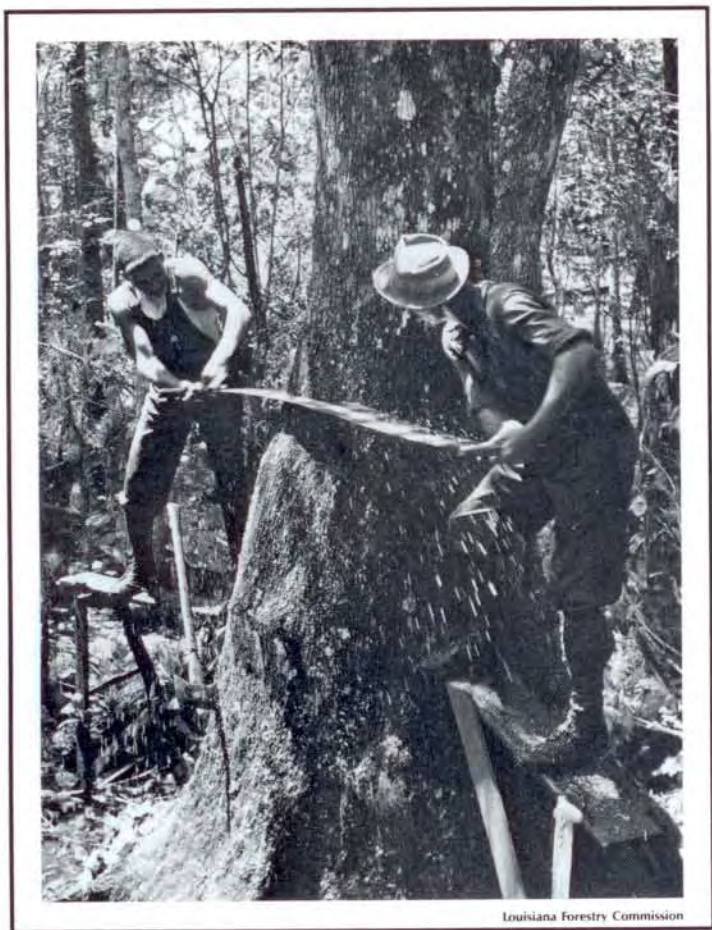


*Louisiana's*  
Stream and River  
Bottomland Hardwoods





Louisiana Forestry Commission

*Bottomland forest scene early in this century as the natural forest was being logged.*

# Introduction



R. K. Jeane, 1990

A bottomland hardwood forest\* means different things to different people. Each person sees it from his or her own point of interest, but few people are aware of the overall importance and far-reaching effects of these vanishing lands that lie between the rivers and lakes and the uplands.

A casual passerby may look at a bottomland hardwood forest and see

just a "swamp." A regular flooding pattern is one characteristic that makes bottomland hardwoods different from upland forests. Because they are flooded much of the time, the passerby might think that these forests are valueless or wasted lands, but that would be very wrong.

Foresters see the bottomland hardwoods in terms of valuable timber.

Only certain trees can grow in floodplains, and they are distributed according to their tolerances for standing water. In a typical bottomland, gum and cypress\*\* grow on the lowest land, where the water stands the longest. As the elevation increases slightly, oak and water hickory may take over, followed by other kinds of oaks and hickories in slightly drier spots, then sweetgum, water oak, laurel oak, American elm, swamp chestnut oak and other trees better adapted to drier land. To foresters, this variety of hardwoods is a valuable, renewable resource to be carefully managed and used.

Hunters, fishermen, and trappers know that bottomland hardwoods are where wood ducks breed and raise their young, migratory waterfowl take refuge in winter and raccoons, squirrels, mink, otter and opossums



Distribution of bottomland hardwood forests in Louisiana.

REDRAWN FROM U.S.D.A. AGRIC. HANDBOOK NO. 181.

\* Bottomland hardwood forest also refers to stream and river bottomlands in replanted forest stands.

\*\*Cypress is not really a hardwood tree, but it is usually included when speaking of bottomland hardwoods because many of its characteristics are similar to those of the broad-leaved hardwoods.

make their permanent homes. They are also spawning grounds for bass and other game fish. For people who simply enjoy being in the woods and observing the natural world, the bottomland hardwoods are among the most rewarding wildlife viewing sites.

Scientists who study and manage water think of the bottomland hardwoods as an extension of the river itself. The regular flooding of the bottomlands is part of the river's normal cycle, with the forest acting as a natural control against extreme highs and lows in the water level.

Conservationists know that bottomland hardwood forests are refuges for many animals, including some that are endangered because of



*The bottomland hardwoods are feeding and nesting sites for large numbers of native birds and fish, as well as refuges for winter migrants.*



*R. K. Jeanes, 1990*

farmers who need to make a living from their land. Should they manage the bottomlands for timber, hunting leases or other low-investment, stable-income sources? Or should they clear and drain them, and make large investments for higher, but perhaps unstable, returns? Their decisions will be greatly influenced by the amount of government financial backing they can get.

Like important organs in the human body, bottomland hardwood forests are part of a larger system, one that includes the rivers and their drainage areas, agricultural lands, upland forests, bays, and even cities. As the bottomland hardwoods are lost, the entire system feels the effects; eventually, it will be damaged beyond repair.



*R. K. Jeanes, 1990*

*Bottomland hardwoods provide many recreational opportunities.*

the loss of other habitats. The bottomlands provide winter refuges for multitudes of overwintering birds and breeding sites for vast numbers of native birds. Conservationists also know that current trends to drain and clear these unique areas not only will affect those animals, but will have far-reaching effects on downstream areas. Bays and estuaries will be severely damaged and important coastal and offshore fishing industries could be crippled by loss of these bottomland hardwood forests.

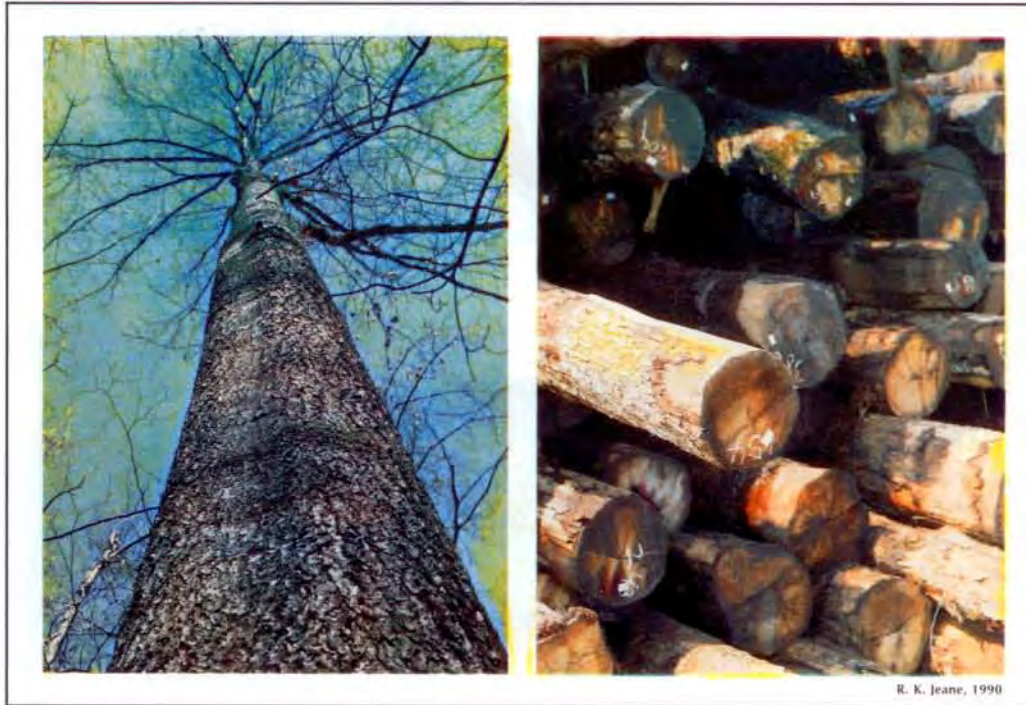
Farmers view bottomlands as rich farm land. Centuries of yearly flooding have enriched the soil by depositing layers of fertile sediments. This very richness can present a problem to



*J. E. Lied*

*Clearing of bottomland hardwoods for farming. Short-term profits or long-term values?*

# The Valuable Resource



Louisiana's moist stream and river bottomlands grow mostly hardwoods. Half of the state's forest area is hardwood. More than 47 percent of the state's timber volume is hardwood, or about 8.9 billion cubic feet in growing stock.

Louisiana's 1993 production of

hardwood sawtimber totals over 225 million board feet. Pulpwood production is over 1.7 million cords.

Additional markets for hardwood products are being studied and analyzed. Prices paid for hardwoods continue to improve at a rate faster than pine. High quality red and white

oaks, ash and bald cypress usually provide the landowner with excellent monetary returns, and can be more valuable than pine.

## Benefits of Bottomland Hardwoods

The high productivity of bottomland hardwood forests provides us with other valuable services. There are several reasons for this.

Southern forests receive more sunlight than those in the North because they are closer to the equator. The large amount of sunlight stimulates growth throughout the forest. The growing season is longer, the temperature is higher and water is available during winter. The regular flooding not only increases fertility by depositing soil and nutrients, it also speeds up decay, releasing nutrients stored in leaves, branches, downed logs and other dead material on the forest floor. The thick, spongy mat of

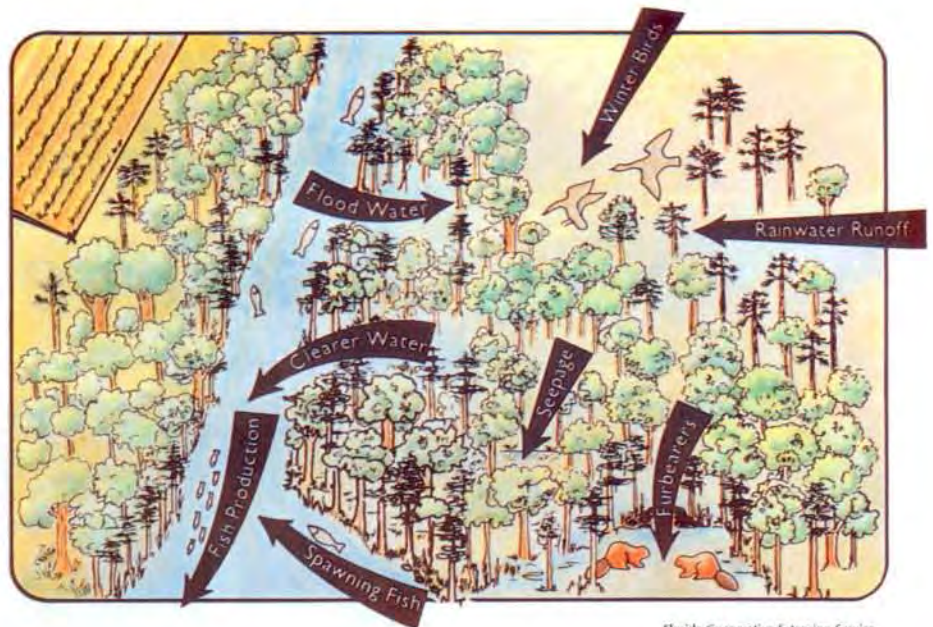


*Berries produced during one season occur next to nuts and fruits from another season and demonstrate how bottomland fruits are available throughout the year.*

decaying matter on the forest floor soaks up and retains water for later use by trees and plants.

Lots of sunlight and water, regular deposits of soil and nutrients, and rapid decay all add up to very high forest productivity. Bottomland hardwoods, properly managed, can be renewable sources of valuable timber. Many tree species reach their greatest size and fastest growth in the bottomlands; sound management can take advantage of this timber growth while preserving the bottomlands' other values.

*The bottomland hardwood ecosystem is linked to the surrounding environment in many ways. The level of services performed depends on the integrity with which we maintain the forest and these linkages.*



Florida Cooperative Extension Service

## The Overflow System

The river bottomland hardwood forest is part of a larger landscape system that starts at a river's headwaters and ends in a bay, sometimes called an estuary, at the ocean. It is called a flow-through system because water flows through and links together all parts of the system. The water is collected from a drainage basin, perhaps hundreds of miles away. It flows through creeks and rivers until it



A. A. Allen

*Bottomland hardwoods produce an abundance of wildlife.*



*Spring floods help enrich bottomlands.*

J. E. Lied

reaches the flatter land of the coastal plain. There, during winter or spring floods, the water overflows the normal channels and spreads out to form a shallow layer throughout the bottomland forest. As the water overflows and recedes, silt, nutrients, live animals and pollutants all flow back and forth between the river and the forest. The river also shapes the land itself by cutting new channels, deserting old ones, depositing sediments and building levees and deltas.

The bottomlands act as safety valves, detaining the flood water when the river overflows the main channel.

## Wildlife

One measure of the bottomland forests' productivity is their abundant wildlife. Recent studies show that the bottomland can support two to five times as many game animals as nearby mixed pine and hardwood forest. During the winter, Louisiana bottomland forests have about ten times as many birds per acre as the surrounding pinelands. Two factors make the bottomland hardwoods especially favorable for wildlife: food and cover.

One of the most important functions of the bottomlands is to serve as refuges for wildlife.

# The Vanishing Resource



R. K. Jeane, 1990

As late as 1900, there were about 70 million acres of stream and river valleys throughout the southeastern United States. Because of the frequent flooding, their development was at first limited. Clearing for agriculture was confined to a relatively small acreage of well-drained areas where cotton was the main crop. The more frequently flooded areas were left in native timber that was harvested for sale.

As the larger and more valuable trees were removed, the remaining stands became less valuable, and, by the end of World War II, little marketable timber was left. At about the same time, soybeans were becoming a major cash crop.

Although it is possible to grow soybeans on periodically flooded areas, there is considerable risk involved. It soon became obvious that to make farming profitable, landowners would require financial help, and extensive flood control and drainage systems would have to be built. Perhaps the best example of federal support of

agricultural development is in the lower Mississippi Valley.

Other uses of bottomlands that cause environmental concerns are intensive forestry, poorly designed highway construction and urban or industrial development. Forestry practices are not generally as damaging as agricultural development, although draining, clearing, and conversion of the site to large stands of a single kind of tree can be nearly as damaging as agricultural clearing.

The damage done by bottomlands development depends on how extensively the larger landscape is affected. Complete development of the bottomland hardwoods reduces the periodic flooding and removes the native vegetation. Reducing periodic flooding is the more critical of the two. It causes an immediate reduction of feeding, nesting and resting areas for waterfowl and other water-based wildlife, and spawning and feeding areas for fish are lost. Water quality in

the rivers and streams is degraded if flood waters do not spread through the forest and drop their load of silt as the water slows. Reduced flooding prevents water from being stored in the forest; the result is sharper flood peaks and increased flood depths downstream. Greatly reducing or preventing the periodic flow of water through the forest decreases the productivity of the lakes, coastal bays and oceans into which river bottomland hardwoods drain because the rich organic matter that normally provides the energy and nutrients for the aquatic food chain is flushed rapidly downstream at a time when the water is heavily loaded with silt and is moving rapidly.

The second phase of bottomland hardwood development, removal of the natural plant cover, virtually completes the destruction of the bottomland hardwoods. Along with the plant cover, much of the wildlife is lost. Rain and runoff water carry off soil and deposit it in lakes and bays.

# The Vulnerable Resource



R. K. Jeane, 1990

Each piece of the bottomland forest, no matter how small, is part of the larger landscape system and is important. As competition for the remaining bottomland hardwood forest intensifies, that forest is disappearing from many parts of the South. When drained, channelized, diked and cleared, the forest is changed and no longer performs the same functions in the landscape system.

Bottomland forests perform jobs vital to the river and downstream bay system: water control and purification, groundwater recharge, soil enrichment, erosion control and support for downstream fishing industries.

It is not necessary to leave the bottomland hardwoods untouched in order to maintain the system. Indeed, one of the most valuable functions of these areas can be to produce timber, fish, shellfish, wildlife and recreation on a continuing basis. Management for these renewable resources is our best

policy since it allows us to harvest them year after year without changing the basic system. We just have to make sure that the natural water cycle



R. K. Jeane

*Timber is a source of valuable, renewable income for landowners.*

functions as it always has and that we do not deplete certain plants and animals.

The best way to do this is to develop the many different income sources available from a bottomland forest. Government agencies can assist by developing conservation easements paid for by recreation users. These are agreements that reward the landowner for protecting his or her forest. While allowing public access to it, they still allow the owner to make a profit from the forest's resources. Many choices are available to the landowner, and agency personnel will assist in planning. In selecting a management plan one should keep in mind the following:

**1** **Timber can provide a steady, renewable income for landowners, but they must use care in their forestry methods.** It is not a good idea to use practices that involve serious changes to the site, such as draining and





R. K. Jeanne



A. A. Allen

*Hardwoods that are flooded in the winter attract feeding waterfowl which provide valuable recreational opportunities.*

*Cavities in trees and downed logs are important components of wildlife habitat.*

converting to large stands of a single kind of tree. The softwood trees usually planted in these situations cannot stand flooding and do not fully take advantage of the rich bottomland soils. These large stands of a single tree type also significantly reduce many of the wildlife and fisheries values of the bottomland hardwoods.

**2** Harvest systems that take only the largest and best trees from a forest will lower the quality of the forest as a whole. They leave the small, badly formed trees to reproduce; often these are not good for either timber production or wildlife. The forest can be successfully managed much like a herd of cattle; allowing the best individuals to reproduce while removing the weaker stock raises the quality of the whole forest and future profits.

**3** One of the best management plans is to thin the forest from below and leave the largest, most desirable trees to provide seeds. A cut that leaves about half the forest floor shaded by large trees and half open to the sun is ideal. This plan provides a smaller

profit in the first years than does the cutting of all trees, but it will eventually raise the quality of the whole forest. It also provides continuous financial reward to the forest owner.

**4** The most cost-efficient acceptable management plan is one that cuts all the trees in small patches (10-20 acres) of the forest and allows the trees to regrow naturally. This practice is known as small patch clearcutting. It favors trees that have large, heavy seeds that are not carried by the wind; these are the same trees that are best for wildlife. But remember that this only works when the patches are small in proportion to the overall forest. Small patch clearcuts should be spaced so that they are surrounded by as much old forest as possible.

**5** Cutting all the trees from large blocks of forest has many disadvantages. It changes the forest's water table and may cause flooding of the site. It also favors the less desirable kinds of trees over those that are good for wildlife and timber.

**6** Remember that dead trees, logs and trees with cavities are critical to wildlife and should be left in the forest. Large fallen logs also slow the movement of water through the forest, letting more soil settle on the forest floor during times of flood.

**7** Bottomland forests can be deliberately flooded during winter months to attract waterfowl. These flooded areas, which can be as small as 40 acres, are called green tree reservoirs. Many landowners profit by leasing the duck hunting rights to these lands.

**8** Hunting and trapping leases, wood duck management, shellfish "farming" and small-scale timber cutting are all profitable options for private owners of bottomland hardwoods. All of these avoid clearing and draining the bottomlands and preserve the health of the overall landscape system. You may be pleasantly surprised by the amount of annual profit that such an integrated plan can produce.

The southern bottomland hardwoods are part of our national heritage, providing many services to all of us. But they are fast disappearing from our landscape. We must become aware of the great value of these forests and take steps to protect them before they are lost forever. Remember that each piece of bottomland hardwood forest, no matter how small, is part of the land use system and is important.



R. K. Jeanne

*Hunting leases provide income for landowners.*

# Re-establishing The Resource



R. K. Jeane, 1990

## Planning for Reforestation

Careful planning is the first, and perhaps the most critical, step in the reforestation process. You will have to choose a planting site and decide whether or not there is a need for site preparation; you will also have to choose which species you will plant and the planting method you will use. You should make these decisions well in advance of the planting date—ideally in the summer or early fall prior to planting—to ensure the availability of labor, equipment, and planting stock.

## Choosing the Planting Site

Reforestation should take place primarily on lands least suitable for agriculture. In general, such sites will be fields on the lower portion of your land which have poor drainage or are subject to frequent flooding. Other recommended planting sites include

the edges of rivers, streams, borrow pits, drainage channels, farm ponds, roadsides, and fencerows. You might also want to consider reforesting areas

that would join two existing tracts of forest since this can provide valuable travel corridors for wildlife.



Louisiana Department of Wildlife and Fisheries

*Five-year-old nuttall oak seedlings on what was once farmland.*

Where possible, combining reforestation with other types of wildlife management can be beneficial.

Once you select the planting site, you should obtain information on its soils and flooding characteristics, since these will affect your selection of the tree species. A good place to start is with the county or parish soil survey, which you can obtain through your county or parish Soil Conservation Service office or the Louisiana Office of Forestry. Soil surveys contain a wealth of information on the soil characteristics (including degree of flooding and soil saturation) that affect the survival and growth of trees, as well as information on the suitability of the soil type(s) on the site for various tree species.



Louisiana Department of Wildlife and Fisheries

*Green ash seedlings.*

## Choosing the Species

Proper tree species selection is critical, since it will greatly affect the chances for successful reforestation. You should base your selection of tree species on several factors, including which species are capable of growing on the site, the availability of planting stock, and your personal objectives for reforestation.

The final choice of species, however, depends on you and the specific wildlife species you want to favor, and whether you also want to produce a valuable crop of timber. To help get you started, characteristics of some of the most commonly planted tree species are presented on page 10.

## Choosing the Planting Method

The two major planting methods are direct seeding and planting seedlings. Both can be done either by hand or with machines.



Direct seeding (hardwood seeds).

R. K. Jeane

Direct seeding is usually less expensive than planting seedlings, though this will depend on factors such as the price of seed and labor and the availability of suitable machinery. Typical costs of direct seeding in 1993 were about \$40-\$60 per acre, while planting seedlings costs roughly twice as much. On the other hand, planting seedlings may result in faster initial establishment of a forest. You should give each method careful consideration in the planning stage because they will affect the type of planting stock you



Louisiana Department of Wildlife and Fisheries

Hand-planting hardwood seedlings.

will need, and you should try to ensure that your desired stock will be available as early as possible.

## Site Preparation

The main purpose of site preparation is to create suitable growing conditions for tree seed or seedlings. Another purpose in some cases is to create improved conditions that allow for use of mechanical planting equipment. Site preparation is not always necessary, but we do recommend it if the area to be planted has a plowpan or otherwise compacted soils or if the site has extensive weed cover.

Regardless of whether you reforest by direct seeding or planting seedlings, you will probably prepare your site by disking. If the site has a substantial cover of weeds, disking is helpful because it reduces the amount of competing vegetation, and by reducing the amount of weeds, it reduces the number of small rodents. High rodent populations are especially troublesome if direct seeding is planted.








Ideally, you should disk no more than two months prior to planting or seeding. However, disking may need to be done somewhat earlier if you plan mid to late winter or early spring planting and if flooding is possible.

Federal cost-share assistance may be available to private landowners for planting or direct seeding hardwoods.

## Cost-Share and Technical Assistance

Various federal forest cost-share programs are available to Louisiana forestland owners. Eligible forestry assistance for these programs include site preparation, tree establishment, and improving a stand of forest trees. These programs are administered by the Agricultural Stabilization and Conservation Service (ASCS) with technical assistance provided by the Louisiana Department of Agriculture and Forestry, Office of Forestry.

### LOUISIANA SPECIES FOR SEEDING AND PLANTING IN CREEK AND RIVER BOTTOMS

Common and Scientific Names	Site-Soil Conditions	Wildlife Value	Commercial Value
<b>BUR OAK</b> <i>Quercus macrocarpa</i> 	Wide variety.	H	L—M
<b>CHERRYBARK OAK</b> <i>Quercus falcata</i> var. <i>pagodaefolia</i> 	Loamy, well-drained (clay has to be well drained).	H	H
<b>COW OAK</b> <i>Quercus michauxii</i> 	Well-drained silty clay and loamy terrace.	H	M—H
<b>DELTA POST OAK</b> <i>Quercus stellata</i> var. 	Wide variety.	H	L—H
<b>LAUREL OAK</b> <i>Quercus laurifolia</i> 	Well-drained sandy bottom.	H	L
<b>LIVE OAK</b> <i>Quercus virginiana</i> 	Wide variety.	M	L
<b>NUTTALL OAK</b> <i>Quercus nutallii</i> 	Heavy, poorly-drained alluvial clay.	H	M—H

**OBTUSA OAK**  
*Quercus obtusa*



Wide variety (tolerates poorly drained soils).

H

M

**OVERCUP OAK**  
*Quercus lyrata*



Heavy, poorly-drained alluvial clay.

H

L-M

**SAWTOOTH OAK**  
*Quercus acutissima*



Wide variety.

H

L

**SHUMARD OAK**  
*Quercus shumardii*



Well-drained terraces and bluffs; dry uplands, clays (tolerates highly alkaline soils).

H

H

**SOUTHERN RED OAK**  
*Quercus falcata* var. *falcata*



Dry, sandy or clay; sandy loam, sandy clay, loam, silty clay loam.

H

M-H

**WATER OAK**  
*Quercus nigra*



Better-drained silty clay or loamy ridges.

H

H

**WHITE OAK**  
*Quercus alba*



Well-drained loam, but varies widely.

H

M-H

**WILLOW OAK**  
*Quercus phellos*



Variety of alluvial soils (tolerates poorly drained clays).

H

M-H

**SWEET PECAN**  
*Carya illinoensis*



Wide variety, best in loams.

H

H

Common and Scientific Names

Site-Soil Conditions

Wildlife Value

Commercial Value

**BITTERNUT HICKORY**  
*Carya cordiformis*

Variety of alluvial soils, moderately well drained.

M

L-M

**PIGNUT HICKORY**  
*Carya glabra*

Variety of alluvial soils, moderately well drained.

H

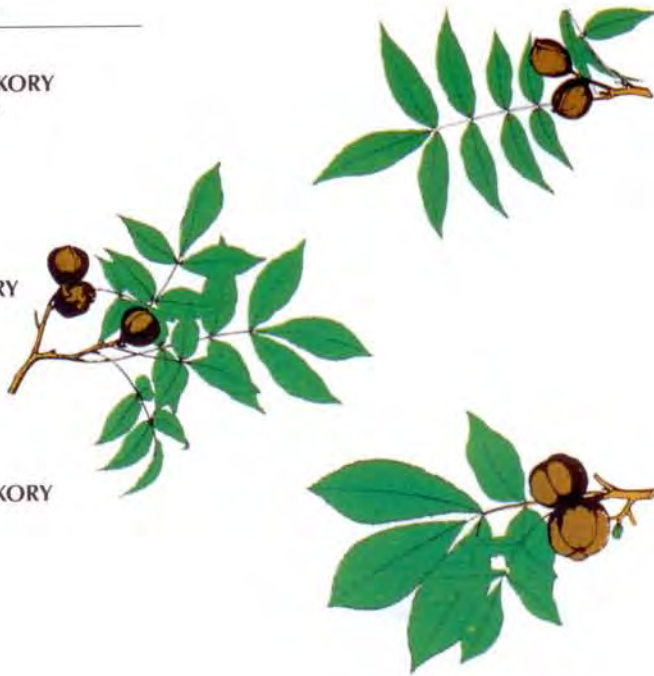
L-M

**SHAGBARK HICKORY**  
*Carya ovata*

Variety of alluvial soils, moderately well drained.

H

L-M



- It is not necessary to leave bottomland forests unmanaged to protect their vital functions.
- Wise use of renewable resources such as timber, furbearers, fish and shellfish is encouraged. Development that changes natural water flow patterns and cycles is discouraged.
- Conservation programs that reward private landowners for the public services the owners provide should be developed.
- Timber harvests that remove weaker trees while leaving many large good trees will increase both the value of the timber and the value of the forest for fisheries and wildlife.
- Timber harvests that remove all the trees from small patches of 10 to 20 acres and allow the trees to regrow naturally are better than larger cuts that are then planted with a single kind of tree.
- Leaving small strips of bottomland forest surrounding lakes and drainageways in areas that are developed or planted in crops is of great value to wildlife and water conservation.
- Broken top trees, trees with cavities and fallen logs are important to wildlife. If these trees are removed there will be a need for nest boxes and artificial cavities.
- Natural water cycles that cause shallow water during winter or spring, but allow the bottomlands to dry in the summer and fall, are best for both timber production and wildlife.
- Hunting, trapping and fishing leases can be very profitable if the bottomland forest has not been misused. Many private owners throughout the South receive more than \$5.00 per acre per year for partial hunting rights.



**Louisiana's Stream and  
River Bottomland Hardwoods  
1990  
Revised 2001**

LOUISIANA DEPARTMENT OF  
AGRICULTURE & FORESTRY  
MIKE STRAIN DVM, COMMISSIONER

The Louisiana Department of Agriculture and Forestry acknowledges the information collected by the Florida Cooperative Extension Service. This information was initially published "*Bottomland Hardwoods, Valuable, Vanishing, Vulnerable.*" 1984.

---

**HEADQUARTERS**

---

Office of Forestry  
Post Office Box 1628  
Baton Rouge, La 70821-1628  
Phone (225) 925-4500 Fax (225) 922-1356  
<http://www.ldaf.state.la.us>

---

**NURSERIES**

---

Beauregard Nursery  
6308 Hwy 190 West  
P.O. Drawer 935  
DeRidder, LA 70634-0935  
(337) 463-5509  
Fax (337) 825-6814

Columbia Nursery  
276 Columbia Nursery Rd.  
P.O. Box 1388  
Columbia, LA 71418-1388  
(318) 649-7463 or 649-7501  
Fax (318) 649-7463

Oberlin Nursery  
772 Nursery Rd.  
P.O. Box N  
Oberlin, LA 70655  
(337) 639-2911

Monroe Nursery  
752 Hwy 80 East  
Monroe, LA 71203  
(318) 362-3015  
Fax (318) 362-4629

---

**DISTRICTS**

---

D-1 47076 Morrison Blvd.  
Hammond, LA 70401  
(985) 543-4057

D-3 215 Hangar Rd.  
Jena, LA 71342  
(318)992-1400

D-5 754 Hwy 80 East  
Monroe, LA 71203  
(318) 345-7595

D-7 585 Hwy 3099  
DeRidder, LA 70634  
(337) 463-7801

D-2 9418 Hwy 165  
P.O. Box 459  
Oberlin, LA 70655  
(318) 639-4978

D-4 740 Covington Rd.  
Haughton, LA 71037  
(318) 949-3225

D-6 4089 University Pkwy  
Natchitoches, LA 71457  
(318) 357-3126

D-10 10221 Williams Dr.  
Clinton, LA 70722  
(225)683-5862

This public document was published at a total cost of \$2196.69. Five thousand copies of this public document were published in this first printing at a cost of \$2196.69. The total cost of all printings of this document including reprints is \$2196.69. This document was printed for the Louisiana Department of Agriculture and Forestry by Division of Administration, State Printing Office, to inform the public about wise management of renewable natural resources. This material was printed in accordance with the standards for printing by state agencies established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.

