously growing trees.

A third zone to your riparian area may be needed if a crop field, pasture, or similar land use is adjacent to the trees. A grass zone can make the tree zones more efficient by changing channel flow into sheet flow. The high number of grass stems slows down and spreads out overland flow better than the litter layer under the trees. The width of your riparian area will vary by its primary function.

- Wildlife habitat will need a minimum width range between 30 and 300 feet.
- Sediment removal needs a minimum width range between 50 and 150 feet.
- Nutrient removal needs a minimum width range between 35 and 125 feet.
- Water temperature cooling needs a minimum width range between 10 and 60 feet.
- Bank stabilization needs a minimum width range between 10 and 30 feet.

For all purpose use, a minimum width range between 35 and 100 feet is recommended. The wider widths provide the best results. Steep slopes will require wider widths to trap sediment and remove nutrients.



Removing livestock and planting trees can make a dramatic impact on a streamside riparian zone in just 3 years

Riparian areas are vital for water quality, fish, and wildlife. If you are fortunate to have water in your backyard woods, restoring or maintaining riparian areas are critical activities.

Amount of Water

Trees and other vegetation play a key role in the cycling of water from ocean to land and back to ocean. Rainfall entering the soil fills the soil spaces at the surface. Gravity pulls the water deeper into the soil. Most of the water remains in spaces attached to soil particles and humus. Trees and other vegetation remove most of the stored water, creating space in the soil for more rainfall. The water rises as sap through the trunk and branches to the leaves, where most of the water is transferred to the air. For the Continental United States on average, vegetation (mostly trees) returns about 60 percent of the water entering the soil back to the air. If you add evaporation from leaves and other surfaces, a total of about 70 percent of the precipitation that falls on your backyard woods is returned to the air. Only 30 percent of the rain or snow arrives at a stream.

Removing trees from your woods increases the amount of water in the soil, and the amount of water moving to a stream. Less trees results in less water removed from the soil. More than 50 percent of the trees need to be removed from your woods before an increase can be measured. Tree removals can be caused by fires, storms, insect and disease outbreaks, or tree harvests. Most of the streamflow increase occurs during the growing season when streamflows are normally low. The path water takes through your backyard woods remains the same. Water still enters the soil because the roots and litter layer are still present.

As new trees grow back, your backyard woods gradually returns to its normal water removal rates.

Changing a woodland to a crop field, pasture, residential, or urban use has a different outcome on the amount of water reaching a stream. Changing the use of the land removes the trees, litter layer, compacts the soil, and in some cases covers the soil with surfaces that prevent water from entering it. Water moves over the surface and more water reaches the stream at a faster rate. Greater streamflow throughout the year increases streambank erosion. Streambank erosion reduces fish habitat and decreases water quality. Increased streamflow continues until the land use is changed back to woodland.

Water Management Practices

A few simple practices can help your backyard woods produce clean water.

- Keep the woods you have and plant more trees in old fields and other open land.
- Plan road and trail locations to reduce the area they cover. Avoid wet soils, and keep them away from streams if possible.
- If you must drive off a road and trail into your woods, do it when the ground is frozen or during dry periods.
- Install stream crossings to eliminate soil movement into the stream or channel.
- Cover roads and trails with woodchips or gravel, especially on steep sections and on approaches to stream crossings to reduce soil movement.

- Be sure that water flowing off roads and trails enters your woods rather than going into a stream or a ditch that flows into a stream.
- Keep livestock out of your woods, confine them to trails and control the surface runoff, or manage the trees and grass as a system that maintains water movement into and through the soil.
- Maintain a minimum 35 to 100-foot wide woody riparian area next to any water on your property.

the principal nonpoint pollutant from forests. Nationwide, only 3 to 9 percent of the total nonpoint pollution comes from forest management practices such as road construction, timber harvesting, planting site preparation, and fire-line clearing. Even though forest land is not a major pollution source, pollution from forest land practices should be controlled because forested areas have high quality water and small changes in this quality can have an impact. Best Management Practices (BMPs) have been developed and adopted by the Forest Service, State forestry agencies, and the forest industry. These BMP's are very similar to the practices recommended for your backyard woods.

In the Forest

The greatest threat to water quality in the United States is nonpoint source pollution. Nonpoint source pollution includes soil, nutrients, animal waste, pesticides, and other substances from many places over the landscape. Soil is

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Select trees for wildlife, aesthetics, and products

In Your Backyard Woods

What does it mean to favor preferred trees?

Favoring preferred trees means selecting those with the greatest potential to accomplish your objectives for your backyard woods and giving them special treatment by removing the competition from adjacent trees. Trees with tops (crowns) touching are competing with each other. Roots for most tree species extend twice as wide as the crown, and most of the tree roots are in the top 18 inches of the soil. Tree crowns compete for sunlight and roots compete for moisture and nutrients.

Eliminating competition from other trees increases the light, moisture, and nutrients available to a preferred tree so it will be healthier and grow faster. The forest canopy will be more open after employing this technique and preferred trees will have more growth space. Favoring individual trees is analogous to a gardener tending a row of carrots. The goal is to produce carrots that

are large enough to eat. When the seeds are sown, many carrots germinate and become crowded and unable to grow rapidly. The gardener thins the carrots to provide ample light, moisture, and nutrients to the “keeper” carrots, so they will grow large.

Why would I want to favor individual trees?

Favoring individual trees can help you accomplish multiple uses of your backyard woods, because individual trees can be selected to meet different objectives, such as protecting wildlife, enhancing the beauty of your woods, and producing income from the sale of wood or special forest products. A sugar maple provides attractive fall foliage, valuable wood products, and sap for maple syrup. An oak tree produces food for wildlife and boards for woodworking projects.

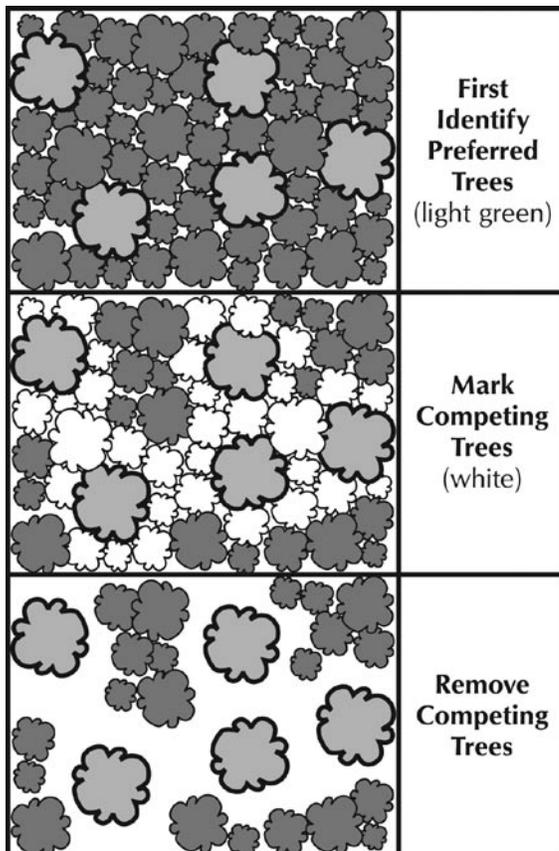
Is my backyard woods suited to this technique?

If most trees are at least 25 feet tall, then your woods is probably a candidate for this technique. Usually when trees are this tall their crowns are touching. Often, this occurs in broadleaf trees when they are about 4 inches in diameter at a point 4.5 feet above the ground.

While this technique has been used mostly with broadleaf trees such as oak, maple, and ash, it also may be used with needleleaf trees such as pine, spruce, and fir. The variety of trees available in your woods will vary depending on your geographic location, available moisture and nutrients, and the actions of any previous landowners.

How many preferred trees should I have?

The number of potential preferred trees depends on the climate, soil, species of trees, previous management activities, and—most importantly—the age of your woods. A woods with younger trees has many small trees, therefore more preferred trees can be selected than an older woods with fewer trees. The actual number of preferred trees to select depends on your objectives. Each preferred tree selected should help you reach at least one of your objectives.



Remove competing trees to give your preferred trees room to grow.

The number of preferred trees also will impact the density of your woods. The more preferred trees you select the more competing trees you will cut. The amount of sunlight reaching the ground also increases with the number of trees cut, and the ground vegetation will grow faster. The combination of stems and branches from the cut trees and the increased growth of ground vegetation may make it harder to walk through a woods with many preferred trees.



All preferred trees should have healthy crowns.

To help you visualize how your woods will look after you remove competing trees, use brightly colored flagging to mark all preferred trees, and a different colored flagging to mark all the trees to be cut. Walk around to get an impression of how the area will look without the competing trees. Will this number of preferred trees meet your objectives?

If you decide that too many competing trees were marked, then you need to reduce the number of preferred trees you selected – don't just reduce the number of trees to be removed. This will ensure that the crowns of all preferred trees will be free from competition.

How do I select preferred trees?

Criteria to guide your selection of preferred trees will depend on your objectives. (See the Backyard Woods

Tip Sheet on Make a Master Plan for more information.) Generally, you will be selecting preferred trees that are taller than or as tall as the competing trees and have healthy crowns. Species diversity should be considered in your criteria. Selecting only one or two tree species may make your woods more susceptible to pest outbreaks. (See the Backyard Woods Tip Sheet on Keep Your Woods Healthy for more information.) Also favoring species that are best adapted to the site should be considered. (Consult the USDA Forest Service Silvics Manual, available online at www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm.) Frequently conflicts among the criteria will occur when selecting between two potential trees, but you need to make these tough decisions when selecting your preferred trees.

The decisions that you make will impact the next generation of trees in your woods. The trees that you keep will be the seed source for the next woods, and the density of the remaining trees will influence which seedlings will be able to survive to form the next woods.

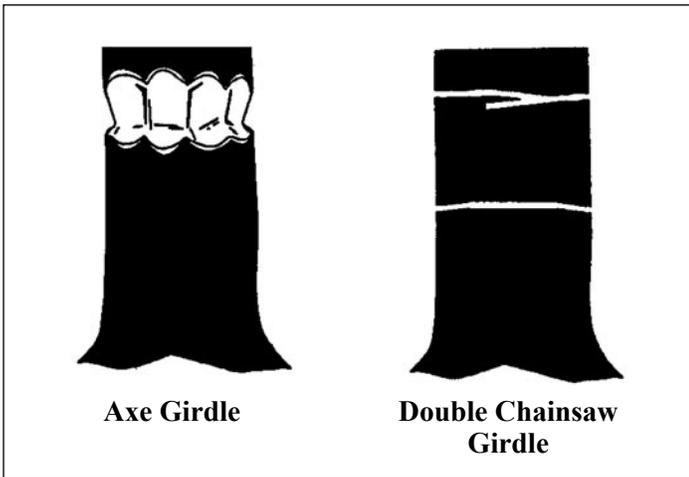
How do I increase the value of wood products from my woods?

In your backyard woods, even favoring just a few trees that have the potential for producing high-value products can be profitable. Eliminating competing trees can double the annual diameter growth of the preferred tree. The most valuable portion of the tree is the first 9 feet of the trunk. Select trees with no branches on at least the first 9 feet of the trunk, or prune these branches. (See the Backyard Woods Tip Sheet on Prune Your Trees for more information.) Form and lack of defects are important criteria to produce high-value wood products for the future. (See the Backyard Woods Tip Sheet on Generate Wood Products for more information.)

Besides the traditional timber products, you may consider managing for other forest products in your selection of preferred trees. Preferred trees may be selected for their fruit and nut production. Other trees may be favored for their bark, such as paper birch, that can be used for crafts. Other woodland plants can be encouraged to grow that can yield special products. (See the Backyard Woods Tip Sheets on Grow and Collect Special Forest Products for more information.)

How do I select trees to attract wildlife?

Select trees that will produce food and shelter for the wildlife you desire. Open the canopy around these preferred trees to increase sunlight to the crowns. This will



Axe and double chain saw girdling techniques

increase production of flowers, fruits, and nuts. One large crown produces more food than two or three small crowns on trees of the same species.

Dead and dying trees provide food and shelter to many different types of animals. These trees can be any size and any type. They don't need to have competing trees removed from near their crowns, but they need to be left standing. They need to be in a place where they will not cause damage when they fall. (See the Backyard Woods Tip Sheet on Identify and Manage Hazardous Defects in Your Trees for more information.) If you don't have any wildlife trees in your woods, you can create them by girdling some of the competing trees around preferred trees.

Wildlife trees near water are especially valuable. (See the Backyard Woods Tip Sheet on Attract Wildlife for more information.) Areas near streams and other water bodies contain different types of trees and more of them than other areas in your woods. Trees next to a stream improve the habitat for fish. Favor a mixture of tree types and ages. Retain large branchy trees near a stream. (See the Backyard Woods Tip Sheet on Protect Clean Water for more information.)

How do I enhance the aesthetic appeal of my woods?

Selecting trees that you find interesting and beautiful will enhance the appearance of your woods. Often the focus is on trees with attractive fall foliage or spring blossoms. When competing trees are removed, preferred trees are able to expand their crowns and produce additional leaves in the fall or blossoms in the spring



This tree does not need space to grow; it only needs to be retained.

Other trees may be desirable because of their unique size, shape, or form. For example, an unusually large, open-grown, branchy tree may be a preferred tree for aesthetics. Special treatment may not be needed; they simply need to be retained.

What do I do with competing trees?

What you do with the competing trees depends on their value, size, and number. If the competing trees have a market, you may sell them. Even a few trees can be sold to local woodcrafters or other niche markets. (See the Backyard Woods Tip Sheet on Grow and Collect Special Forest Products for more information.) You may use less marketable trees for firewood. (See the Backyard Woods Tip Sheet on Generate Wood Products for more information.) If you lack a market or another use for these competing trees, they can be killed by girdling and left standing to provide wildlife habitat, or felled to the ground to hasten their decomposition and nutrient recycling.

If I want to proceed, what do I do?

First, identify preferred trees based on your objectives and mark each trunk with plastic flagging. For each preferred tree, identify all trees touching the crown and mark these competing trees with another color of flagging. If you have any doubt about whether an adjacent tree is competing with a preferred tree, mark it because it soon will be. Healthy crowns of young trees without competition can expand 1 foot per year. Two preferred trees close together with adjoining crowns can be considered as one crown, and all adjacent trees around their joint crown should be removed. Only the trees that are in direct competition with the preferred trees are removed; all others are left.

Based on your objectives, decide which competing trees to cut and which to girdle. If you have chain saw training, you may want to do this work (see the Backyard Woods Tip Sheet on Work Safely with a Chain Saw for more information) or find someone with the skills. This project does not need to be completed in a single year. You can accomplish a portion each year as time permits and whenever products from cut trees are needed.

If you desire additional assistance to accomplish your objectives, contact your local Cooperative Extension Service for appropriate educational opportunities available in your area. If you desire personal assistance, ask for references for qualified consulting foresters. They will talk with you to gain an understanding of your objectives, and then evaluate your backyard woods and assist you in meeting your objectives. As the landowner, however, you ultimately determine what you want to see accomplished in your woods.

Additional information on selecting preferred trees and forest management may be found at your local library, County Extension Service, and the Backyard Woods Web site (www.arboday.org/backyardwoods).

In the Forest

Public and private forests have management plans that guide decisions on which trees to favor for various uses. Foresters manage the species composition, stand density, stand age, harvests, and regeneration of each stand.

Silvicultural methods, such as clearcutting, seed tree, shelterwood, group selection, and single-tree selection, are implemented to manage a stand. Frequently, these forests are intended to produce income, but many of them are managed to enhance wildlife and aesthetic benefits with no anticipated financial return. Management of these large forests attempts to provide the multiple uses and products that are desired. However, the primary focus should be on long-term forest health. Forests need to be diverse, resilient, and sustainable for future generations.

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Prune early, prune often, prune for safety

In Your Backyard Woods

Why should I prune?

Safety, tree health, aesthetics, and value are the primary reasons for pruning trees.

A single pruning can accomplish more than one objective and save time.

Safety

Pruning for safety removes branches that could fall and cause personal injury or property damage. (See the Backyard Woods Tip Sheet on Identify and Manage Hazardous Defects in Your Trees for more information.)

Removing low branches in fire-prone areas can prevent a ground fire from climbing into the tops (crowns) of the trees. (See the Backyard Woods Tip Sheet on Protect Your Property From Wildfire for more information.)

Tree health

Pruning for tree health removes diseased or insect-infested wood, thins the crown to increase airflow and reduce some pest problems, and removes crossing and rubbing branches. Removing broken or damaged limbs encourages wound closure and prevents diseases from entering the tree. Pruning encourages trees to develop a strong structure and reduces the likelihood of damage during severe weather. (See the Backyard Woods Tip Sheet on Keep Your Woods Healthy for more information.)

Aesthetics

Removing lower limbs to improve visibility in your woods and to stimulate flower production are primary reasons to prune for aesthetics. Pruning also increases the amount



of sunlight that reaches the ground, stimulating growth of wildflowers and flowering shrubs.

Value

Pruning for value increases the amount of high value wood products produced on individual trees. Pruning preferred trees produces knot-free wood. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information) A knot is the portion of a branch that becomes incorporated within the trunk of the tree. Knots are the primary reason for reduction in lumber value. (See the Backyard Woods Tip Sheet on Generate Wood Products for more information.)

Which trees should I prune?

Prune trees that pose a safety hazard, threaten to damage property, pose a fire hazard, and will have improved health as a result of pruning. Your objectives for your backyard woods will determine whether you also prune trees that will improve the aesthetic appearance of your woods or that will have increased value for wood products as a result of pruning.

Trees that pose a safety hazard or threaten property

For safety, focus on trees that are in your immediate backyard, and trees that are in high-use areas of your backyard woods, such as near a bench, picnic table, fire pit, or trail. To reduce the risk of property damage, focus on trees that could fall on a vehicle, building, or other structure. Examine trees once a year and after severe storms, being sure to check all parts and sides. Remove any broken branches lodged in the tree crown. Look for and prune branches with the following:

- Dead wood
- A crack that extends through the bark and into the wood
- A weak V-shaped union with the stem or another branch
- Decay—wood that is soft, or crumbly, or a cavity where wood is missing
- A canker—a localized area of sunken or missing bark

(See the Backyard Woods Tip Sheet on Identify and Manage Hazardous Defects in Your Trees for more information.)

Trees that pose a fire hazard

Focus on trees in a safety zone around your home. This zone should be at least 30 feet wide on level or gently sloping ground, and 100 feet or more on slope grades 30

percent or greater down hill from all structures. Outside the safety zone, prune branches near power lines and outbuildings, low hanging limbs, and dead branches. (See the Backyard Woods Tip Sheet on Protect Your Property From Wildfire for more information.)

Trees with health problems

Pruning trees with diseased and insect-infested branches may help alleviate the problem. For example, prune infected lower branches of white pines to reduce damage due to white pine blister rust. (See the Backyard Woods Tip Sheet on Keep Your Woods Healthy for more information.)

Trees with aesthetic value

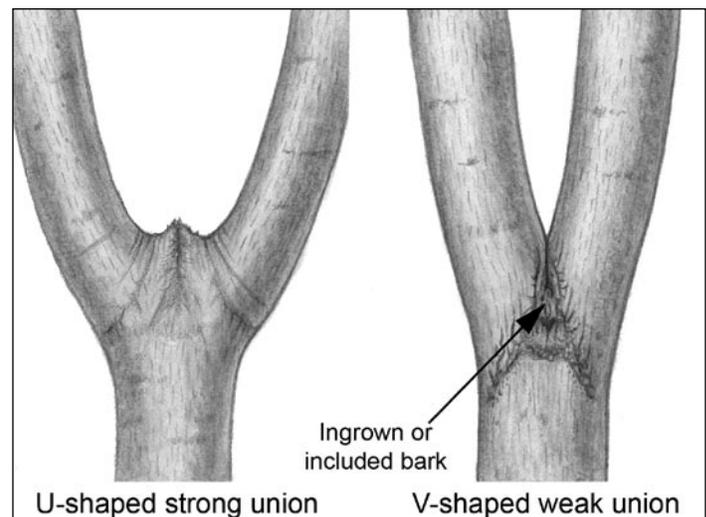
If having an aesthetically pleasing woods is one of your objectives, evaluate and prune trees that block your view and thin crowns of broadleaf trees to increase flower production. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.)

Trees with wood products value

If your objectives include producing high-value timber or veneer, prune preferred trees that have good local markets for these products. Pruning is a long-term investment. Even under good conditions, it takes 20 years to add a 5-inch layer of clear wood on a tree. (See the Backyard Woods Tip Sheet on Generate Wood Products for more information.)

How big should a tree be when I start?

Begin pruning broadleaf trees, such as oak, maple, and hickory for strong structure shortly after they are planted. Retain branches with strong U-shaped attachments.



The shape of branch unions on young broadleaf trees indicates their future strength.

Remove branches with narrow V-shaped attachments because they are weak and could fail when the tree matures. As two branches with narrow V-shaped angles of attachment grow, they produce a wedge of inward-rolled bark between them. This included bark prevents strong branch attachment, which often causes a crack at the point below where the branches meet. Removal of one branch will prevent a potential failure of the branch attachment when they are much larger.

Needleleaf trees, such as pine, spruce, and fir that have branches in whorls around the trunk, rarely need structural thinning except to restore a dominant leader. This becomes necessary occasionally, when the leader—branch at the top of the tree—is damaged and multiple branches form at the top of the tree. Select the strongest branch from among them and remove the competing branches to prevent the development of a bushy or forked tree.

Producing strong structure or value or both is the emphasis when pruning young trees. Pruning goals shift to maintaining safety and tree health as trees mature.

Begin pruning for fire protection when trees are 3 to 5 inches in diameter at breast height (d.b.h.). (Breast height is about 4½ feet above the ground.) Through periodic pruning remove all branches to a height of 6 to 10 feet.

Begin pruning needleleaf trees for aesthetics when they are 3 to 5 inches d.b.h. Through periodic pruning remove all branches until the desired view is obtained. Flowering broadleaf trees can be pruned at any age. Crowns should be thinned to increase sunlight penetration and air movement throughout the crown. Avoid unnecessary stress to the tree by removing no more than one-quarter of the living crown.

Begin pruning for value in broadleaf trees such as walnut, oaks, and hickory when they reach 2 to 8 d.b.h. Begin pruning needleleaf trees when they reach 3-5 inches in d.b.h. The sooner you start, the greater the amount of high quality knot-free wood is produced. Usually, it is uneconomical to prune trees larger than 10 inches in diameter. Continue pruning all live and dead lower branches until the trunk is free of branches to a height of 17-18.5 feet. Be sure to leave 50 percent of the total tree height in live branches to maintain healthy tree growth. Following these guidelines and reaching the desired branch-free height will require pruning the tree more than once.

Measure the diameter of trees by making a diameter tape.

Take a regular flexible tape measure and make a mark every 3.14 inches (the first mark is “1,” the second “2,” and so on).

Use these marks to measure tree diameter.

Place the tape measure around a tree at a height about 4½ feet above the ground.

If the tree measures 3 marks that you made on the tape, then the diameter is 3 inches.

At what time of year do I prune?

Prune needleleaf trees at any time of the year, but pruning during the dormant season may minimize sap and resin flow from cut branches.

Prune most broadleaf trees in the dormant season, when tree structure is easy to see. Pruning during the dormant season maximizes wound closure during the following growing season, reduces the chance of transmitting disease, and discourages excessive sap flow from wounds. Recent wounds and the chemical scents they emit can actually attract insects that spread tree diseases, especially in oaks and elms. Usually, the best time to prune oaks and elms is late fall and winter. Check with your local Cooperative Extension Service or arborist for additional information for your area.

Remove dead branches at any time of the year.

Which pruning tool should I use?

The choice of tool depends largely on the size of branches to be pruned and the amount of pruning to be done. Use hand pruners on small branches (under 1 inch diameter). Cut larger branches (up to 2 inches) with lopping shears. Hand pruners and lopping shears are available in anvil and by-pass cutting styles. The anvil style cuts the branch

between a straight blade and an anvil or block. The by-pass style uses a curved cutting blade that slides past a broader blade, much like a scissors. To prevent tearing or crushing of branches, the by-pass style cutting blade is the best.

Use a pruning saw for branches 2 to 4 inches in diameter. Unlike most other saws, pruning saws are designed to cut on the “pull-stroke.”

A chain saw is preferred when pruning branches larger than 4 inches. Safety dictates not using a chain saw above shoulder height and using additional safety equipment. (See the Backyard Woods Tip Sheet on Work Safely with a Chain Saw for more information.) To avoid the need to use a chain saw, prune when branches are small. Also, a small branch leaves a small wound and generally heals faster.

To cut branches beyond reach use a pole pruner. Generally, pole pruners have a pruning head (similar to a lopping shear) and a pruning saw. The pruning head can cut branches up to 1.5 inches; and once again, the by-pass style is preferred.

Sanitizing tools helps prevent the spread of disease from infected to healthy trees. Tools become contaminated when they come into contact with fungi, bacteria, viruses, and other microorganisms that cause disease in trees. Pathogens need some way of entering the tree to cause disease, and fresh wounds are perfect places for infections to begin.

Sanitize your tools by using either 70 percent denatured alcohol or a solution of 1 part liquid household bleach to 9 parts water. Before making each cut, immerse the tool in the solution for 1 to 2 minutes, and wipe wood particles from the cutting surface. Bleach is corrosive to metal surfaces, so when you are finished pruning clean tools thoroughly with soap and water.

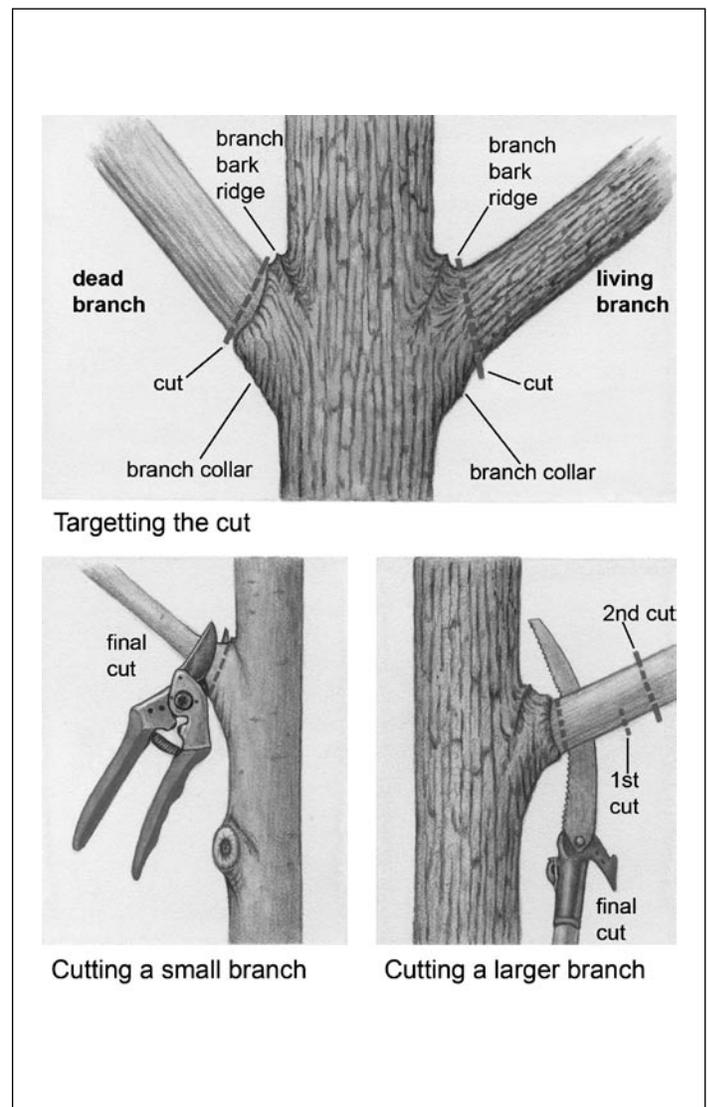
Tool sanitation is not needed during the dormant season.

Where and how do I make pruning cuts?

Make pruning cuts at a node, the point at which one branch or twig attaches to another. In spring growth begins at buds, and twigs grow until a new node is formed. Remove only branch tissue and take care not to damage stem tissue so it will not decay, and so the wound will heal more effectively.

To find the proper place to cut a branch, look for the branch collar that grows from the stem tissue at the outside of the branch. On the upper branch surface, there is usually a bark ridge that runs (more or less) parallel to the branch angle, along the stem of the tree. A proper pruning cut leaves both the branch bark ridge and the branch collar intact.

You can evaluate the quality of pruning cuts after one growing season. A concentric ring of woundwood forms from proper pruning cuts. Improper cuts made inside the branch bark ridge or branch collar result in pronounced development of woundwood on the sides of the pruning wounds and very little woundwood on the top or bottom. A cut too far from the stem leaves a branch stub, and wound closure is delayed because the woundwood must grow over the stub.



Branches large enough to require saws should be supported with one hand while the cuts are made. If the branch is too large to support, make a three-step pruning cut to prevent bark ripping.

1. The first cut is a shallow notch on the underside of the branch, outside the branch collar. This cut prevents the falling branch from tearing the stem tissue.
2. Make the second cut outside the first cut, all the way through the branch, leaving a short stub.
3. Cut the stub just outside the branch bark ridge and branch collar, completing the operation.

Prune dead branches the same way you would live branches. Making the correct cut is usually easy because the branch collar and the branch bark ridge continue to grow and can be distinguished from the dead branch. Make the pruning cut just outside the ring of woundwood tissue that has formed, being careful not to cause unnecessary injury. Large dead branches should be supported with one hand or cut with the three-step method.

Can I harm trees by pruning?

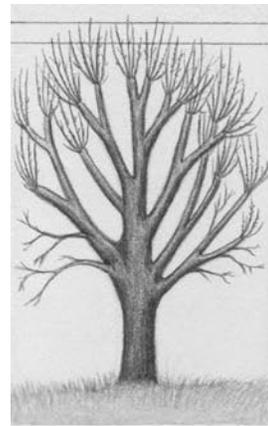
Topping and tipping are pruning practices you should not use. Topping is the pruning of large upright branches to reduce the height of a tree. Tipping is the cutting of lateral branches to reduce crown width. Both practices result in the death of the cut branch back to the next lateral branch below and the development of numerous sprouts. These sprouts are weakly attached to the stem and eventually will be supported by a decaying branch.

Improper pruning cuts cause unnecessary injury and bark ripping. Flush cuts injure stem tissues and can result in decay. Stub cuts delay wound closure and can provide entry to canker fungi, delaying or preventing woundwood formation.

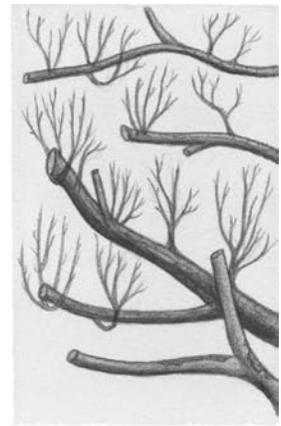
Avoid producing “lion’s tails” (tufts of branches and foliage at the ends of branches) caused by removing all inner lateral branches and foliage. Lion’s tails can result in sunscalding (bark damage caused by freezing and thawing), abundant branch sprouting, and weak branch structure and breakage.

Should I treat tree wounds?

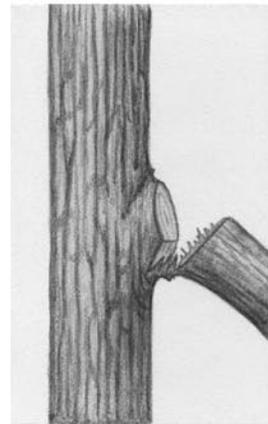
With the exceptions noted below, do not apply wound dressing. Tree sap, gums, and resins are the natural means by which trees combat invasion by diseases. Although unsightly, sap flow from pruning wounds generally is not harmful.



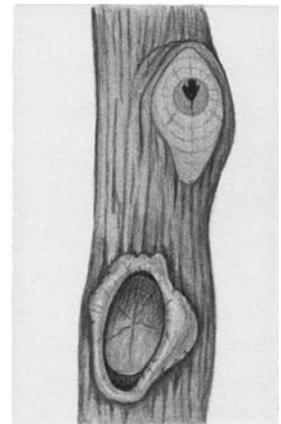
Topping



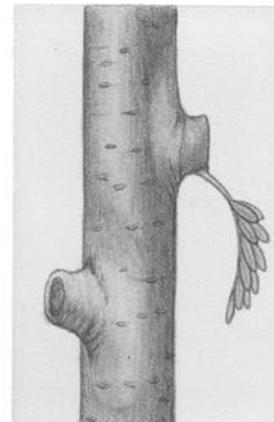
Tipping



Bark ripping



Flush cutting



Stub cutting

A proper pruning cut does not damage either the branch bark ridge or the branch collar.

Wound dressings will not stop decay or cure infectious diseases. They may actually interfere with the protective benefits of tree gums and resins, and trap moisture behind the dressing and promote the growth of wood-decaying fungi.

The only benefit of wound dressing, such as you can buy at farm and garden stores, is to prevent introduction of oak wilt and Dutch elm disease. When oaks and elms are wounded accidentally or by necessary pruning during the critical time of the year (usually spring for oaks, and the entire growing season for elms), apply some type of dressing to the wound immediately after it is created.

In the Forest

Trees are pruned in public and private forests to increase tree value. Pruning is the forester's "value added" effort, because it produces higher quality boards and veneer. Pruning is time consuming and, therefore, expensive. Foresters select only the highest value tree species on the best growing sites for pruning. They only prune trees selected for harvest. Finally, they keep good records on pruned trees so they can be marketed for the value obtained by pruning.

Although pruning is done primarily to enhance tree value, it can fulfill other objectives. Pruning in large forests increases fire resistance by removing lower branches that spread fire to tops of trees. Pruning improves walking access into dense tree stands. Pruning also lessens the impact of blister rust in young white pine stands, and reduces incidence of leaf diseases, like Swiss needle cast, that thrives in humid environments.

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Expand your woods for the future

In Your Backyard Woods

Tree planting is one of the best ways to renew or expand your backyard woods. Trees will grow into open fields if there is sufficient rain, and naturally reproduce after tree harvests, storms, and wildfires. Tree planting speeds up the process and allows you to select the types of trees in your new woods. Tree planting is a long-term investment. Not only will you benefit, but your children, grandchildren, and possibly their children will enjoy and use the trees you plant.

Why do I want to plant trees?

With the help of your family take time to determine what you want to accomplish by planting trees. Be specific. Most tree plantings can have more than one objective, but try to focus on a central objective and then add plants to meet secondary ones. Be creative. The following examples of planting objectives and design considerations are not mutually exclusive.

If your objective is attracting wildlife, consider doing the following:

- Increasing plant diversity that complements the surrounding landscape.
- Developing habitats that are in short supply in the area.
- Choosing trees and shrubs that are preferred food for various species, or providing cover (nesting habitat and winter thermal cover), or both.
- Establishing travel corridors to connect separated woods.
- Creating areas of differing tree size and age.
- Planting around existing old trees with large crowns.
- See the Backyard Woods Tip Sheet on Attract Wildlife for more information.

If your objective is enhancing aesthetics, consider doing the following:

- Planting species with desirable spring and fall colors or attractive fruit and seeds.

- Varying the layout and location of plantings.
- Using a wide variety of species, including shrubs used by wildlife.
- Planting along any hillsides.
- Randomly planting trees or using curved rows.
- Creating irregular planting edges.
- Leaving openings within the planting.
- Creating areas of differing tree size and age.
- Retaining landmarks and distinct features (old trees with large crowns)

If your objective is to protect or improve water quality, consider doing the following:

- Planting trees with long life expectancy in buffer zones near streams, lakes, and wetlands, to trap sediment and remove nutrients.
- Plant trees near streams and lakes that hold their leaves over winter (oaks and beech) so that they feed the aquatic insects during the winter.
- Plant trees near streams and lakes that tolerate periodic wet soils.
- Plant along contours on slopes to prevent soil erosion.
- Avoiding site preparation that might increase erosion.
- See the Backyard Woods Tip Sheet on Protect Clean Water for more information.

What are the site conditions?

Trees grow best on sites that meet their needs. Climate, soil, moisture, and amount of sunlight are primary factors. Get some basic information on the area you are planting.

Is the soil sandy (coarse), loamy (medium), or clayey (fine) texture?

Is the site wet at various times of the year or does precipitation enter the soil readily?

Does the area receive full, partial, or very little sunlight?

Armed with this information you should be able to select from a list of trees at your local nursery that will meet your objectives and grow well on your site.

What can I plant?

Plant native species. Native species are adapted to site conditions in your part of the country. Matching a tree with a planting site becomes much more important when the species is not native. One of the best ways to check how trees will do on your land is to observe species growing naturally in the vicinity.

State and private nurseries within your state are good sources of planting stock to match your local climate. Be careful when ordering trees from out-of-state nurseries. Be sure to check the seed source. The source of seed used to grow the trees should not be more than 100 miles north or south or east or west of your state border. This “rule of thumb” works well in the eastern United States. In western States, however, elevation is an additional factor to consider. The seed source should be near the same elevation as the planting site.

How do I prepare the site?

Controlling competition from grasses, weeds, and existing woody cover is the reason for site preparation. Soil type, soil moisture, and geographic location are also important considerations. For example, highly productive loamy soils require more intensive site preparation than do less productive sandy soils.

Site preparation methods that can be used are mechanical, manual, chemical, and fire. Rototilling, plowing, disking, or all of these in a 6-foot wide strip in the fall before spring planting will set back grass sod, and minimize erosion and weed seed invasion. A machete, hoe, shovel, and brush-ax can be used to remove vegetation in the area around where a seedling will be planted.

Herbicides can be a safe and economical alternative to hand tools and power equipment methods. They also provide the least amount of soil disturbance and allow you to leave the surface layer of soil, which has the most nutrients for the new trees. Success depends on timing of application, herbicide selected, weather conditions, and application rate. Always follow herbicide label directions.

Fire can be used alone or in combination with other site preparation methods. It is simple and inexpensive, but should be done only by trained personnel under carefully controlled conditions.

How should I space trees?

Whether you plant trees in rows or place them randomly, you need to give them room to grow. The spacing you select depends on your objectives.

Height growth is reduced at extremely close spacing. Diameter growth begins decreasing when tree branches touch. Spacing determines when growth will slow.

At close spacing trees will grow straight and tall with smaller and fewer branches on the lower main stem. Close spacing enables trees to outgrow the competition and dominate the site, but it requires the removal of some trees when their crowns begin to touch, much like thinning carrot seedlings from a garden. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.)

Wide spacing reduces the number of trees to buy and plant, but it may increase the length of time weed control is needed. Tree crowns will be larger with more branches on the main stem. Trees may produce seed sooner, and undergrowth (associated shrubs and other plants) will provide wildlife food, but undergrowth may also increase fire hazards.

How do I handle bare rootstock?

Bare rootstock is the most economical way to purchase trees and it can be used to meet nearly all your planting objectives. Bare rootstock is obtained as 1-to 3-year-old trees, either as seedlings or transplants. Seedlings grow in the nursery in the same bed they were planted.

To calculate the number of trees per acre for any spacing, divide the number of square feet in an acre (43,560 square feet) by the growth area for each tree.

Example: For an 8 feet by 8 feet spacing each tree is in the center of an 8-foot square, and has 64 square feet of growing space before it touches another tree’s branches.

Therefore, 43,560 divided by 64 equals about 681 trees per acre.

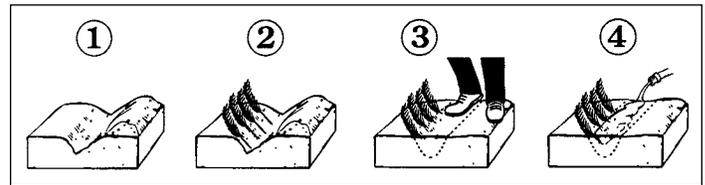
Transplants were removed from the seedbed and replanted (transplanting improves root development).

Bare rootstock is susceptible to root drying and physical damage. Stock is packed at the nursery in a bag and wrapped in moss to keep the roots moist. Keep stock at a constant low temperature (33-40 degrees Fahrenheit) and the roots moist but not soggy. They must remain dormant from the time they are removed from the nursery bed until they are planted.

Transportation is an important consideration for orders of all sizes. For orders over 1,000 trees, a refrigerated truck is the preferred method of transportation. If you transport them in a pickup truck, keep bags separated for ventilation, cover with a moist tarp, and protect from the sun with a solar reflective tarp. If seedlings will fit in your car, keep them inside with insulation, ice packs, and air conditioning on maximum. Only a few minutes in a hot trunk can permanently damage seedlings.



Bare-root trees need special care to survive the transition from the nursery to your backyard woods.



To store bare rootstock for more than a few days, use this method: In a cool shady location dig a V-shaped trench deep enough to hold the entire root system and part of the lower stem, fill with soil, and water.

After stock arrives at your property, keep the bags in deep shade and protect them from freezing. Separate the bags to prevent overheating. Plant the trees as soon as you can.

If you must store trees for longer than a few days, open the bags and place the trees in a trench. Dig a trench deep and wide enough for the whole root system and part of the stem to be covered with soil. Lay the seedlings next to each other in the trench and fill with soil and water. The length of time seedlings can be stored varies by region of the country. Check with Cooperative Extension Service or state forestry offices for local recommendations.

How do I prepare seedlings?

Before you plant, grade the seedlings and discard those of poor quality. Poor-quality seedlings will have excessive mortality and poor early growth. They can be identified by these criteria:

- Broken, skinned, or weak stems.
- Fermented odor or mold on needles.
- Slippery bark on root or stem.
- Diameter of root collar (junction between root and stem) smaller than 1/8 inch or larger than 3/8 inch.
- Root systems less than 4 inches long.
- Root systems more than 12 inches long if more than 50 percent of the fine roots must be pruned to reduce the length and width of the root system for planting.
- A dry root system resulting from improper storage, exposure to sun and air for over 10 minutes on a cool humid day, or for 5 minutes on a warm windy or dry day. Bitter cold dry winds can be equally destructive.

If possible, prune roots and grade seedlings at the same time. Long fibrous root systems require pruning to avoid bent or "J" roots in the planting hole. Root pruning should be done in a cool controlled environment where the root system will not dry out. Have water available. The worst place to prune roots is at the planting site. Prune with a sharp knife, machete, ax, or hatchet. Never break or twist roots off by hand.

Broadleaf trees need large vigorous root systems to survive. They can be pruned to 8 to 10 inches long with at least 4-inch long lateral roots. Needleleaf trees can be pruned to 5 to 8 inches long, but never remove more than 50 percent of the lateral roots.

Recommendations vary for different regions of the country, so be sure to check on local guidelines.

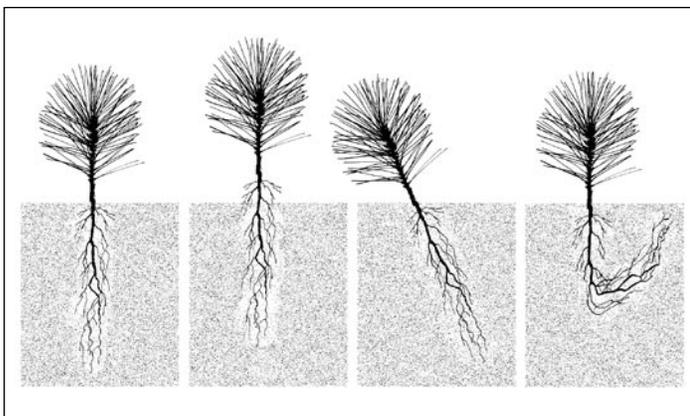
Keep the seedlings in the shade and cool until planted. The seedlings should be carried in a bucket or planting bag with wet burlap or something similar to keep the roots moist at all times. Never carry seedlings exposed to the air or immersed in water.

What is the best way to plant?

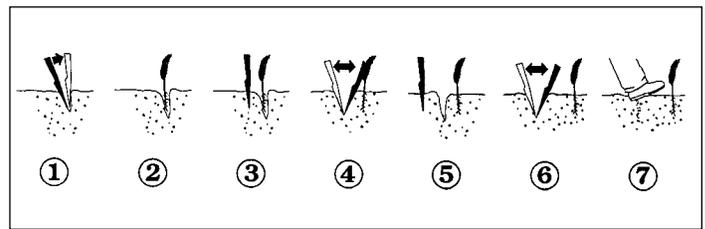
Hand planting is the best method for planting a small number of trees. The hole or a slit method can be used to hand plant trees. No matter what method you use follow these steps:

- Plant the tree at the same depth that it grew in the nursery. Error on the side of planting a little deeper rather than exposing roots.
- Plant the tree in a vertical position to avoid a crooked stem.
- Place roots in the planting hole without bending them.
- Carefully firm the soil around the roots to eliminate air pockets.

With a shovel dig a hole deep enough to plant the tree roots without bending them, and pack the soil firmly around the roots. This hole method usually results in a high rate of survival, but it is slow and not practical for planting a large number of trees.



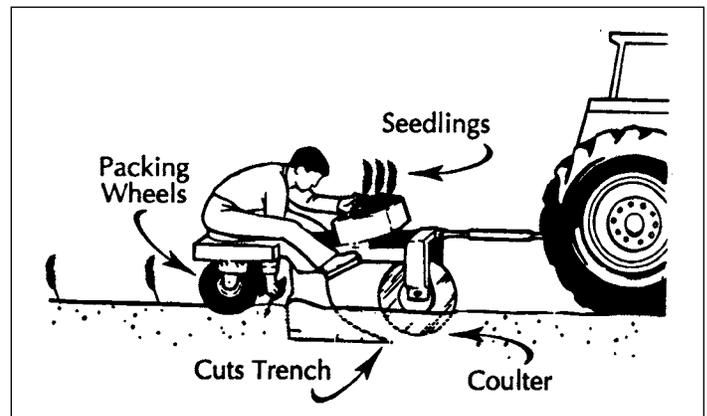
Plant trees upright, at about the same depth they grew in the nursery, as shown in the first diagram on the left. Don't expose or bend the roots.



Using the slit or bar method, you can plant about 1,000 seedlings a day.

The slit or bar method is faster. A rough estimate is that an inexperienced, but physically fit, tree planter can plant 1,000 to 3,000 seedlings per day.

If you want to plant more than 1,000 trees, you may want to consider using a planting machine. It is suitable for use on level terrain that is free of stumps, rocks, wet areas, and brush or tree cover. Generally a 30-50 horsepower tractor and a crew of three are sufficient. Experience in operation of planting machines comes quickly, and a crew can plant about 10,000 seedlings a day.



There are many types of tree-planting machines, but generally they have a coultter that breaks through the soil surface, a V-shaped blade that opens a trench into which the trees are placed, and packing wheels that firm the soil around the tree.

How do I maintain new plantings?

Maintaining moisture and nutrients is critical for tree survival during the first 3 to 5 years. Grass, weeds, and animal pests are the culprits you need to control. The amount of maintenance needed varies by region of the country. Grass and weed control methods include these:

- Shallow mechanical cultivation (2 to 4 inches) two to three times during the growing season controls weeds on sites with no erosion problems.
- Herbicides are an effective and economical grass and weed control method. They are especially useful in

controlling weeds within rows, where cultivation is more difficult, or in plantings designed without rows.

- A mulch such as woodchips can reduce weed competition, moderate soil temperatures, and help retain soil moisture. Mulch is aesthetically more appealing than any of the other weed control methods. Place a 2- to 3-inch thick layer, and maintain it for 3 to 5 years. Keep the mulch 3 to 4 inches from tree stems to prevent damage by small rodents. Avoid using grass clippings, hay, or straw mulch because they attract rodents.
- Landscape fabrics are effective in reducing soil moisture loss and weed growth, especially in low rainfall areas. Small squares (3 feet square) and continuous strips (6 to 8 feet wide), when properly installed, can control weeds for 5 to 10 years. Installing individual squares is fairly easy, but the continuous sheets require a machine and experienced installers. Landscape fabric is more expensive than other weed control methods, but its long life makes it cost-effective. Landscape fabric can attract rodents in some areas. Check with the Cooperative Extension Service or county Conservation District for local recommendations before applying fabric.

Old grass fields, pastures, and openings in the woods are ideal places to plant trees. They are also “buffets” for deer and rodents. Deer will feed on needleleaf trees in fall and winter when preferred food is limited and in spring when buds are most succulent. Deer can kill seedlings or severely stunt their growth. Rodents can kill seedlings up to 2 inches in diameter by girdling them as they eat the bark near the ground. Fencing, physical barriers, repellents, and habitat manipulation are deer protection methods.



- Electric and standard fences are effective, but construction and maintenance costs are high.
- Physical barriers protect individual trees or parts of trees. Tree shelters (polypropylene tubes) are used to protect entire seedlings or the seedling terminal bud (bud at the top of the tree), however many of the tubes are photodegradable and break down in 2 to 5 years. A paper bud cap, a rectangular piece of paper stapled around the terminal bud, is another physical barrier to protect the terminal bud. Bud caps need to be replaced annually.
- Repellents include bone meal and putrefied fish or egg solids. Repellents need to be periodically reapplied as the vegetation grows.
- Habitat manipulation includes planting preferred deer food with the seedlings, improving deer food away from the plantation, planting needleleaf trees less palatable to deer, and leaving brush as a physical barrier to deer movement.

Manipulating habitat, encouraging predation, and protecting seedlings are ways to control rodent damage.

- Removing grassy habitat by using fire, herbicides, or clearing debris reduces rodent protective cover.
- Hawks and owls are rodent predators. You can encourage them by leaving dead trees or providing artificial perches. Predation is more effective if rodent protective cover is removed by one of the above methods.
- Tree shelters can also be used to protect seedlings from rodents.



Bud caps and tree tubes are physical barriers that protect young trees from deer and other animals.

Do I have any options?

If all this seems like too much work, you can contract with a vendor to do everything from site preparation to maintenance or any of the steps in between. The information in this tip sheet will help you write a contract and monitor its implementation to be sure you have a successful tree planting operation.

In the Forest

Tree planting in public and private forests is very similar to the tree planting you are doing in your backyard woods. Planting trees renews forests, replacing trees that have been removed by fires, insect and disease outbreaks, storms, or harvests. While none of these events destroys forests, it can take a long time for trees to grow back. Planting seedlings decreases the amount of time needed for a forest to become lush again.



Pesticide Precautionary Statement:

Pesticides used improperly can be injurious to humans, animals, and plants. Follow label directions and heed all precautions on the label. Store all pesticides in original containers and out of reach of children. Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. After handling a pesticide, do not eat, drink, or smoke until you have washed. Dispose of empty pesticide containers properly.

NOTE: Registrations of pesticides are under constant review by the Federal Environmental Protection Agency. Consult your local county agricultural agent or Cooperative Extension Service about restrictions and registered uses of particular pesticides.

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Let your imagination run wild

In Your Backyard Woods

The term “special forest products” describes products generated from plants or fungi that can be harvested from your backyard woods. Unlike wood products, special forest products have diverse uses and come from a large variety of sources: **foods** from mushrooms, nuts, fruits, and sap; **medicinals** from herbs and other plant parts; **decoratives** from stems, branches, flowers, boughs, and buds; and **handicrafts** from bark, burls, conks, and stems. In some areas, the special forest products are more valuable than the wood products.

Foods

Berries, wild fruits, mushrooms, nuts, and maple syrup are examples of the many food items to be found in your backyard woods. What you have and what you can grow depend on your location.

Berries and other fruits

Your family can enjoy the berries and other fruits you find or grow in your backyard woods. The most well known are probably the wild blueberry and the big huckleberry. Other popular wild berries are gooseberries, currants, strawberries, blackberries, blackcaps, and raspberries. Lesser known berries are lingonberries, juneberries, elderberries, mulberries, coralberries, salmonberries, and thimbleberries. Native wild fruits include mayhaws, pawpaws, persimmons, chokecherries, crabapples, Oregon grape, and several types of plum. Staghorn sumac, prickly pear, deerberry, passionflower, and black cherry are also used for their berries and fruit. Cultivation of berries and fruits is rewarding, because their produce can be harvested 2 to 3 years after planting.

Mushrooms

Mushrooms—like other fungi—are saprophytes, which means that they live on dead and decaying material. When temperature, light, moisture, and nutrients are right, the microscopic mycelium (white and black strings of fungi) forms small buds that grow into the fruits we know as mushrooms. Many species of mushrooms are inedible or poisonous, so the ability to identify different types is critical to harvesting and cultivating. The most commonly collected wild mushrooms are chanterelle, morel,

(black and yellow) matsutake, and boletus. Cultivated mushrooms include shiitake, chanterelle, oyster, and enoki.



As soon as 6 months after logs are inoculated, shiitake mushrooms may be ready for harvest.

WARNING:

Do not eat any wild mushroom without first obtaining an identification from an expert. Toxins are found in many different kinds of mushrooms. Most poisonous mushrooms are not fatal to humans, but they may produce nausea, diarrhea, or hallucinations when eaten. Only six species of North American mushrooms, out of several thousand species, are considered deadly poisonous.

Cultivation of shiitake mushrooms can be rewarding and challenging. They can be cultivated in virtually every part of the country, in small and large operations, either indoors or outdoors. The primary growing medium for shiitake is logs cut during the dormant season from living decay-free trees. This is a potential use of small trees removed around preferred trees. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.) White oak, maple, and sweetgum are good species, but other species will also work. Red oak and pine should be avoided. Cut logs that are 3 to 5 feet long and 3 to 6 inches in diameter, with the bark intact. Two weeks after being cut, logs are inoculated with spawn (live fungus). Spawn can be purchased as dowel plugs or sawdust blocks from spawn producers throughout the United States and Canada. Different strains are better suited for different climatic conditions. The inoculation process consists of drilling each log with 35 to 40 holes 6 inches apart in rows offset and spaced about 2 inches apart. A dowel or plug is placed in each hole and sealed with a thin coat of hot wax. The logs are then stacked in at least 60 percent shade. (A woods of mixed needleleaf and broadleaf trees is ideal.) Moisture content is critical. Logs should never dry out, but should not be so wet as to produce mold. Fruiting will usually occur in 6 to 18 months and continue for 3 to 5 years.

Nuts

Acorns, beechnuts, black walnuts, hickory, pecan, and pine nuts are commonly used for food and commercial purposes. Acorns are the most abundant nut because there are more than 60 types of oak trees and all produce edible acorns. Oaks are divided into two groups: red (or black) oaks that produce nuts with a bitter taste, and white oaks that produce a considerably sweeter nut.

Beechnuts are small and triangular and are found within the small burrs that appear after the beech tree leaves begin to fall. They are best gathered from lower branches just prior to dropping, before small animals have a chance to forage.

Black walnuts are valued for both their nuts and their shells. The shell of the black walnut is used for metal cleaning and polishing, oil well drilling, paints, explosives, and cosmetic cleaners. They can be gathered and sold commercially.

The most desirable hickory nuts come from shellbark and shagbark hickory trees. Both have sweet nuts that vary in

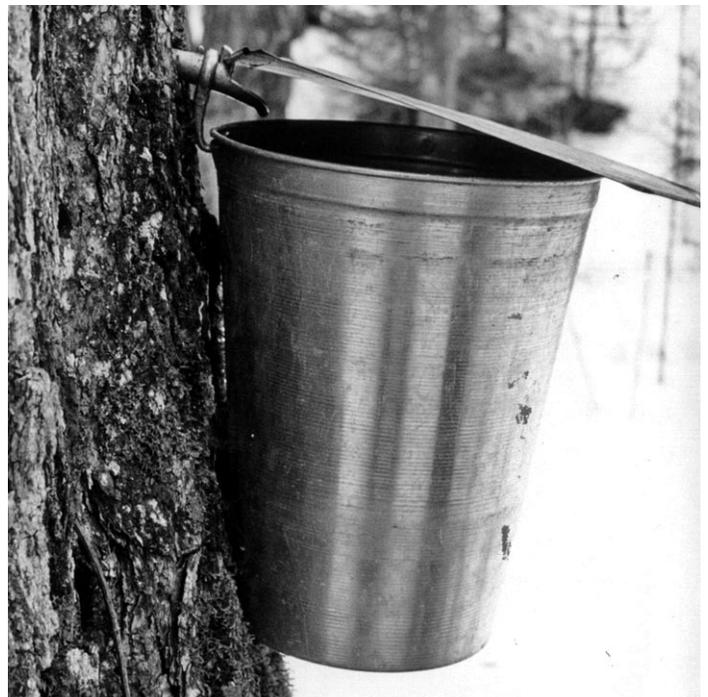
size and are encased in hard, thick husks that turn from green to brown in the fall.

Pecan is a member of the hickory family. It grows in the wild, primarily in the lower Mississippi River Valley in an area extending westward to eastern Kansas and central Texas, and eastward to western Mississippi and western Tennessee. Pecans are grown commercially throughout the southern part of the United States. Pecan trees begin to bear when they are about 10 years old.

Pine nuts are not true nuts since they lack a woody covering. The western portion of the country provides the majority of the edible pine nuts. Pine trees that bear edible fruit include the ponderosa, Coulter, sugar, and Digger pines, but the most popular is the common or Colorado pinyon and single-leaf pinyon. Seeds of these pines have the size and appearance of puffed rice. Wild pinyons do not bear full crops until they are about 75 years old.

Maple Syrup

North American maples are the only maples in the world that produce maple-flavored sap for syrup. Sugar maple is the tree most often tapped. Black maple, a close relative to sugar maple, is also a good sap source. It is also possible to make syrup from red maple, silver maple, box elder, and even white birch sap, but the sugar maple produces 50 percent more sap with higher sugar content than these trees. Therefore, it will take considerably more sap trees to produce the same amount of syrup.



A tapped sugar maple yields about 10 gallons of sap in a year.

Trees 10 inches in diameter and larger (measured 4.5 feet above the ground) are tapped. A tap is a hole drilled into the tree trunk into which a metal spout is driven and a bucket or plastic bag is hung to collect the sap. In an average year, each sugar maple tap yields 10 gallons of sap.

Overtapping damages a tree's health. General guidelines recommend one tap for a tree 10-15 inches in diameter, two taps for a tree 16-20 inches, and three taps for a tree 20-25 inches. A young vigorous tree is best for tapping because it can rapidly produce new wood to cover the tap hole.

Maple tree sap is boiled until it thickens into sweet syrup. About 30 to 40 gallons of sap are needed to make 1 gallon of pure maple syrup.

Medicinals

Your backyard woods may contain plants that can be used for medicinal purposes. You can harvest naturally growing plants or grow them in your woods.

A broadleaf woods is best for growing medicinal plants. Selecting medicinal plants that are native to your location makes your work easier and more productive. In ideal situations, cultivation requires minimum disturbance of the area. Unwanted plants are removed and seeds or seedlings are planted. In other situations, underbrush and weedy plants are removed, and the ground is worked into beds with hand tools, rototiller, or tractor, and then planted. The type of cultivation you choose depends on your growing conditions.

To be marketed as medicinals, plant products first must be proven safe and effective according to U.S. Food and Drug Administration (FDA) standards. About 25 percent of all prescription medicines used in the United States contain active ingredients extracted from plants. Plants and plant products that do not meet the strictest FDA standards or have not been tested, but are believed to have medicinal benefits, are marketed as dietary supplements in the United States. These products are legally considered food items, and product labels cannot make claims about their medicinal benefits. More than 25 tree species, 65 herbaceous plants, and 29 shrubs have been listed by the U.S. Pharmacopoeia for their medicinal value and are marketed as dietary supplements.

By far, medicinal and dietary supplements are the most valuable segment of the special forest product market.

Between \$7 billion and \$8 billion is the estimated value of the worldwide market, and some estimates go as high as \$14 billion annually. Europe is the largest market for these products, representing one-half of the worldwide demand.

The future markets for these products appear prosperous. There is a dramatic increase in demand for natural products, including a growing interest in alternative medicines. Many of the most popular dietary supplements are overharvested in woodlands. For example, some of the most profitable plants (ginseng and goldenseal) are in short supply. Both ginseng and goldenseal can be cultivated in your backyard woods, provided you have the right conditions—broadleaf trees on north- and east-facing slopes. Both plants need deep well-drained soils with high organic matter content and partial shade for goldenseal to high shade for ginseng. If you like gardening, are patient, and also appreciate learning by trial and error, the personal and financial rewards from growing medicinal plants can be exceptional.

You can find plant identification books at the library or bookstore to help you identify medicinal plants that are in your backyard woods.

Decoratives

Stems, branches, cones, vines, leaves, and small plants found in your backyard woods can be used for home decorating and sold to craft stores or wholesalers. Here are just a few examples of how plants and parts of plants can be used in decorating:

- Needleleaf boughs for Christmas wreaths
- Grape vines for wreaths
- Young flexible willow stems for baskets or furniture
- Red stemmed dogwood, cork screw willow, and decorative buds in dry floral arrangements
- Cones of all sizes and shapes for various uses
- Blossoms like witchhazel and cherry in fresh floral displays.

If your backyard woods does not have the plants you want, consider adding them. An annual soil fertility program and an aggressive pruning regimen may be necessary to produce the high quality plant material you need. When you own a few acres, there usually is a place just right for growing the plants you need.

Handicrafts

The woods in your backyard may contain a host of material that can be hand crafted by you or sold to crafters to make objects ranging from pencils to art. Parts of trees such as limbs, branches, twigs, bark, and knotholes can all be turned into things of beauty in the right hands.

Burls are one of the best sources of beautiful wood grain. A burl is produced where an injury or other external stimulus has affected the growth pattern of the tree, causing a deformity. The resulting wood grain patterns may be wavy, swirled, marbled, or feathered. Woodcrafters value all of these characteristics.



A burl has unique wood grain patterns valued by woodcrafters.

Imaginative people can even use conks (fungi fruiting structures on tree trunks), pine needles, and roots to produce beautiful and useful objects. Materials from your backyard woods that can be used for handicraft products are almost limitless.

Marketing Special Forest Products

No one ever makes money growing anything; they make money selling it. If you decide to sell some of your special forest products remember one thing: marketing matters.



In the right hands these "artist conks" are transformed.

Markets can vary from the roadside stand to international markets.

- Generally, markets for special forest products are “niche” markets—small, very specialized, and with only a few buyers.
- Production is often seasonal (for example, nuts, berries, mushrooms, flowers), or consumption is seasonal (for example, Christmas wreaths or boughs). This means that production labor is highly concentrated and that products may need to be stored for months.
- Some products, such as mushrooms and berries, are highly perishable. This feature increases costs and risks for storage and transportation between you and the consumer.
- Other producers may be reluctant to share information on their sources of product, methods of production, or potential markets. This reluctance can make it difficult for you to enter the market.

You need a strategic marketing plan, which should evaluate three things: your competitors, the business environment, and your customers.

Getting Started

Get to know your backyard woods; there is more there than meets the eye. You and your family can explore it in all seasons of the year and discover new wonders. Enjoy it, use it, make things from it, taste it, and care for it. You may even be able to make some money from it.

If you need help to get started, there are books, publications, periodicals, associations, and wholesale buyers that can help you. A good place to start is your local Cooperative Extension Service or www.backyardwoods.org.

In the Forest

Forests were used for special forest products long before they were harvested for timber. Today most special forest products are still gathered from the forest. The most popular gathering places are Federal, State, and other public forests. Many of them sell permits and provide information on how to identify and harvest specific products. Gathering and selling special forest products from public forests helps the local economy by supplementing local incomes. Some public forests are managed for special forest products. Management

increases the quantity and quality of the products, controls the harvest, and prevents damage to the special plants and to the rest of the forest. Growing the products best suited to the specific site on a sustainable basis requires the application of both sound science and art.

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From firewood to high-quality veneer

In Your Backyard Woods

Firewood, fence posts, sawlogs, and veneer logs are examples of wood products that can come from woodlots of any size, including your backyard woods.

Firewood

Trees that are crooked, poorly-formed, infested with pests, or that crowd out more desirable trees are recommended candidates for the firewood pile. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.) Trees that have died and fallen to the ground are also good possibilities for burning in a fireplace or wood stove.

After cutting firewood trees into logs of proper length for burning, a minimum of 6 months of favorable drying

conditions (spring through fall) is needed to “season” the firewood. Splitting the logs hastens the drying process. To dry logs, stack them in a sunny, open, airy, and well-drained location where the moisture will evaporate from the wood. A supporting base of concrete blocks or metal or plastic pipe promotes air circulation and keeps the wood from drawing moisture from the ground. A simple cover to shed rain and snow from the woodpile aids drying.

Fence posts

Some tree species are naturally resistant to decay and insect attack, and can provide long-lasting fence posts. The natural resistance varies from tree to tree and is particularly dependent on the age of the tree. Younger trees have less heartwood and are less resistant.



Stack firewood in a sunny, well-drained location 30 feet or more from your house. Cover your pile to keep out rain and snow.

Be careful to cut posts with a high percentage of heartwood (the darker wood near the center of a tree) since sapwood (the lighter wood near the bark) is easily degraded by fungi and insects. Fence posts from osage-orange, with at least 3 inches of heartwood, and from black locust usually last in the ground for 15 or more years. Posts from cedar, cypress, redwood, and white oak heartwood can last 7 to 15 years. Untreated pine, hickory, red oak, spruce, sweetgum, sycamore, willow, and yellow-poplar posts typically last from 2 to 7 years. In general, where long life of a post is important, it is best to treat posts with preservative.

Posts that have been seasoned are lighter and easier to handle than green, fresh-cut posts. To season posts stack them in "Lincoln log" (crisscross) fashion in columns for 6 to 12 months or more for adequate drying.

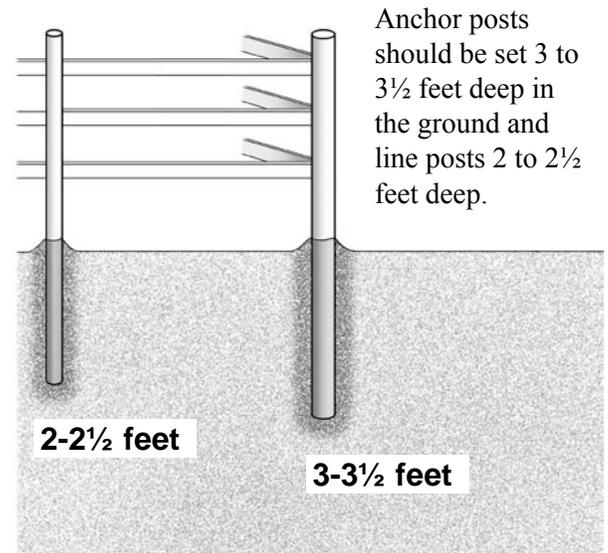
The art of making a wood fire

Needleleaf trees, like pine, spruce, and fir, ignite easily because they are resinous. They burn rapidly with a hot flame; however, a fire built entirely of needleleaf trees burns out quickly and requires frequent attention and replenishment. The denser broadleaf trees such as ash, beech, birch, maple, and oak provide a longer lasting fire. These broadleaf species burn less vigorously and with a shorter flame than do needleleaf trees.

Aroma is best derived from the woods of fruit trees, such as apple and cherry, and nut trees, such as beech, hickory, and pecan. The aroma of their smoke generally resembles the aroma of their fruit.

By mixing logs from needleleaf and broadleaf trees, an easily ignited and long-lasting fire can be created. Later, by adding some fruit or nut woods, a nostalgic wood smoke aroma can be generated.

Setting Posts



Anchor posts (gate, corner, and end) should be 5 inches in diameter or larger. Line posts should have a minimum diameter of 3 to 3½ inches, although smaller posts are often used. Posts 4 or 5 inches in diameter should be used for barnyards, corrals, and other confined areas, and in sandy or wet soils.

Sawlogs

Relatively straight trees with one main trunk and a diameter greater than 12 inches can produce lumber for home or commercial use. These trees, often referred to as "sawtimber," may contain one or more "sawlogs" that can be converted by a sawmill into boards of varying lengths and widths.

If you need rough sawn lumber for a do-it-yourself project, you can often contract with a portable sawmill operator. A portable mill can be brought directly to your woods to convert the logs to boards. The mill operator can be paid in a number of ways—on a unit basis (cost per board foot sawn), a negotiated "shares" agreement (mill operator and woodlot owner divide the lumber output, usually on a percentage basis), or an hourly rate.



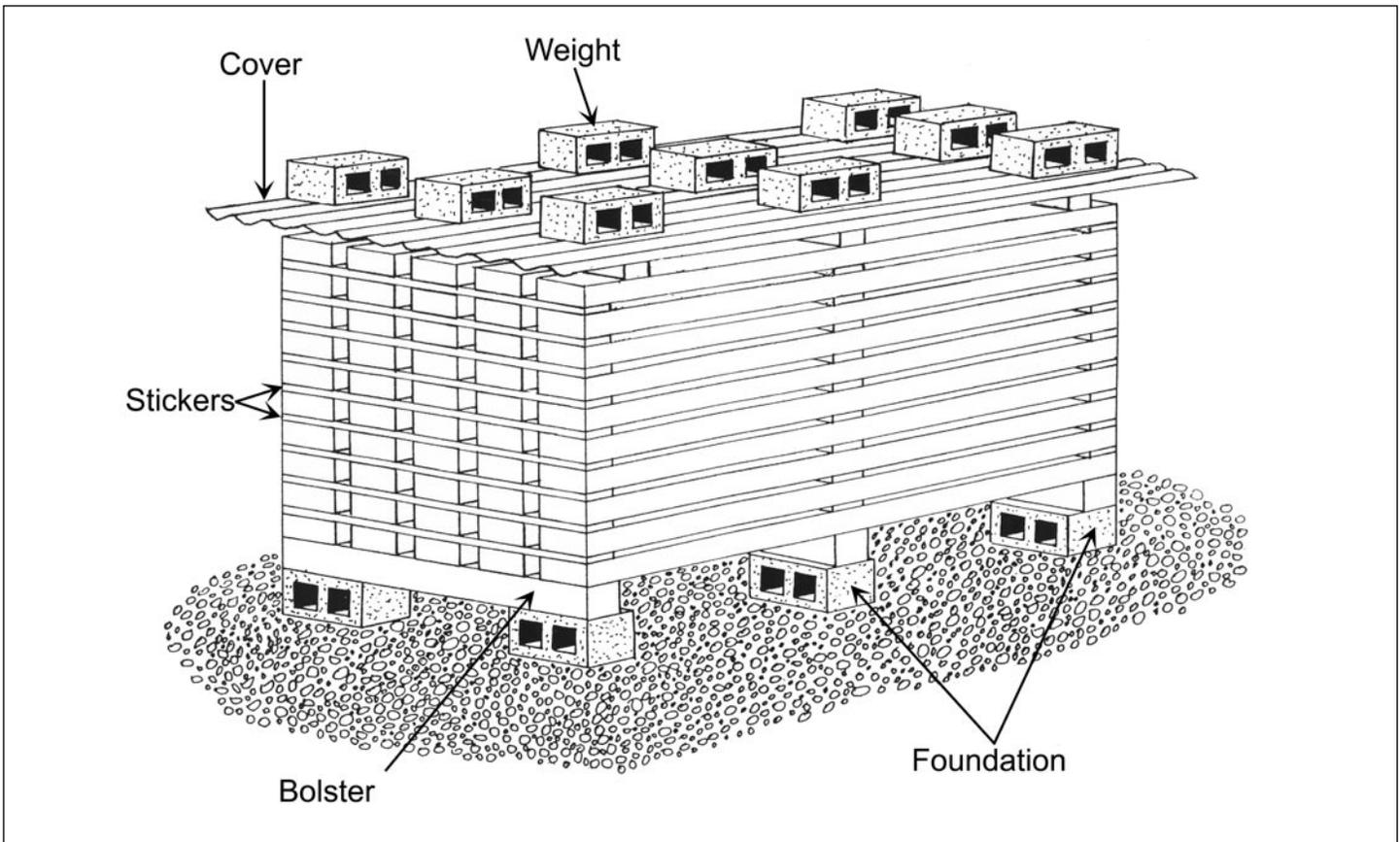
A portable mill can convert your backyard woods sawlogs into lumber for do-it-yourself projects.

Sawlogs converted to green (fresh-from-the-saw) lumber can be adequately air dried outdoors for rough construction uses such as sheds, barns, fences, and crates. Successful air-drying is dependent upon warm air temperature, low relative humidity, and good circulation of the air within the pile. The temperature and relative humidity vary with

the region of the country and the season of the year. The number of months per year of good air-drying conditions increases from north to south in the United States.

Green lumber should be stacked on a foundation to elevate the lumber pile 12 inches or more off the ground and to exhaust air that has moved downward through the pile. Wood “sleepers” or posts or piers made from wood, concrete, cement building blocks, or masonry can function as a foundation. Timber bolsters (supporting beams) should be placed directly on the foundation. The bolsters must be perfectly aligned with the spacers (called stickers). Stickers should be 1 to 2 inches wide, a uniform thickness (3/4 to 1 inch), as long as the pile is wide, and made from straight, dry lumber. Stickers should be distributed across the stack every 12 to 24 inches to separate each course of lumber and promote good air flow on all sides of each board. Also, the ends of each board, if possible, should be supported by a sticker (above and below) to limit end checking (splitting) and reduce warp.

A good cover is essential for air-drying of lumber. A water-tight cover protects the top courses of lumber



Lumber piled properly for drying should have a solid foundation, stickers aligned vertically with the bolsters, a water-tight cover, and heavy weights on the top of the pile.

from rain, snow, and direct sunshine. The top courses of uncovered piles are subject to warping and checking. Unprotected piles also permit moisture to penetrate the pile, which slows drying and increases the chance of staining. Concrete blocks, old timbers, or other heavy objects should be placed on the cover to keep the lumber flat and straight.

Since different wood species and lumber thicknesses dry at different rates, all lumber in a pile ideally should be of the same species and thickness. For example, in the central United States, 1-inch thick yellow-poplar lumber requires about 1 to 3 months during summer to dry to 20 percent moisture content, whereas 2-inch thick white oak requires about 6 to 9 months to dry between spring and fall.

Lumber for indoor use such as furniture, cabinets, and flooring is typically kiln-dried to 6-8 percent moisture content. Kiln operators are often available to do custom lumber drying for woodlot owners. The 6-8 percent moisture content can also be achieved by placing the lumber in a heated room with low relative humidity; however, custom kiln drying is probably a better option if available.

Veneer

Black walnut, red and white oak, sugar maple, and black cherry are prized for the high quality of veneer—thin sheets of wood—that can be manufactured from them. Veneer trees are typically large, straight broadleaf trees, greater than 20 inches in diameter at a point 4½ feet above the ground, with the first 9 feet of the trunk completely free of limbs, branch stubs, scars, wounds, foreign material such as nails and fencing, and other defects. Sometimes, one or two high quality veneer trees are enough to attract the interest of a timber buyer. Do not attempt to fell a veneer quality tree; leave the job for a professional tree harvester, and do not sell the veneer tree to a buyer until you have gotten advice from a professional forester.

Other wood products

Local markets often exist for unique or niche markets. For example, trees for cabin logs are in demand in selected areas for home construction. Large needleleaf trees, in certain localities, may be sold for utility poles. If a paper mill is nearby, you may be able to market both broadleaf and needleleaf trees as pulpwood. There may also be a local market for special forest products from your backyard woods, such as holiday boughs, mushrooms, berries, and fruit. (See the Backyard Woods Tip Sheet on Grow and Collect Special Forest Products for more information.)

Marketing products from your woods

Landowners with small acreages should consider selling products jointly with neighboring landowners. The larger the quantity of product offered for sale the more interest there will be from buyers and greater the potential economic return. Never accept an offer from the first potential buyer, especially an unsolicited offer. Always seek bids from a number of buyers.

The assistance of a professional forester is recommended whenever you sell timber. A forester can assist you (and your neighbors) in determining the quantity and quality of product in your woods, explain the different types of sales (lump-sum versus sale-by-unit), assist in the preparation of a timber sale contract, advertise the sale, help with selecting a buyer, and monitor the harvesting. A professional forester can also advise you on how a tree harvest will affect the long-term growth and health of your woods.

In the Forest

Together with other nonindustrial private forest landowners, you own 57 percent of the commercial forest land in the United States. With a trend of declining harvests on public forest lands, demand for forest products from private lands is increasing to meet the needs of a growing U.S. population. Each year, one American uses about 600 pounds of paper, plus the lumber equivalent of a 100-foot tall tree. Annual growth of U.S. commercial forests fortunately exceeds harvests and mortality by 33 percent. In addition to the millions of trees that regenerate naturally every year, on average almost 5 million new trees are planted each day in the U.S. Not only are forests renewable, but the growth of wood is powered by environmentally friendly solar energy. Also, the manufacture of wood products requires significantly less fossil-fuel energy consumption than does the manufacture of substitute products from nonrenewable sources such as steel, plastic, and aluminum.

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