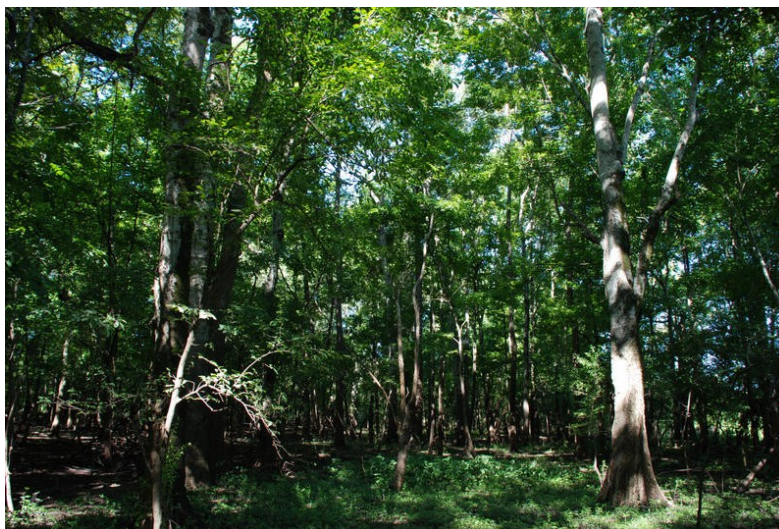


Florida 4-H Forest Ecology Contest
Forest Ecosystems
Bottomland Hardwoods Forests Description for Intermediates

Intermediate youth should study the following description to prepare for the Ecosystem station in the Florida 4-H Forest Ecology Contest.



Overview and General Characteristics

Bottomland hardwood forests flood seasonally and are located along waterways. These forests have high species richness (greater variety in tree and shrub species); complex vegetative structure (greater variety of trees with different sizes, heights, and ages); and nutrient-rich soils. Although described as ‘hardwoods,’ these ecosystems can have conifers (softwoods) like bald cypress, loblolly pine, and slash pine. These ecosystems are critical for water filtration and purification, supporting plant diversity, and habitat for a wide diversity of wildlife.



Figure 1: Deciduous trees in the Southeast.

There is variety among bottomland hardwood forests, based on slope of the land, soil type, water availability, and climate. Deciduous trees (see Figure 1) 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.

Bottomland hardwood forests constantly change and are altered over time by natural disturbance and climatic changes. They experience infrequent, low-intensity fire; more importantly, poor drainage and frequent flooding define these ecosystems. The poor drainage can give a bottomland hardwood a distinctive smell like rotting plants or even rotten eggs because of chemical processes taking place in the soil.

Water levels in bottomland hardwoods vary depending on the time of year and environmental conditions; bottomland hardwoods may be underwater part of the year, soggy part of the year, and completely dry during droughts. When wet, this ecosystem provides important habitat for young fish, insects, crayfish, worms, and microorganisms. Nutrients are more available during wet periods as floodwaters drop sediment and organic matter. When dry, the soil can release stored nutrients to plants and take in oxygen.

Soil in bottomland hardwoods varies from clay-rich organic mixtures in the panhandle and northern peninsula to coarse sand in South Florida. The central region has intermediate, sandy soil with some clay deposits. Very often the soil in bottomland hardwoods is a grey color because of the lack of oxygen in the soil caused by flooding and a high-water table.

The nutrient content in the leaf litter and other organic matter present on the forest floor is an important aspect of bottomland hardwoods. Because the forest is full of deciduous trees, which drop their leaves annually, there is significant leaf litter and other organic matter on the ground. This increases the nutrient level of the soil as the litter decays and provides shelter and food for animals (e.g., crayfish). While most Florida soils have low nutrient content and are not as rich as soils in the northern U.S., bottomland hardwoods have nutrient-rich soils resulting in a greater variety of plant and tree species than upland pine forests.

Environmental Factors

The Role of Flooding

Flooding plays a major role in maintaining bottomland hardwoods. Changes between wet and dry periods help to maintain the health of the ecosystem. During flooding along rivers, bottomland hardwoods create a natural filtration system as water meanders around and slows down when it encounters the tree trunks. Nutrients, silt, and tiny organisms slow down when carried by floodwater, and can also move between streams that are connected during a flood within the broader system. When the bottomland hardwood forests are located near a coastal estuary, this filtration system helps protect the estuaries from the ‘shock’ of too much freshwater, pollution, and nutrients during flooding events.



Figure 2: Flooding in a bottomland hardwood forest.

Frequent flooding in bottomland hardwoods 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. 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. Bald cypress seeds, for example, are dispersed exclusively by water.

The trees and plants found in this ecosystem are well adapted to the presence of water. Although bald cypress knees have been thought to help that help the trees to take in oxygen, there is little scientific evidence of this, and it is more accepted that the function of these knees is to help stabilize the tree in the mucky soil. Many trees also ‘flute’ or create wide buttresses at the tree base when growing in areas with a high-water table (e.g., tupelo).

The Role of Fire

Wildfires do not affect bottomland forests very often, but when wildfires occur, they can 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 (typically only once per century) remove leaf litter and release nutrients back into the soil. Long-term exclusion of fire can lead to an excessive accumulation of plant material. This build-up of organic matter can become fuel for fires 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 hardwood forests of the Panhandle and North Florida, the trees resemble those in the Piedmont region in the Carolinas. Dominant trees are a mixture of hardwoods, such as American beech and white oak, along with various evergreens. Fewer plants grow on the ground than in bottomland hardwoods farther south.

The bottomland hardwood forests of the central region and southern peninsula of Florida have more evergreen or conifer species (bald cypress and pines, which are called ‘softwoods’). Some of the most common dominant hardwood tree species are live oak, water hickory, swamp chestnut oak, and red maple.

The bottomland hardwood forests of the southern regions of Florida are characterized by many tropical species of trees and plants and the largest number of epiphytes (plants that grow on plants) in the United States. These include numerous ferns, bromeliads, and orchids. Dominant hardwood trees in South Florida bottomland forests are most often live oak and red maple. Cabbage palms are also dominant.

Wildlife

Nutrient-rich hardwood bottomland 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 is available as well.

A wide variety of birds can be found in bottomland hardwood forests. Common species include Wild Turkey, Chuck-will's-widow, Wood Duck, and Black-bellied Whistling-Duck, several species of woodpeckers, owls, vireos, and warblers (including the Swainson's Warbler), as well as Northern Cardinal, Blue Jay, and Carolina Wren.

Mammals found in bottomland ecosystems may include white-tailed deer, black bear, wild hog, raccoon, skunk, fox, otter, mink, gray squirrel, opossums, and squirrels. The Florida panther, a federally listed endangered species, can also be found in bottomland hardwoods. The presence of these mammals may be limited by the size of the forest, since larger animals need more space.

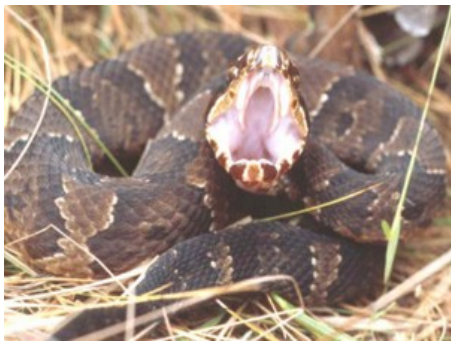


Figure 3: A cottonmouth snake.

Several species of snakes live in these bottomland hardwood forests including Eastern coral snake, cottonmouth (Figure 3), Eastern diamondback rattlesnake, and many non-venomous snake species. Box turtles and mud turtles live in the moist areas, while many frogs, skinks, and fish breed in the shallow water and vegetation.

Hardwood trees are preferred nesting sites for various cavity dwellers, such as owls, woodpeckers, bats, raccoons, opossums, and squirrels. Along with resident species of wildlife, many migrating birds and waterfowl use bottomland hardwoods each year.

Human Impacts

When European's first colonized North America, bottomland hardwoods near rivers offered an easily accessible source of wood because the logs could be floated down a river to a sawmill. Even today, if you float down a Florida river you can see massive stumps (usually bald cypress) that are evidence of a harvest, sometimes 200 years ago! The stumps were cut high from the water surface because the loggers needed to stand above the waterline to cut the tree. Often new trees sprouted out of the stumps.

As the human population continued to increase in Florida, bottomland hardwood forests have been drained and used for agriculture or residential development.

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.

While bottomland hardwood forests may be found throughout Florida, some good examples of these ecosystems may be seen in Blackwater River State Forest, Lake Talquin State Forest, 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.

Links to learn more:

Bottomland Forest, Florida Natural Areas Inventory:

https://www.fnai.org/PDFs/NC/Bottomland_Forest_Final_2010.pdf

The Importance of Bottomland Hardwood Forests for Wildlife (Holly K. Ober, UF/IFAS EDIS document WEC271, 2019):

<https://edis.ifas.ufl.edu/publication/uw316>

Bottomland Hardwoods, U.S. EPA: <https://www.epa.gov/wetlands/bottomland-hardwoods>