Pine flatwoods consist of primarily flat terrain with a canopy of pines and possibly a midstory of hardwood pulpwood with some scattered hardwood sawtimber trees. These stands can be composed of loblolly pine, slash pine, and longleaf pine in single species or multi-species mixtures, either even-aged (one age class) or multi-aged-uneven-aged (two or more age classes). Within the pine stands can be found scattered live oaks and red oaks, valuable mast producers for wildlife but subject to competition from neighboring pines and other, less valuable hardwoods.

Where landowners are primarily interested in improving and maintaining quality wildlife habitat, woodlands in this condition can be managed by using the “thinning from below” silviculture practice, live oak, white oak, and red oak release, and prescribed fire.

“Thinning from below” is a method of selecting pine trees for harvest on the basis of removing trees with defects and slower growth rates. This selection process starts at the ground level where many disease infections, fire scars, and mechanical (logging or equipment) damages occur.

Inspection of the tree should proceed up the trunk to determine if upper stem infection, excessive crook or sweep, ring knots, or other defects occur. Provided no major defect is found, the tree is then inspected for shape and cone production. Trees with no
major defects, full, well-shaped crowns and indicating the ability to produce cones are
selected to remain in the forest until the next thinning or stand maturity. Trees showing
disease infections, damages, other defects, or are over-topped by faster growing trees are
selected and marked for harvest.

In stands with mixtures of pine species, thinning from below can shape the future
forest into one with a more desirable species mix or desired species. For example, in pine
flatwoods that contain pond pine, that species can be removed over time through
improvement cuts. Pond pine is a slow growing, poor quality tree that does not produce
quality forest products. In forests that contain mixtures of loblolly and longleaf pine,
thinning from below over time can be used to favor longleaf pine, if that is an important
objective.

An additional factor in the thinning process is spacing between trees. Too little
space and the resulting competition is undesirable. There should exist a minimum
opening of 3 to 9 feet between the live crowns of pine.

“Thinning from below” will carry forward the dominant, desirable trees to the
final mature forest.

Another practice that can be used in all the forest types mentioned is oak release. Oak release
is accomplished by removing all pine and undesir able hardwood trees in close competition
with select oak trees. Hardwood species such as maple, sweetgum, or elm are not favored by
wildlife and, when growing in close competition with oaks, should be removed. Pines that have
over-topped the selected oaks or have crowns within a few feet of the oak tree crowns should

Examples of typical defects found in pine flatwoods.
also be removed. Release of the oaks not only benefits the individual trees, but creates small openings within what is often a pine monoculture. These openings provide increased habitat diversity for wildlife by providing critical feeding and resting areas as well as increasing oak tree growth and mast (acorn) production.

Prescribed burning is fire used under specific conditions to accomplish specified objectives such as:

- Reducing hazardous fuel buildup by reducing forest floor litter
- Controlling hardwood brush competition with the pines
- Improving aesthetics by opening up the forest
- Improving wildlife habitat

In the Lowcountry, woodland areas are usually burned every one to three years, depending on objectives, weather conditions, and fuel accumulation. Landowners with a high priority for managing bobwhite quail usually burn annually or on a 2-year rotation. Those interested in white-tailed deer management usually burn on a 3-year rotation. Many opt to use prescribed fire on a 2-year rotation as the best balance between wildlife habitat goals and fuel reduction and brush control needs. Most prescribed burning is done during the dormant season (November through March), although there is increasing interest in growing season (April through September) prescribed fire to better control hardwood brush and manage for specific fire-dependant plant and wildlife species. The use of prescribed fire in pine flatwoods forests stimulates many desirable wildlife plants in the understory such as native legumes and native warm season grasses. Periodic fire is absolutely critical in maintaining pitcher plant bogs, depression meadows and other unique flatwoods habitats.

The climax forest (provided prescribed burning is continued) in the pine flatwoods type is a mature pine and live oak stand with an open forest floor. Pine stocking will range from 10 to 30 trees per acre (depending on pine species) along with scattered oaks. This configuration can be maintained by prescribed fire or at some future time, burning can be temporarily halted to allow for pine regeneration.

**Pine-Hardwoods**

Mixed pine-hardwood stands consist of primarily flat terrain with some low stream drainages and occasional saw-palmetto flats. Canopies are generally composed of pine and oak with a mid-story of hardwood pulpwood. This forest type also contains scattered clumps of hardwood brush and saplings in lower areas where prescribed fires
burn out due to the wetness of the site. The stocking (number of trees per acre) within this type varies from well-stocked areas of pine with scattered hardwoods to well-stocked hardwoods with little or no pine. The forest floor in mature pine hardwood forests is generally open, with the exception of scattered, poorly drained areas. This timber type provides a transition zone in many areas the frequently contains prime nesting sites for eagles. These sites can be enhanced for this purpose by reserving large mature pines with suitable crowns.

Suggested management practices for pine-hardwood forests include “thinning from below” in well-stocked pine areas, “crop-tree management” in well-stocked hardwood areas, oak release, and prescribed burning.

Areas within this type that contain sufficient stocking of pines can be “thinned from below” as described in the pine flatwoods section. In areas containing primarily hardwoods, the scattered pine can be removed along with undesirable (for wildlife) hardwoods, provided enough hardwood trees exist to withstand some removal and maintain an adequate forest.

Oak release can be conducted as described previously with the understanding that only undesirable species of hardwood and pine are to be removed. Oak and hickory trees should be protected and maintained.

One method of maintaining desired hardwood trees in forests is “crop-tree management.” Crop tree management is designed for use in stands of adequate quality but not quite ready for final harvest and regeneration. With this method, decisions are made at the individual tree level rather than at the stand level. Crop tree management singles out and releases only the best trees and requires the removal of only those non-crop trees in direct crown competition with the selected crop trees. A number of desired hardwood trees are identified in the stand and undesirable trees whose crown are touching or extend over the canopy of the crop tree are harvested. Just prior to the next harvest cycle, the crop trees are again evaluated and the process is repeated. This way, the desired crop trees can be maintained indefinitely through the rotation. The main difference between crop-tree management and oak release is that oak release is practiced in predominately pine stands and crop-tree management is more useful in predominately hardwood stands.

When stands of live oak occur within pine-hardwood and pine flatwoods forest types they should be maintained and protected. Since live oaks cannot compete with taller trees, the pines and hardwoods growing in and around live oak groves that are competing with them should be removed, providing there is no damage to the live oaks.

The climax forest in the pine-hardwood forest type is usually a mature hardwood and live oak stand with some scattered clumps of mature pine. Oaks and hickories will dominate the hardwood component.
**Bottomland Hardwoods**

Bottomland hardwood forests consist of flat, dissected areas of floodplains somewhat elevated from adjacent swamp hardwood forests. The slight difference in elevation means less continuous flooding and thus a different mix of hardwood species than in the swamp hardwood type. Bottomland hardwood forests often contain a well-developed canopy of maple, sweetgum, blackgum, water oak and other lowland species. The mid-story is composed of young canopy species as well as tall shrubs and small trees such as wax myrtle and ironwood. The forest floor in mature stands is generally very open with little, if any brush. This type can contain moderate to fair stocking of sawtimber sized sweetgum, blackgum and red maple along with hardwood pulpwood sized stems. Management for this type can range from doing nothing to using crop-tree management or patch cutting if timber objectives are important. Patch cutting can create small openings scattered in the forest that can provide for hardwood regeneration as well as creating wildlife feeding areas and increased diversity.

**Swamp Hardwoods**

Swamp hardwoods are usually associated with braided streams and old rice fields in the Lowcountry. Typical species are those that can tolerate continuous inundation such as baldcypress, water tupelo, and red maple. Because of frequent flooding, these sites can be a challenge to manage and harvest timber. Shovel logging is currently the preferred method of harvesting these forests. Harvesting equipment moves over log mats to minimize disturbance of soils. Trees are harvested from these mats, and the mats are removed when harvesting is completed. In many cases there is not enough high-quality merchantable timber to justify harvesting costs or risk site damage. These sites are usually best left “as is” for wildlife habitat and to protect water quality.
**Planted Pines**

Stands of planted pines are becoming common in the Lowcountry and South Carolina. As much as 25% of our state’s forest acreage is occupied by pine plantations, with loblolly pine being the major species planted. Pine plantations are essential in economic timber production. They can, however, be poor wildlife habitat. The best recommendations for managing pine plantations for wildlife and aesthetics are to:

- Selectively thin the trees early and often
- Use prescribed fire early and often
- Retain streamside buffers as wide as practical
- Pay attention to pine plantation location in the landscape, shape configuration, and age class distribution.
By using the practices outlined in this brochure, landowners can improve their Lowcountry forest lands for aesthetics, recreational enjoyment and wildlife habitat. For additional information on managing your property for wildlife, contact your local Clemson Extension Service Area Forestry and Wildlife Agent; South Carolina Department of Natural Resources Wildlife Biologist or South Carolina Forestry Commission Area Forester.


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Public Service Activities