Freshwater Swamps

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

Freshwater swamp ecosystem. Source: USFWS

Contents

General Description

Freshwater swamps are the lifeblood of Florida's rich water resources. Of Florida's 11 million acres of wetlands, nearly 50% are swamps. These places are hotspots for wildlife and act as important filters for Florida's drinking water.

Freshwater swamps are forested areas that are flooded for most of the year. They can be categorized into two types: river swamps and stillwater swamps. River swamps are usually fed by nearby streams and rivers that have flooded over. The water in these swamps has a noticeable flow. The floodwaters in stillwater swamps come primarily from rainwater and groundwater. These swamps are more acidic than river swamps and the water is murky due to tannins, which are chemicals that leach out of plants and turn the water tea colored.

The soil in freshwater swamps is a mixture of sand and clays that are very poorly drained. The poorly drained soils contribute to the water-holding capacity of swamps. In the flooded waters, bacteria use oxygen to break down plant material. The shady conditions in swamps limit the ability of algae to replenish the oxygen in the water. Because of this, partially broken-down plant material accumulates and forms peat. During the few months of the year when the ground is exposed to the air, this peat starts to break down once again.

Swamps can be found throughout Florida. They are often located near bodies of water or in low areas with a high clay content. Most of the time, swamps are just a small part of a much larger landscape. However, some swamps are massive and span over hundreds of thousands of acres, such as the Okefenokee Swamp on the border of Florida and Georgia.

Environmental Factors

The most influential environmental process in freshwater swamps is flooding. The length of time an area is flooded, also known as the hydroperiod, determines which plants will grow there. Swamps with longer hydroperiods tend to have fewer species than those with shorter hydroperiods. Stillwater swamps typically have longer hydroperiods than river swamps. In addition, the center of stillwater swamps holds water for longer portions of the year than the edges. As such, the species diversity is low in the center and increases as you reach the edges of the swamp.

Bald cypress trees with buttressing base. Source: Tim Graham and Robert Harding

Plants in the swamp have many different adaptations that allow them to survive in flooded conditions. Trees like the bald cypress develop wide bases to stabilize them in the soft, wet soil, a phenomenon called buttressing. Another adaptation many plants have is aerenchyma, which are hollow tubes throughout the plant that act like straws and deliver oxygen to the roots. The seeds of plants like

cypress trees will also float on the water and will only germinate once they hit mineral soil after the floodwaters recede.

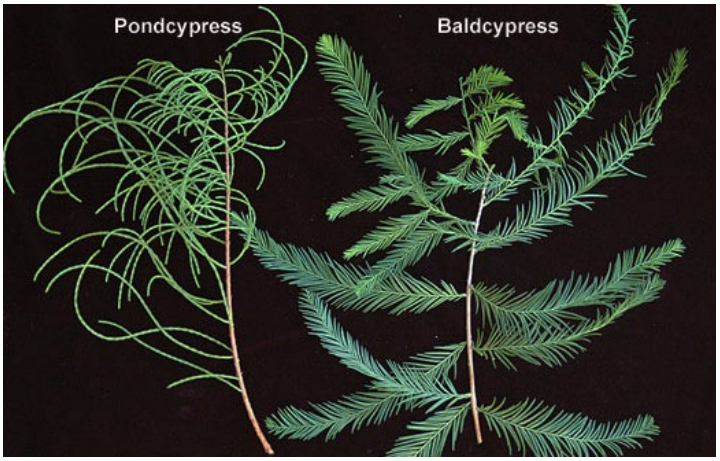
Fire rarely infiltrates freshwater swamps. When it does, it has profound effects on the vegetation. It is difficult for fires to start and carry within swamps, so fire often creeps in from surrounding communities. On the edges of swamps, fire may occur every three to five years. Fire-resistant plants such as cypress trees are found in more frequently burned areas. Cypress trees have bark that protects them from the heat of the fire. However, if that fire burns into the peat, it can burn the roots and kill the tree. The interior of swamps may only receive fire every 100 to 150 years during prolonged droughts. The interior also has the largest accumulation of peat, so fires in the interior can kill many of the trees. In areas that do not receive fire, fire-sensitive hardwood trees such as swamp bay and titi may replace the cypress.

Topography also plays a major role in freshwater swamps. A few inches can make all the difference in which plants can grow if it means they are above the water line. Most seeds cannot germinate in flooded soil. When large trees fall over, they can act as a foundation for plants that are intolerant of flooding. These are called microsites and they serve as a diversity hotspot in the swamp.

Flora and Fauna

Plants

Cypress trees are often synonymous with Florida's swamps. In the southeastern United States, there are two species of cypress - bald cypress and pond cypress. Bald cypress trees prefer the flowing water of river swamps and can grow up to 150 feet in height. The pond cypress is a little smaller and prefers the slow-moving water of stillwater swamps. Both trees are most famous for their knees. The knees grow from the roots and stick up out of the ground. Scientists still are not sure of their function, but leading hypotheses suggest that they help stabilize the tree in the wet soil.

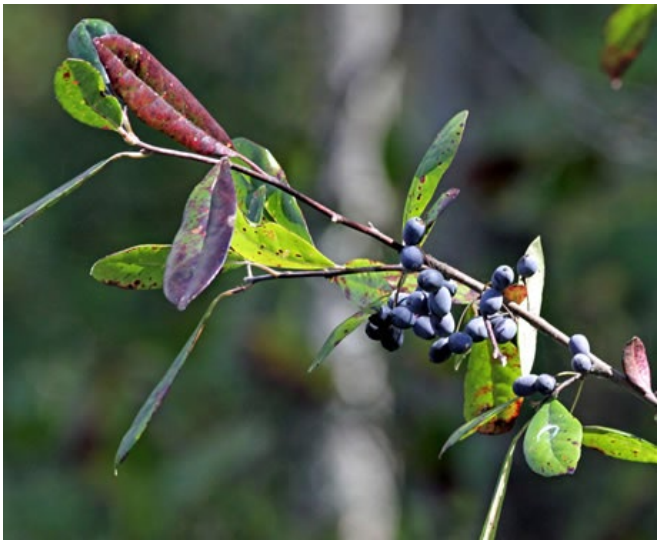


Difference between bald cypress (*Taxodium distichum*) and pond cypress (*Taxodium ascendens*) leaves. Source: Oregon State University

Cypress knees. Source: Bob Holland

Hardwood trees frequent the canopies as well and include loblolly bay, swamp tupelo, and titi. These trees help form the dense, shady canopy typical of swamps. Shrubs are usually sparse and grow in areas that do not burn as frequently. Commons shrubs in freshwater swamps include fetterbush, wax myrtle, and Carolina willow. Grasses and ferns are also sparse on the forest floor, but flood-tolerant species such as maidencane, cinnamon fern, and royal fern may dot the landscape.

Loblolly bay (*Gordonia lasianthus*) leaves and flowers. Source: John Bradford



Swamp tupelo (Nyssa biflora) leaves and fruit. Source: Will Stuart

In the branches above the flooded swamps, a striking diversity of epiphytes abound. Epiphytes are plants that live on another plant, called the host plant, but do not harm their host. They collect water from the air and nutrients from debris that fall on them. Many species of bromeliads, orchids, and ferns live in the canopy. Spanish moss is a famous epiphyte found throughout the state. Spanish moss is not a moss but a bromeliad and hangs from tree branches. It has scales that trap water for the plant to use and give it its gray color

Additionally, freshwater swamps host a suite of rare plants. Florida willow, pond spice, and panhandle spider-lily reside on the forest floor. Gracing the air are plants like the many-flowered catopsis and swamp plume polypody.

Animals

Many animals can be found lurking within freshwater swamps. Whether swimming among the cypress knees or flying between the trees, swamps provide wildlife with food, drinking water, shelter, and nesting sites.

The aquatic environments in freshwater swamps teem with invertebrates. The decaying plant material supports snails, crayfish, and mosquito larvae. These invertebrates in turn feed many other animals.

Fish swim through the water in swamps. Common species include the golden topminnow, American flagfish, and mosquitofish. Many fish species must move to larger sources of water as the swamp dries up. Low areas in swamps may pool with water even during the dry season. Many of these fish and other aquatic animals take refuge in these pools.

Golden topminnow. Source: Florida Museum, Zachary Randall

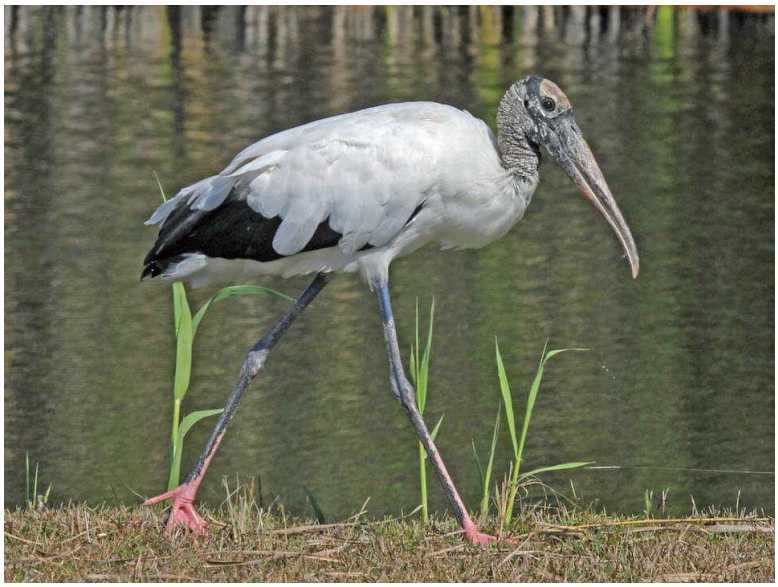
Swamps provide essential breeding grounds for many amphibians. The low oxygen levels in the water helps limit the number of predatory fish, ensuring that many of the young can reach adulthood. Common amphibians include the leopard frog, bullfrog, northern dwarf siren, and two-toed amphiuma.

Reptiles frequent freshwater swamps as well. American alligators, mud snakes, eastern cottonmouths, and soft-shelled turtles swim through the water to feed. Meanwhile, diamondback rattlesnakes and box turtles inhabit the drier areas.

Swamps are rich feeding grounds for many birds. Wading birds such as limpkins, anhingas, and great blue herons hunt in the water for fish, amphibians, and aquatic invertebrates. Swallow-tailed kites and red-shouldered hawks soar high above the forest looking for their next meal. Pileated woodpeckers and warblers flit among the trees looking for insects.

Many mammals use freshwater swamps as well. Mammals like the river otter, beavers, and minks can be found swimming in the water. Cotton mice and long-tailed weasels scurry along the forest floor. For large animals such as the Florida black bear and Florida panther, swamps act as temporary refuge as they search for food and drinking water.

Swamps host many rare animals, including the threatened wood stork. The wood stork is the only stork that breeds in North America. It depends on seasonal flooding to support its diet. Prey populations increase during the rainy season and provide rich hunting during the dry season when they concentrate in smaller pools.



Endangered wood stork. Source: Dick Daniels

Human Impacts

Florida has lost nearly 50% of its natural wetlands since it became a state in 1845. Most of this loss has come from draining wetlands for residential development. By building dikes and canals, we have altered the flow of water to wetlands to dry them out and build on them. With the water gone, these wetlands cannot support the wildlife that depend on them. Diverting the water also exposes the peat soil to air more often throughout the year. The peat breaks down faster when exposed to air and the soil's elevation gradually decreases over time, a phenomenon known as soil subsidence. This process is shown in the Everglades where, since 1924, the soil elevation has dropped by more than six feet.

Nearly all of Florida's freshwater swamps have been harvested at one point in time for their valuable timber. The wood from cypress trees is sought out because it is strong, rot-resistant, and water-resistant. To get cypress logs to the sawmill, loggers would float the logs down rivers. To this day, people find cypress logs that have sunk to the bottom of rivers and are still well preserved. Most of what is left in Florida's swamps is growth that has occurred since then.

Today, many areas of freshwater swamps are protected by different agencies such as water management districts, state parks, and national parks. Florida's swamps not only provide habitat for diverse species of plants and animals, but they are also essential for Florida's residents. Swamps provide flood control and filter water that goes into the Floridan aquifer–essentially purifying our drinking water. Protecting this ecosystem helps ensure the health of the environment and people.

Places to see examples of freshwater swamps:

- Three Lakes Wildlife Management Area
- Goethe State Forest
- Fakahatchee Strand State Preserve
- Everglades National Park

Links to learn more:

- Florida Natural Areas Inventory: https://www.fnai.org/species-communities/natcom-accounts (See: Dome Swamp, Basin Swamp, Strand Swamp, and Floodplain Swamp)
- UF/IFAS Extension: https://programs.ifas.ufl.edu/florida-land-steward/forest-resources/bottomland-forest-ecosystems/ (See River Swamps and Stillwater Swamps)
- Florida Museum of Natural History: https://www.floridamuseum.ufl.edu/southflorida/habitats/cypress-swamps/flora-fauna/