

# Bottomland Hardwoods

Intermediate and Senior Contestants should study the following description to prepare for the Ecosystem Quiz station in the Florida 4-H Annual Forest Ecology Contest.



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## Overview and History

Hardwood hammocks may be the oldest natural community type in Florida. Pollen core evidence indicates that hardwoods existed in Florida at least 25 million years ago. In fact, there are some indications that hardwoods may have existed in the Southeast for 100 million years. The bottomland hardwoods of the panhandle and northern peninsula are among the oldest natural communities in the state.

## General Characteristics

Bottomland hardwoods are one of the lowest in elevation and the wettest types of hardwood forests. They are generally found along the edges of lakes and rivers and in sinkholes. Bottomland forests represent a transition between drier upland hardwood forest and very wet river floodplain and wetland forests. While trees and plants in the bottomland hardwood forest cannot tolerate long periods of



Figure 1: Deciduous trees in Southeast

flooding (as in a swamp), they are flooded periodically when water levels rise.

There is much variety among bottomland hardwood forests, based on slope of the land, soil type, water availability, and climate. Deciduous trees (see Figure1) of

various ages grow in these forests. They often grow in distinct layers, with an overstory of

dominant tree species, an understory of companion trees and shrubs, and a groundcover layer of herbaceous plants. These diverse forests are known for their species richness and may support from two to five times more species of both plants and animals than either pine forests or upland hardwood forests. While the types of plants and animals found across Florida vary, there is no “peninsula effect” (declining number of species from north to south) in the bottomland hardwood forests. These forest ecosystems are rich and diverse everywhere in Florida.

Bottomland hardwoods forests constantly change and are altered over time by natural disturbance and climatic changes. They are characterized by infrequent, low-intensity fire; poorly to well-drained soils; and frequent flooding.

Bottomland hardwoods may be underwater part of the year and completely dry during droughts. When wet, they provide important habitat for young fish, insects, crayfish, worms, and micro-organisms. Nutrients increase during these periods as floodwaters drop sediment and organic matter. When dry, the soil is able to release stored nutrients and take in oxygen.

Soil within bottomland hardwoods varies from clay-rich organic mixtures in the panhandle and northern peninsula, to coarse, nutrient-poor sands in south Florida. The central region has intermediate, sandy soil with some clay deposits.

The nutrient content of the soil is determined by the amount of leaf litter and other organic matter present on the forest floor. Because the forest is full of deciduous trees, there is a lot of leaf litter and other organic matter on the ground. This increases the nutrient level of the soil as the litter decays. While most Florida soils have low nutrient content and are not as rich as soils in the northern U.S., bottomlands have some of the best soils in Florida. Forests with nutrient-rich soils generally have a greater variety of plant species.

## **Environmental Factors**

Environmental factors such as floods, fires, and climate changes affect the composition of plants within natural communities. Bottomland hardwood forests are a complex natural community with many beneficial ecological functions. Regular flooding along river basins creates a natural flow-through system that connects the headwaters of rivers to coastal estuaries. Nutrients, silt, and tiny organisms move between waterways within the broader system.

Low areas in bottomland hardwoods will flood, which provides a place for excess water to go, and helps to reduce flooding main river channels. The wet soils help to filter out pollutants and recharge the water table.

### ***The Role of Flooding***

Flooding plays a major role in maintaining bottomland hardwood hammocks. Changes between wet and dry periods help to maintain the health of the ecosystem and eliminate species that cannot tolerate these changes. Frequent flooding in bottomland forests promotes water storage within organic matter for use in dry periods. It also slows down the decay of vegetative matter, allowing nutrients to build up.



Figure 3: Flooding in a bottomland hardwood forest.

Floodwaters bring sediments and nutrients that settle into the soil. During drought periods, leaf litter decays quickly because the soil is exposed to oxygen. This allows the nutrients to be released so plants and trees can use them.

Floodwaters also help many trees to disperse their seeds. Some seeds are carried directly by water, while others may be eaten by fish or other wildlife and dispersed to new locations. Baldcypress seeds are dispersed exclusively by water.

The trees and plants found in this ecosystem are well adapted to the presence of water. Although baldcypress knees have been thought to help that help the trees to take in oxygen, there is little scientific evidence of this and scientists think they help stabilize the tree in the mucky soil. The wide buttresses of Tupelo trunks also help keep these trees standing.

### ***The Role of Fire***



Figure 4: Prescribed fire in a hardwood forest.

Wildfires do not affect bottomland forests very often, but they still contribute to changes in the trees and plants that grow there. When the forest is dry enough to burn, the fire can remove built-up leaf litter and groundcover and release nutrients back into the soil. The dead leaves are fairly moist and burn slowly, unlike the dry, flammable leaf litter in sandhill or scrub forests.

Infrequent fires enable slow-growing hardwoods to establish themselves in the forest. However, long-term exclusion of fire can lead to an excessive accumulation of

plant material. This build-up of organic matter can become fuel during drought periods, which may result in high-intensity fires that damage the tree canopy and endanger wildlife and humans. If the fire is severe enough, it may destroy the dominant hardwoods and provide an opportunity for other types of plants and trees to establish in the area. This could change the ecosystem from bottomland hardwoods to a community of faster growing pioneer species, such as pines and herbaceous plants.

### ***Geographic Distribution***

In the bottomland forests of the panhandle and far northern Florida, the trees resemble the ones growing into the Piedmont region farther north (see Figure 5). Dominant trees here are a mixture of hardwoods, such as American beech and white oak along with various evergreens. Fewer plants grow on the ground than in hardwood stands farther south. Hardwood forests in northern Florida have one of the largest numbers of species per unit area in the United States.

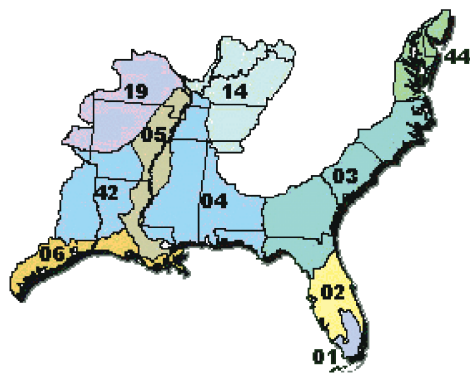


Figure 5: Ten types of bottomland hardwood forests in the Southeast  
<http://el.erdc.usace.army.mil/elpubs/pdf/si21.pdf>

The central region and southern peninsula of Florida have more evergreen species (air plants). Some of the most common dominant trees are live oak, water hickory, swamp chestnut oak, and red maple.

The southern regions of Florida are characterized by many tropical species of trees and plants and the largest number of epiphytes in the United States. These include numerous ferns, bromeliads, and orchids. Dominant trees in south Florida bottomland forests are most often live oak and cabbage palm.



## Wildlife

Nutrient-rich hardwood forests also support a variety of wildlife species since these ecosystems have lots of flowering and fruiting plants and an abundance of natural cover for animals. Both food and shelter are available year-round, and often water.

A wide variety of ground birds and song birds use bottomland hardwood forests. Wild turkey, chuck-will's widow, woodcock, and many ducks can be seen in these habitats. Wood ducks like to nest in the trees in bottomland forests. Also using the forests are several species of woodpeckers and owls, wood warblers, cardinals, blue jays, vireos, wrens, and others. Mammals found in bottomland ecosystems may include white-tailed deer, black bear, wild hog, raccoon, skunk, fox, otter, mink, gray squirrel, and fox squirrel. The presence of these mammals may be limited by the size of the forest, since larger animals need more space.

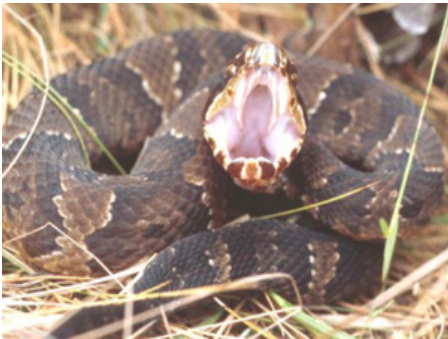


Figure 6: A cottonmouth snake.

Several species of snakes live in these hardwoods forests including coral snake, cottonmouth (Figure 6), eastern diamondback, rattlesnake, and many non-poisonous varieties. Box turtles and mud turtles live in the moist areas, while many frogs, skinks, and fish breed in the shallow waters and vegetation.

Hardwood trees are also preferred nesting sites for various cavity dwellers, such as owls, woodpeckers, and squirrels. Along with resident species of wildlife, many migrating birds and waterfowl use bottomland hardwoods each year. Several threatened or endangered species may be found in these habitats, including the Florida panther and both Bachman's and Swainson's warblers.

## Human Impacts

For hundreds of years Florida was characterized by vast forests of longleaf pine and wiregrass in drier areas and bottomland hardwood forests in the areas

where the soil and climate allowed them to grow. Many of these ancient hardwood communities have been replaced with other land uses or forest types, either naturally or because human activity. As populations have increased in Florida, bottomland hardwood forests have been drained and used for agriculture or residential development. Water from bottomland forests is sometimes pumped to irrigate agricultural crops. This can lower the groundwater levels and damage the health of the ecosystem. Runoff from agricultural and urban area has had a serious impact on the water quality and health of many bottomland forests. Excessive amounts of nutrients within the water may result in low oxygen levels and die-offs of fish, insects, micro-organisms, and plants.

## Summary

Bottomland hardwood forests represent a rich and diverse ecosystem with many benefits to the environment, humans, and wildlife. These beautiful natural communities help to maintain healthy water systems, fertile soil, and habitat for numerous species of wildlife and must be carefully managed and protected to ensure their preservation.

While bottomland hammocks may be found scattered throughout Florida, some good examples of these ecosystems may be seen in Ichetucknee River State Park, O’Leno State Park, Apalachicola National Forest, San Felasco Hammock Preserve State Park, Suwannee River State Park, Dead Lakes State Recreation Area, Wakulla Springs State Park, St. Mary’s National Wildlife Refuge, Faver-Dykes State Park, Silver River State Park, and the Myakka River State Park.



Figure 7: A healthy bottomland hardwood forest.

### **Links to learn more:**

Bottomland Hardwood Fact Sheet from Electronic Data Information Source of UF/IFAS Extension—<http://ediss.ifas.ufl.edu/uw316>

EPA

<http://water.epa.gov/type/wetlands/bottomland.cfm>

Army Corps of Engineers Publication:

Management of Bottomland Hardwood Forests for Nongame Bird Communities on Corps of Engineers Projects, ERDC TN-EMRRP-SI-21  
September 2001, <http://el.ercd.usace.army.mil/elpubs/pdf/si21.pdf>