

3 Woodland Management



Forest Succession

At some stages or under some management regimes, forests can provide suitable habitat for a variety of wildlife. Young forests can provide a plant community with structure similar to grassland or old field habitats and, for the first few years, can support early-successional and grassland birds, cottontail rabbits, sun-loving wildflowers and insects. However, unless they are disturbed within a few years, young forests shade out low-growing cover and early-successional wildlife species are replaced by species that feed in the forest canopy or can dig through the litter layer. Other wildlife species cannot exploit the resources provided by forests until trees reach fruit or seed-producing age or until the trees age to the point that tree disease or mortality provides cavities for roosting or nesting.

Forest management decisions have long-term consequences. Informed landowners will seek professional assistance, as well as research the implications of forest management decisions on wildlife. They will weigh those consequences, along with economic and aesthetic considerations, to be certain they have considered the range of management choices. They will consider things such as which groups of species will benefit or be harmed in the short and long term. Are there alternatives that will extend the time the forest is inhabited by target species or that will benefit them from the proposed action? Are there ways to mitigate impact or make maintenance less expensive? Does the action mesh with surrounding landscape features? Well thought-out decisions will result in realistic expectations and management success.

Plan Ahead

Frequently wildlife biologists and foresters are asked to provide technical assistance after a forest stand is harvested. Unfortunately, at that point, the harvest has limited many options for regenerating the stand and improving wildlife habitat. Seek professional assistance from a wildlife biologist prior to initiating a timber sale. Sometimes minor adjustments can be made in the sale area, logging instructions, or contract requirements that can put you years ahead toward meeting goals for your property.

The Wildlife Society maintains a list of certified wildlife biologists and the North Carolina Division of Forest Resources maintains a list of registered foresters who offer consulting for private landowners. These lists can be accessed through www.ncwildlife.org/tarheelwildlife.

Snags and Den Trees

A snag is a standing dead tree. Den trees are live trees or snags with a natural hollow in the trunk or limbs. Den trees can provide homes for a diversity of cavity-nesting birds and den sites for other wildlife. Cavities encourage a variety of wildlife, but if you manage to attain high populations of quail or rabbits, you should consider the trade-off of providing habitat for potential predators (among them raccoons, opossums, and rat snakes).

Many birds, mammals, and reptiles use dying trees and cavities throughout the year for nesting, feeding, perching, escape cover, and protection from the weather. In a typical woodlot, trees with cavities are often in short supply. To have the greatest diversity of wildlife, it is important to protect snags along with existing and potential den trees.

The flush of insects associated with a dying tree are an important resource for wildlife. Some birds use specialized bills to extract insects, while other birds, bats, and lizards are efficient in capturing the insects as they disperse. Once a tree dies, the slow process of decay begins. As the heartwood in a snag softens, woodpeckers excavate nest holes, which are later used by other wildlife.

Woody material on the forest floor can be important feeding areas, offer protection from predators, and help moderate the effects of weather extremes for small mammals, reptiles, and amphibians.

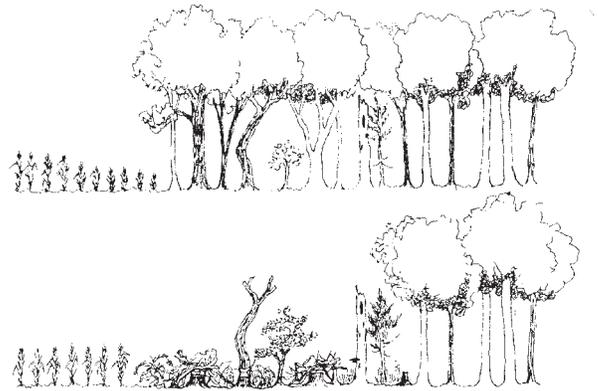
Woodland Edges and Openings

Edge is the transition zone between habitat types. Man-made edges are frequently abrupt and narrow (think of a typical edge where a cropfield meets a mature forest), while natural edges frequently make a gradual transition from one habitat type to another. The most common edges are where woodland meets an opening. This zone offers critical wildlife food and cover. The amount, diversity, and quality of the edge directly affects wildlife food and cover resources.

High-quality edge consists of a wide band of diverse plants that gradually changes from one cover type to another. It has grasses, weeds, shrubs, vines, and small trees that provide wildlife foods such as berries, seeds, browses, and insects. It also offers cover for nesting and protection from weather and predators, and is wide enough to offer animals many hiding spots. Developing high-quality edge requires deliberate action on the part of the landowner.

A high-quality “feathered” edge can be created as follows: large trees of low commercial value within 30 feet of the crop field should be marketed for pulpwood, removed for firewood, or killed to allow sunlight to reach smaller shrubs; within 15 feet of the crop field, even small trees such as dogwoods, hawthorns, plums, and red cedars should be cut to allow full sunlight to reach the groundcover; when possible and safe to accomplish, vines attached to trees should not be cut when felling the trees.

If you are interested in benefiting a variety of wildlife, kill low-quality trees. If they are in locations that would not create a safety hazard, allow them to stand for snags. However, if you are targeting management to increase quail or rabbits, trees should be felled and the slash used to provide cover or burned. These practices create heavy cover and reduce perch sites and cavities used by predators.



The edge where cropland meets woodland provides an opportunity to create a gradual transition from one habitat type to another.



BENDY STROPENCARC

Early-succession species benefit from field borders and open canopy forest, which provide escape cover and nesting and brood habitat adjacent to crop fields.

Spot application of herbicide targeting less desirable tree species is an effective way to maintain high-quality edges. The transition zone concept works well along power-line rights of way and access roads, and as a transition between a lawn or landscaped area and woodland.

Frequently, the outside row of trees adjacent to openings has many large and low limbs, which reduce wood quality. By removing these low-quality trees when conducting a commercial thinning, growth is concentrated in more valuable forest products and better wildlife habitat is created along the edge.

Another option to creating a wide transition zone is to allow a 30-foot wide strip of cropland to revert to volunteer plants. The natural process usually is rapid and reliable after the elimination of grazing, plowing, and mowing. However, the field edge transition zone will require periodic management to prevent it from growing into mature woodland. Conversion of heavy sod, such as fescue, to edge habitat can be hastened by applying herbicide to the border strip and plowing or disking, which allows native species to invade.

Pine Forests

Pine forests are adapted to a variety of sites and are often favored by landowners because they produce valuable forest products more rapidly than hardwood forests. Pine forests are often thought of as poor wildlife habitat, but they can be managed to provide high-quality habitats. Habitat quality is a reflection of how pine stands are managed.

The key to having pine forests with abundant wildlife is frequent disturbance. Tools that are useful in managing pine forests for wildlife are thinning, burning, herbicides, and soil disturbance.



TERRY SHARP/NCWRC

Open-canopy pine forest managed with timber harvest, midstory hardwood control and frequent fire.

Even Age vs. Uneven Age Management

Pine stands are often managed as units in which trees are of similar or “even” age. Stands are planted, managed, and at some point harvested by clear-cutting. Though even-age management is common, it is not the only option for managing a pine forest. Managing pine forests that have trees of many ages in the same stand involves trade-offs but provides many benefits. Stands managed by uneven-age management can accommodate a wider variety of wildlife, including animals that benefit from features provided by older stands (such as mast and cavities) and younger stands (such as groundcover) through time. Another advantage of uneven-age management is that income is spread more evenly through time. The disadvantages of uneven-age management are that the time required to manage the stand is greater, marketing of forest products is more challenging, and prices paid may be lower because harvest is less efficient.

Even-age pine forest management units of 10 to 50 acres are large enough to be practical from an economic standpoint, but small enough for species like deer and turkeys to move among stands to take advantage of resources. Consider breaking large even-age stands into smaller management units of different ages. Trees from around age five until the first thinning are less productive for wildlife and almost unhuntable. Having multiple age classes allows you to avoid extensive stands of trees of the same age, increases diversity, and provides multiple habitat types for many wildlife species.

Early-Rotation Pine Management

Young pine trees need lots of light. This means regenerating pine stands provide an excellent opportunity to manage for early-successional wildlife. Most pine plantations are planted following clear-cutting or during conversion of agricultural fields to woodlands. However, pine stands can be regenerated by cutting openings in a stand of mature cone-bearing trees, and burning or disturbing the soil mechanically. Regenerating pine stands that are managed to benefit wildlife should have a high component of grass, forbs, and shrubs interspersed among the young trees.

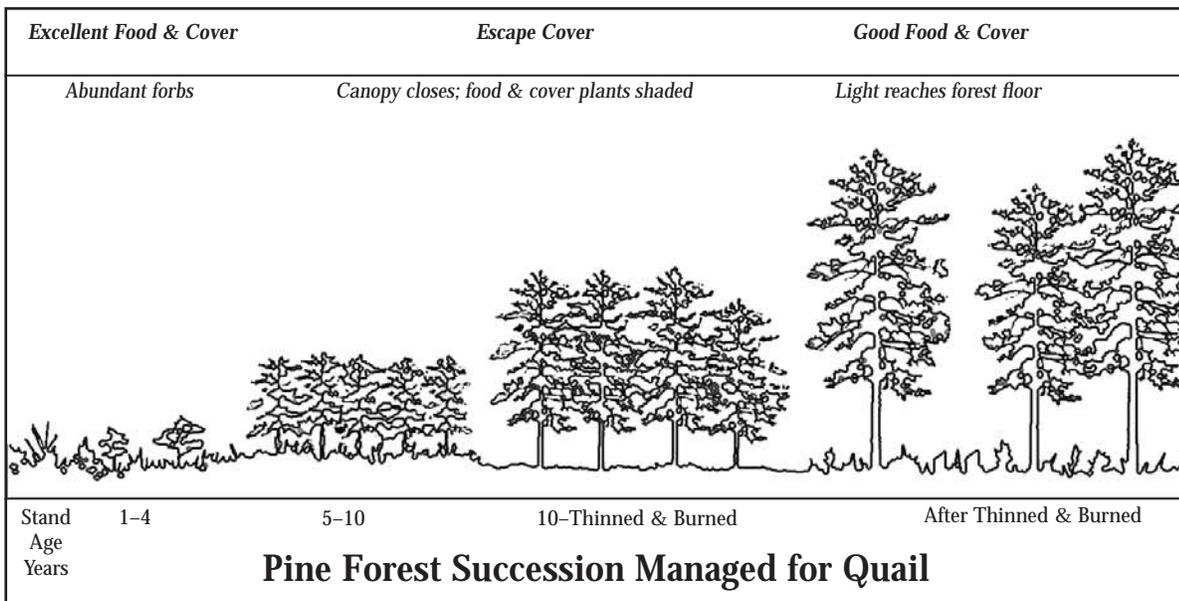
Preparing a site for pine regeneration can range from simply planting following harvest of a mature stand to intensive site preparation, which can include combinations of herbicides and or mechanical treatments to control competition. If no site preparation is used, regenerating hardwoods often suppress grasses and forbs and compete with the young pines. When a management goal is to favor wildlife, some moderate form of site preparation to control hardwood sprouts and to disturb the litter layer is desirable to encourage a diverse grass and forb plant community.

Site preparation techniques that are appropriate where wildlife is a consideration include burning, mechanical site preparation, or a single herbicide treatment to control competing hardwoods. Herbicide applications that effectively control herbaceous weeds and grasses across the whole stand result in poor wildlife habitat. In the few instances where herbaceous weed control is necessary for the survival of seedlings, a spot treatment around individual plants or a band treatment over rows will provide better wildlife habitat than broadcast applications. One exception to this rule is where perennial grass fields (Bermuda, Bahia, or fescue) are being planted to trees. Broadcast herbicide treatments to eliminate exotic grasses should be applied prior to planting these areas.

It is important to consider soil characteristics. For example, if intensive chemical site preparation is used on infertile soils, little groundcover develops before canopy closure. Young pine stands without a diverse component of grasses and weeds growing between the trees offer few benefits to wildlife.

If hardwoods in the pine stand were not controlled at planting, consider herbicide release when the pine stand is two to three years old. The herbicide, imazapyr, can be applied to the stand (often by air) to control hardwoods. When applied according to label instructions, this herbicide will not harm pines and some important wildlife plants (legumes and blackberries) will persist.

Tree spacing is an important consideration. Planting seedlings too closely causes the canopy to close quickly and blocks sunlight from the groundcover plants that are important for wildlife. Close planting also results in small diameter and slower-growing trees. Planting seedlings excessively far apart results in trees that grow quickly but develop large branches making them less valuable for forest products. Frequently used spacing that allows for rapid early growth, acceptable pruning, and good wildlife habitat is 10 feet by 10 feet (436 trees per acre) or 10 feet by 12 feet (363 trees per acre) between trees for all pine species (except white pines which are typically planted at 12 feet by 12 feet). Wider spacing may be appropriate where commercial thinning will be difficult to accomplish due to markets or terrain. However, in very open stands lower limbs may not prune naturally, and the resulting large limbs will lower the quality of forest products being produced. To produce high-quality forest products, hand pruning or pruning by prescribed fire may be required where spacing is wider than 12 feet by 12 feet (302 trees per acre).



Which Pine?

North Carolina supports a variety of pine species, each of which is adapted to specific soil or site conditions. Longleaf pine is adapted to a wide range of Coastal Plain soil types, as well as southern Piedmont upland soils. As an adaptation to frequent fire, longleaf often spends several years pumping energy into the root system and then undergoes a quick growth spurt to reach a fire-resistant stage. Controlling competition is critical to establishing longleaf on fertile soils that do not have a history of frequent burning. Prescribed fire is used frequently in young longleaf stands to control competition from hardwood and other pine species and to benefit wildlife. Where wildlife is a consideration, fire is a critical component of managing young longleaf stands.

In addition to being more fire-adapted, the canopy of a longleaf pine forest is more open compared to loblolly forests; therefore, longleaf allows more light to reach groundcover plants. Longleaf has large seeds that wildlife prefer, and it is well suited for uneven-age management. When compared with other pine species, longleaf produces dense wood and straight trees that yield high-value forest products.

Loblolly pine is the most frequently planted pine species in the state. It is fast growing and produces quality forest products on many soil types. It is not as fire tolerant as longleaf when young, but, after the first commercial thinning, it can be managed aggressively with fire to provide excellent wildlife habitat.

The native pine over much of the Piedmont is the shortleaf pine. The shortleaf pine produces excellent quality poles and saw timber. Shortleaf is intermediate between longleaf and loblolly in its adaptation to fire. Young saplings will resprout if top killed, and the species quickly develops thick bark that allows it to withstand low-intensity fires. Open-canopy stands that are frequently burned provide excellent wildlife habitat.

A common mountain pine, the white pine, is less fire tolerant than most other species and unlike other pines is generally not managed with prescribed fire. However, white pine responds well to thinning and can be managed on a long rotation to produce high-quality saw timber. Because white pine is a long-lived species, landowners also have the option of managing for mixed stands of planted white pine and commercial hardwood such as oak. By planting their pines wider than the usual 12 feet by 12 feet and allowing natural hardwood regeneration to develop along with the pine, a landowner has the opportunity to improve the productivity of the stand for wildlife and still produce high-quality timber products. Although a greater commitment of labor is required to successfully manage a mixed oak and pine stand, it will mature into a stand with both food and cover for wildlife. Another plus is that mixed stands generally have more ground cover than single species white-pine plantations, which often have nothing but pine needles on the forest floor. Mature stands of white pine provide thermal cover in winter and are often favored by wild turkey as roosting sites. Diverse flocks of winter songbirds (kinglets, chickadees, pine warblers, downy woodpeckers) can frequently be found feeding in white pines. Deer use younger white pine stands for bedding and hiding cover, and as shelter from winter storms. Green white pine cones are eaten by squirrels as frequently evidenced by piles of cut cones.

Less frequently planted pine species include the pond pine, adapted to organic soils of the Coastal Plain and Sandhills; the Virginia pine, which proliferates on disturbed sites in the Piedmont but produces low-quality forest products; and pitch and table mountain pines, both of which are well-adapted to fire and naturally occur on the thin soils of south-facing slopes in western North Carolina.

Mid-Rotation Pine Management

Young pine stands provide poor wildlife habitat from the time that the canopy closes until the first thinning. Groundcover plants suffer not only because the tree canopy prevents light from reaching the ground, but also because a smothering layer of *duff* builds up on the forest floor. The key to rejuvenating these stands is to implement practices that restore light and remove litter from the forest floor.

If pines are spaced closer than 10 feet by 10 feet, consider a mechanical pre-commercial thinning with brush saws while the trees are five to 12 years of age. In most areas, first commercial thinnings are viable at stand age 12 to 20 or when trees reach six to eight inches in diameter. Thinnings remove suppressed and poorly formed

trees, as well as trees with large and low limbs along edges. They also and space the crop trees that are left so they can take advantage of additional space, sunlight, and nutrients. First commercial thinnings of young pine plantations can be made to 65-75 square feet of *basal area* (BA) per acre for normal forest management practice. This type of first thinning will allow trees to increase in diameter while still maintaining close-enough spacing for larger lower limbs to prune naturally. In addition, the trees can help to support each other in high winds and ice. Heavier first thinnings (40-60 BA) can be made for intensive wildlife management and to create early-successional habitat for species like quail, but landowners may need to prune trees which sprout larger and more numerous limbs under thinner regimes. Many cost-share programs are available to assist landowners with these heavier wildlife-friendly thinnings. (Check with your local USDA Service Center or North Carolina Wildlife Resources Commission biologist.) Under either scenario, trees respond quickly and, within a few years, a second thinning to a basal area of 40-60 square feet per acre (closer to 40 square feet per acre if managing for quail) will set the stage to provide excellent wildlife habitat while producing high-quality forest products.

Immediately following the first commercial thinning is an excellent time to begin a prescribed burning program (except for white pines). Instruct loggers conducting the thinning to pile logging slash away from live trees to prevent damaging them during prescribed fires. If fire lines were not planned and installed when the stand was regenerated, remove trees on the stand perimeter during the thinning to make room to install a permanent fire line. Flat, bladed fire lines of a minimum of 10 feet wide are preferable to fire lines plowed with a dozer/fire plow designed to fight wildfires. Once bladed fire lines are established, they can be economically maintained with farm equipment.



Thinning and frequent prescribed fire promotes a diverse groundcover that supports grassland birds and other early-successional wildlife.

Wildlife Management Tips for Pine Forests

- Thinning and burning can transform a pine plantation into a productive area for wildlife.
- Include fire or soil disturbance when preparing sites for replanting.
- When establishing pine forests, control hardwood competition and exotic grasses but not herbaceous weeds and native grasses.
- Use spot- or strip-herbicide applications instead of broadcast applications to control herbaceous competition in young stands (except broadcast herbicide to control exotic grasses).
- Plant on 10 feet by 10 feet, or 10 feet by 12 feet spacing.
- Plant longleaf or shortleaf pine on appropriate sites.
- Install firebreaks around the stand at the time of establishment.
- If pine spacing is closer than 10 feet by 10 feet, consider a mechanical pre-commercial thinning with brush saws.
- Work with a forester to commercially thin stands as early as feasible.
- When regenerating or thinning pine stands, install bladed fire lines that can be easily maintained.
- Reintroduce fire into the stand at an early age; after 1 to 3 years for longleaf or when other pine species are commercially thinned for the first time.
- Maintain an open canopy by thinning frequently.



Late-Rotation Pine Management

Frequent disturbance through the life of the stand is critical to maintaining quality wildlife habitat in pine stands. Thin pine stands every five to 10 years to maintain an open canopy. If managing for quail, thin to the point that 60 percent of the forest floor receives sunlight at midday on a summer day. This translates to a basal area of 40 square feet per acre. This very open stand is necessary to encourage the cover of grasses and forbs needed to screen quail from aerial and ground predators. Once prescribed fires are initiated, you should continue to burn frequently throughout the life of the pine stand. If managing to encourage quail, burns should be conducted annually until herbaceous cover becomes established. Burn thereafter on a two-year rotation in blocks ranging from five to 50 acres in size. If deer and turkeys are your target species, thin to a basal area of 60 square feet per acre and burn on a two- to four-year rotation.

Hardwood Forests

Hardwood-dominated forests and woodlots provide great potential as habitat for a variety of wildlife species. Older stands provide mast and den trees for squirrels and furbearers and seasonal habitat for deer and turkeys. They also provide habitat for a variety of migratory songbirds (warblers, vireos, wood thrush, woodpeckers, and many more) that take advantage of the vertical structure of habitats ranging from the forest floor to tree canopies. Young hardwood stands, forest edges, and openings produce browse and dense cover for deer, habitat for grouse and woodcock, and nesting areas for many songbirds. The difference between a hardwood stand that provides good wildlife habitat and a poor one may be nothing more than a fence to exclude livestock, creation of a few canopy gaps, or a timber stand improvement cut.

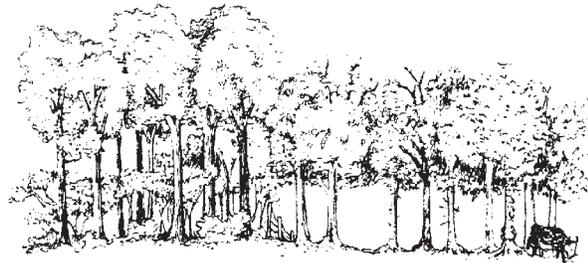
Oak Glades and Savannas

When we think of prescribed burning, we typically think of grasslands and pine forests, but fire can play a role in managing upland hardwood stands. Fire and thinning can be used to create an open oak glade or oak savanna with an herbaceous understory. In fact, thinning the overstory and burning is a simple way to increase browse as well as stimulate seed production and cover provided by groundcover grasses and herbs. Managing for savannas and glades is most appropriate on shallow soils and in hardwood communities with a high percentage of oaks and hickory. Small diameter stems as well as maples, poplars, cherry, holly, sweetgums, and other species with thin smooth bark are not very fire tolerant, so fire in hardwood stands will favor oak and hickory.

Hardwoods and Livestock

Grazing livestock do serious damage to woodland habitats over time. Much of this damage is not immediately visible and shows up only as long-term effects, such as loss of groundcover and regeneration, tree decline and loss, soil erosion and compaction, and wildlife habitat destruction.

Tree seedlings and saplings, wildflowers, and understory shrubs are eaten or destroyed. Saplings are broken, stripped of bark and trampled. Even large trees suffer wounds from rubbing and chipping of hooves at the base of the tree.



ungrazed

grazed

Grazing livestock do serious damage to woodlots over time.

With heavy use, livestock hooves mix the leaf litter into the soil speeding decomposition and exposing bare soil to erosion. The pores in the soil that allow air and water to move down to tree roots are sealed off. Rainwater that should infiltrate into the soil runs off the surface. The fine, hair-like feeder roots located several inches under the ground are exposed and damaged. Trees become weakened and growth rate is slowed. Damaged and exposed tree roots are excellent entry points for insect and disease pests.

Often, trees that are resistant to grazing increase in number as the less resistant but more valuable trees are eliminated. Hickories, with their tap root, can tolerate more soil compaction than oaks and will increase in number at the expense of oaks. Because there is little grass for cattle to eat in the woods, plants are consumed from the ground up to as high as the cattle can reach, creating a browse line. Wildlife requiring groundcover and low-growing plants cannot survive in grazed woodlands.

To return grazed woodland to good wildlife habitat, fence out livestock. Check with your USDA Service Center for possible cost-share programs to help offset fencing costs. Similar reductions in groundcover quality and diversity can also occur where deer populations exceed the *carrying capacity* of the habitat.

Crop Tree Release

Crop tree release (CTR) is the process of removing selected trees from a forest to improve the health and growth of other trees and to benefit wildlife. The remaining trees are selected because of their potential to produce high-value wood products or to benefit wildlife. CTR can be adapted to meet many management objectives, but, in general, the purpose is not to remove every defective tree, but to reduce competition from selected trees with desirable characteristics.

Step one is to identify a dominant tree that has the potential to produce valuable wood products or mast. Step two is to cut or kill adjacent trees whose crowns crowd the desirable tree. For most purposes, efforts should focus on killing only those trees that are in direct competition with the crown of the selected crop tree.

Species selection and proper spacing of trees are key to any CTR operation. Trees spaced too closely will soon become crowded, slowing their growth. Trees spaced too far apart encourage larger crowns, sprouting of new limbs on the trunk, and larger limb diameters at the expense of taller straighter trunks.

When conducting a CTR, the most important trees to leave uncut are the final harvest trees or crop trees. These trees will have the highest value as wood products. Other trees to leave standing are those that will be removed in future thinnings but are needed in the meantime to fill growing space and mast trees. Midstory mast producers such as cherry, dogwood, serviceberry, and black haw can be left for wildlife unless they overtop potential crop trees.

Detailed information on planning and conducting a CTR, including guidelines on the number of crop trees to retain, species composition, the influence of stand age and other considerations, is contained in the publication *Technical Guide to Crop Tree Release in Hardwood Forests* (University of Tennessee Extension).

Canopy Gaps

Canopy gaps add to the importance of true old-growth forests to wildlife. A common problem that limits wildlife in young to middle-aged hardwood stands is development of a uniform canopy. Lack of sunlight inhibits midstory shrubs and vines and shades out low-growing plant communities. Hardwood forests with a uniform canopy can lack the variety of plant communities necessary to support some wildlife populations.



Creating small gaps in the overstory can add diversity to closed-canopy hardwood stands.

Creating gaps in the canopy can create low cover and provide more diverse habitats. A commercial thinning or mechanical or chemical croptree-release operation can be used to create gaps.

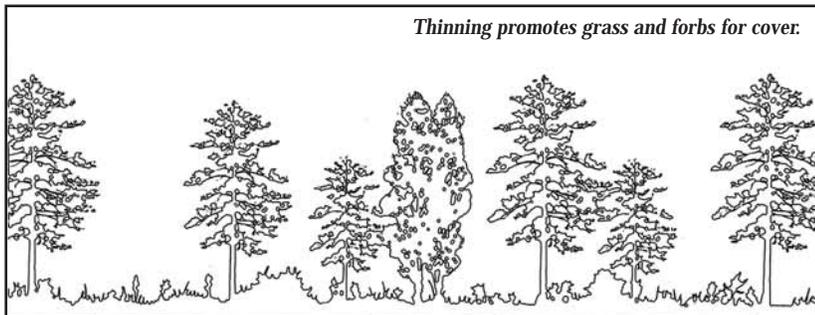
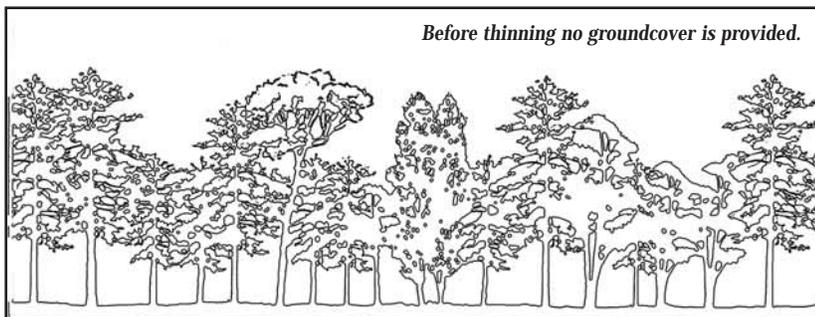
Leaving standing snags will make the gaps attractive to a wider variety of birds. When working in large tracts, leave a variety of hardwood tree species and vary the size of gaps from single tree gaps to gaps up to one acre in size. Five to 10 acres of small gaps per 100 acres of woods is desirable. This practice benefits many forest bird species and can be used to regenerate commercial tree species, create shooting lanes, areas of dense escape cover, and browse.

Timber Harvests in Hardwood Forests

Assess the current condition of the timber stand with a registered forester or wildlife biologist prior to initiating a timber harvest. During the assessment, determine tree species present, quality of the stand, growth rates, current and future value to wildlife, and forest regeneration options. Discuss management options including your long-term economic goals, wildlife goals, and practical considerations such as access and market conditions. Carefully consider all the options including clearcutting, thinning, and letting trees grow without additional management before initiating a timber sale.

Challenges to managing a hardwood forest include obtaining and maintaining a desirable species composition, controlling competing vegetation and, in some areas, reducing the impact of deer on regenerating hardwoods. In the past, many existing hardwood stands have been subjected to “high grading,” a timber-management practice that removes the better formed and more valuable trees and leaves trees that are poorly formed or of species that have lower economic value. Developing a management plan to correct these problems requires an assessment of the current status of the stand and a prescription for regeneration. For assistance in developing a management plan for a hardwood stand that provides for future wildlife habitat and meets your economic goals, work closely with a registered forester and wildlife biologist.

Lone mature trees left standing in clear cuts suffer high mortality rates. If you wish to retain hardwoods for mast production, diversity, or to provide hunting opportunities in an area that is being harvested, consider leaving one- to two-acre islands of hardwoods. Trees in these hardwood islands will survive better than scattered individual trees and will also offer excellent sites for hunting while the next forest is developing. Planning these hardwood islands adjacent to food plots or regularly maintained shooting lanes can be an excellent way to assure that you have a place to hunt during the years that visibility in the young regenerating forest limits hunting opportunities.



Low-growing grasses and herbs that provide food and cover require sunlight to prosper.

Wildlife Management Tips for Hardwood Stands

- Protect woodlands from grazing livestock.
- Kill selected trees along woodland edges to create wide transition zones.
- Manage a 30-foot wide strip as a transition zone of forbs, grasses, shrubs and small trees along mature woodland edges.
- Create small gaps and openings within large blocks of hardwoods to encourage regeneration, vines, and fruiting shrubs.
- Apply timber-stand improvement practices.
- Construct large loose brush piles when cutting firewood.
- Introduce fire to create savannas and glades on appropriate sites.
- Install nest boxes where there are few natural cavities.
- When thinning, leave a variety of species of trees including fruit producers such as hackberry, black cherry, red mulberry, serviceberry, black gum, and persimmon.
- Protect existing snags and den trees.
- Kill undesirable trees but leave them standing to create snags of various sizes to benefit a variety of species. Snags along forest edges will benefit different wildlife from those in forest interiors.

