

Hardwoods—

for Wildlife

and Timber

By Edward R. Smith and
Ramon L. Callahan

Bottom land hardwoods are one of the most productive forest types in the Nation for both timber and wildlife habitat. These forests are in flood plains of creeks, streams and rivers, alluvial swamps, bayous, savannas, and other poorly drained sites. The streams frequently overflow, bringing nutrients and moisture that promote the growth of trees and associated plant communities. The nutrients in turn are passed along to animals and birds that feed on the vegetation.

Flooding of bottom lands generally occurs during winter and spring, but can occur at any time of the year. In the Southern States, where alluvial forests receive an average rainfall of 50 inches annually, flooding can result from local rainstorms or from storms upstream. The elevation of a particular forest determines the frequency of flooding. Some areas, such as the cypress-tupelo swamps of the lower Mississippi Valley, are flooded most of the year. Higher elevations in the river bottoms may be flooded only once every 2 or 3 years.

Flooding creates the rich soils that are the foundation for the high productivity of bottom land hardwoods. Nutrients, both natural and man-applied, are washed into the streams and deposited on the bottom land when the river overflows its banks.

Properly managed, bottom land hardwood forests are rapid-growing stands of good form. Hardwood species common in these

*Edward R. Smith is
Biologist at the South
National Technical
Center, U.S. Soil
Conservation Service
(SCS), Fort Worth, Tex.*

*Ramon L. Callahan is
State Biologist, Mis-
sissippi, for SCS, at
Jackson.*

forests are oak, ash, willow, elm, hackberry, sugarberry, hickory, pecan, water tupelo, maple, cottonwood, sweetgum, magnolia, persimmon, and sycamore. Although baldcypress, Atlantic whitecedar, and pine are softwoods, they occur in some areas and are considered part of the bottom land hardwood forest.

The trees are adapted to soil that is covered with floodwater. Their roots can live without oxygen in the soil for long periods. This adaptive trait is especially pronounced in baldcypress, water tupelo, water elm, water hickory, and overcup oak.

Fish, Birds Benefit

Flooding creates conditions highly beneficial to fish from the streams and natural lakes of the area, which move into the flooded woodlands to feed. The foods taken at this time—such as crawfish, earthworms, and insects—are important to growth of the fish and put them in better condition for reproduction. Many fish species, among them bullheads, pickerel, bowfin, flyers, and warmouth, spawn in flooded bottom land hardwoods.

Lakes within the flooded area are recharged with nutrients and with forage fish from the river. Forage fish, such as shad, minnows, sunfish, and carp, are important food for the predators—bass, pickerel, and gar. Flooding is the reason these lakes are so productive. Many unpolluted oxbow (U-shaped) lakes of the Mississippi Valley produce 400 to 1,000 pounds of fish per acre.



Bottom land hardwoods, although subject to frequent flooding, are

among the most productive forest types for both timber and wildlife habitat.

Long periods of flooding are beneficial to fish but detrimental to terrestrial wildlife. Shorter but more frequent periods of flooding are highly beneficial to terrestrial wildlife.

Bottom land hardwoods provide habitat for a wide variety of mammals and birds. A partial list includes wood duck and migratory waterfowl, deer, squirrels, rabbits, mink, raccoon, otter, beaver, and birds such as turkey, hawks, owls, woodpeckers, herons, sparrows, titmice, chickadees, and warblers.

The beautiful Prothonotary and Parula warblers are year-round residents of bottom land hardwoods. The Bachman's warbler, our rarest warbler and an endangered species, is an inhabitant of these forests. The ivory-billed woodpecker, which once inhabited the forests and is still on the endangered species list, probably is already extinct.

Ducks Winter Here

During spring and fall migration periods, these hardwoods play host to high populations of songbirds and ducks. Historically, flooded bottom land hardwoods have been the wintering grounds for mallard, black duck, and wood duck. The majority of the Nation's wood duck population nests and rears its young in bottom land hardwood wetlands.

Bottom land hardwood areas are capable of supporting higher populations of animals than are upland forests in the same geographic region. Squirrel populations are 2 or more per acre in many bottom land forests; in upland forests, populations are no more than one squirrel to every 2 acres. A deer per 20 acres is not uncommon in well-maintained bottom land forests; in nearby uplands as much as 100

During seasonal migrations flooded areas of bottom land hardwoods are host to many duck species like the mallard.



Tim McCabe

acres might be required to support one deer.

Despite their value as habitat for wildlife and as a source of timber, many areas of the forest have been cleared for other uses. When the Mississippi Valley States of Arkansas, Kentucky, Mississippi, Missouri, and Tennessee were in virgin timber, they had an estimated 24 million acres of bottom land hardwoods. By 1937, this had been reduced to 11.8 million acres; and by 1978, to 5.2 million acres. Experts in land use change have projected further clearing, leaving only 4.2 million acres by 1990.

From 1935-78, the bottom land hardwood area in the Southern Atlantic States (Georgia, Florida, North Carolina, South Carolina, and Virginia) increased from 12.5 to 12.9 million acres. The increase occurred primarily because farmers abandoned fields

in these low-lying areas. However, since 1978 the trend has reversed and the acreage has been substantially reduced as land has been cleared for crop production in eastern North Carolina, South Carolina, and Georgia.

Flood Control

There are advantages to preserving these bottom lands as forest rather than clearing the land for other uses and preventing the streams from flooding it. The forests are an important natural flood-control mechanism. Floodwater that collects in these low-lying areas is gradually released back to the parent stream. This reduces the peak flows downstream.

Bottom land forest ecosystems are nature's water purification plants. During flooding, sediments and associated nutrients and pollutants settle out. This "cleansing" of the water improves water quality and reduces eutrophication of waters downstream. Alterations of the bottom lands, such as clearing or channeling and leveeing, reduce opportunities for the flood plain to recycle nutrients, accumulate organic matter, and precipitate out pollutants.

During floods, water infiltrates the soil and recharges the regional and local aquifers. The recharge may appear many miles away if a regional aquifer receives the water. Water stored locally seeps laterally into swamps and river channels, keeping the water level up over a longer time.



Some efforts are being made to preserve remaining areas. The Water Bank Program, administered by the Agricultural Stabilization and Conservation Service, makes rental payments to landowners who preserve wetlands. Payments are based on a 10-year contract that can be renewed.

Section 404 of the Clean Water Act, administered by the Army Corps of Engineers, helps to preserve bottom land hardwood forests by regulating certain dredge and fill activities that would be destructive to the wetland nature of flood plains. Many States also require permits before allowing work in wetlands. The Fish and Wildlife Service, through its Wetland Acquisition Program, is buying key areas of bottom land hardwood areas to protect them from conversion to other uses.

Federal agencies must consider the impact their programs may have on wetlands. Executive Order 11990, Protection of Wetlands (1977), directs all Federal agencies to avoid, to the extent possible, actions that would cause long- or short-term damage through destruction or modification of wetlands. Executive Order 11988, Flood Plain Management (1977), provides similar guidelines for activities on flood plains.

Large Tracts Acquired

The Nature Conservancy, cooperating with timber companies, State and Federal agencies, and private organizations, has as-

sisted in acquiring several large tracts in recent years. Many of these tracts would have been cleared for other uses had they not been purchased for preservation.

Notable purchases of recent years include the 32,000-acre Pascagoula River Tract in south-east Mississippi and the 20,000-acre Panther Creek Swamp in the Mississippi Delta. The Texas and Bogue Chitto purchases in Louisiana, 65,000 acres, and the Lower Hatchie River Bottom Lands area of Tennessee are other significant acquisitions. Efforts are being made to purchase 30,000 to 40,000 acres of the Cache River Bottom Land Hardwoods in Arkansas.

In many areas where most of the flood plain has been cleared for other uses, only a fringe of trees remains along the streams. Even these stream corridors, as they are called, provide benefits for wildlife. They provide habitat for many forms of wildlife that would not survive in the area otherwise.

The tree fringe provides an "edge effect" important for many types of wildlife. Shade from the overhanging trees and brush keeps the water cool enough to provide habitat for forms of fish that could not survive in the stream if the water were warmed by the sun. These winding corridors break the monotony of an otherwise uniform landscape; many city parks and urban areas owe their beauty and wildlife to stream corridors.

In many areas where the forest

has been preserved it is in poor condition because alterations upstream or nearby have caused damage. Species composition and quality have been changed by improper timber harvest and by altered flooding schedules and excessive sedimentation. In some cases pollutants from oil wells, agricultural activities, and other sources have reduced tree growth and damaged wildlife and fish.

Highgrading Harmful

Improper timber harvesting has had a major impact. In many cases, only the best trees were removed. This "highgrading," as it is called by foresters, left many acres of the remaining bottom land hardwood forests in poor commercial condition, both in form and species composition. Owners of such lands are tempted to convert them to other uses they think will provide a quicker source of income.

Grazing has had an impact on these forests. Livestock should not be permitted to graze bottom land hardwoods. Cattle browsing on the hardwood seedlings kill or deform them. Under heavy grazing pressure there is little or no reproduction to replace the mature trees that are harvested.

Fire also has taken its toll. Hardwood trees have relatively thin bark, which provides little protection against fire damage to the life-supporting cambial layer. Even if the tree isn't killed outright, the lower trunk often develops various diseases that lead to decay.

Recently, beaver have become so numerous that they have been detrimental to some alluvial woodlands. They can and do kill large areas of bottom land hardwoods by flooding them permanently and cutting down or girdling trees for food. Beaver damage is particularly severe in Mississippi, Arkansas, Alabama, and Louisiana. So, between highgrading, flooding by beavers, grazing, and fire, many of the remaining stands are in poor condition and need intensive management.

Evening Out Tree Age

Foresters generally agree that the best way to produce quality timber products is even-age management. Even-age management means that all of the trees in the stand are about the same age. To create an even-age condition, the entire woodland should be divided into stands (compartments) and these stands harvested or managed towards an even-age condition.

Bottom land hardwoods can be restocked by natural regeneration or by replanting with seedlings. If the forest stand contains low-quality undesirable species, the best management is to fell and sell all merchantable trees and cut remaining trees to the ground. The more vigorous oak, ash, and other desirable species will take over. Regeneration by planting is more expensive and site selection is critical.

Bottom land hardwoods can be periodically thinned to favor trees of the best form and of de-



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sirable species and give them more room to grow. The harvest of saw logs can be started when the trees reach merchantable size or at a planned age in the rotation.

With proper management, the tract will become a mosaic of even-age stands of different ages, each stand being no larger than about 40 acres. If the different age groups are distributed over the tract, the result is a diversity of habitat beneficial to wildlife. Deer find browse plentiful in the younger stands. The mature stands furnish mast crops for deer, duck, squirrel, raccoon, and turkey. Dens for wood duck, squirrel, and raccoon are found in the older stands.

Greentree Reservoirs

Other steps to improve wildlife habitat quality are the creation of greentree reservoirs, the planting of existing openings, or the creation of new openings for planting desirable wildlife food plants.

Greentree reservoirs are developed to attract ducks. Greentree areas are leveed on three or four sides, depending on the topography, and flooded from October to March. The impoundments are located in fairly level areas of bottom land hardwoods where the species composition is 40 percent or more mast-bearing oaks.

The levee must have a water-control structure to regulate the water level, and water must be available to flood the area in October. The water supply can

be a river, stream, lake, or well. The levee can be constructed with bulldozers or draglines and should be vegetated as soon as complete to prevent erosion. Average water depth should not exceed 15 inches over the impounded area.

Natural or created openings within the impounded area can be planted to foods attractive to ducks and that resist decay when flooded. Corn, browntop millet, and Japanese millet are three of the best for this purpose.

Water must be removed from the areas by the first of March, so as not to interfere with survival and growth of the trees. Greentree reservoirs benefit both ducks and trees. Studies of greentree areas show some trees increase in growth when properly flooded.

Openings within the forest can be used also for food plantings for rabbits, deer, and turkeys, if these are the preferred species. One to 5 percent of the woodlands should be in openings of some form. These openings can be fields, roadways, or utility rights-of-way. Clovers, various millets, ryegrass, milos, and other desirable foods may be planted.

Bottom lands—the timber, wildlife, wetlands, and beauty—are an important part of our landscape. Only in recent years have we begun to realize the richness, productivity, and many benefits that make bottom land hardwoods one of our more valuable ecosystems.