Pine Flatwoods

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

Pine flatwoods of Goethe State Forest. Source: FL Museum of Natural History, FloridaMuseum.ufl.edu

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General Description

Pine flatwoods are the most abundant ecosystem in Florida. They are known for their open canopy of pine trees and continuous groundcover of grasses and shrubs. Frequent fires keep the shrubs down and allow you to see for hundreds of yards through the forest. These ecosystems have some of the highest plant species diversity in the southeastern United States. Pine flatwoods also provide people with goods such as timber and water quality.

Pine flatwoods have sandy soils with organic matter, or broken down remains of plants and animals, near the surface that darkens the soil. These soils also tend to have very few nutrients and are acidic. There is a condensed layer of organic matter several feet below the surface called the spodic horizon which prevents the water from easily draining through the soil. As a result, there are times during the year where water will pool in pine flatwoods after heavy rains. There may be a few areas with higher amounts of clay in the soil, and these areas can stay flooded for months.

Pine flatwoods are found throughout the state. They often exist in the ecotone, or the transition space between two different ecosystems, of freshwater swamps and sandhills. Because of this gradient, some areas of pine flatwoods experience longer periods of seasonal flooding than others. Pine flatwoods can be organized into three types based on their degree of seasonal flooding: wet flatwoods, mesic flatwoods, and scrubby flatwoods, with wet flatwoods having longer periods of seasonal flooding than scrubby flatwoods.

Environmental Factors

Fire and flooding are important environmental factors in pine flatwoods ecosystems. They are essential for maintaining the ecosystem and many of its inhabitants are adapted to live with these factors.

Pine flatwoods need frequent fire (every 2-4 years) to maintain the structure, or layout, of its vegetation. Fire in these ecosystems keeps the groundcover from growing up into the midstory. These fires are typically low intensity and rarely ever burn past the groundcover. In addition, they allow plants to regenerate and recycle nutrients from plants back into the soil. Many plants have adaptations that help them survive these fires. Many of the herbaceous plants and shrubs will sprout from their roots after being burned up. The pine trees have thick bark that protects the tree from the heat of fire. In addition, Young longleaf and south Florida slash pine have a “grass” stage where they remain low to the ground and are protected from fire by their needles. They may remain in this stage for one to seven years before quickly shooting up and growing out of range of the fire.

The “grass” stage of young longleaf pines (*Pinus palustris*) protects the growth bud from fire until they quickly grow up into the sky. Source: Karan A. Rawlins, University of Georgia, Bugwood.org

Many plants require fire to regenerate. For example, longleaf pine seeds need bare mineral soil to germinate, or take root, and fire will burn the groundcover to give access to mineral soil. Many grasses will only flower after burning like the wiregrass. If fire is excluded from these areas, the shrubs will grow into the overstory and eventually replace the pines, transforming the area into a hardwood hammock.

Seasonal flooding is also an important factor in this ecosystem. Heavy rain events can soak the soil with water and even form ponds in some places. Plants found in pine flatwoods have adaptations to help them deal with this extra water. When their underground roots are flooded, plants such as wax myrtle will grow roots on their stem, called adventitious roots, so that they can breathe. Flooding is also important for the reproduction of some species. Amphibians such as the endangered reticulated flatwoods salamander only lay their eggs in ephemeral ponds, or ponds that form after heavy rainfall and will eventually dry up. Because the pond exists for only a portion of the year, fish that would otherwise eat the young salamanders cannot live in these ponds. This helps protect the salamander's young from predators.

The reticulated flatwoods salamander (*Ambystoma bishopi*) and other amphibians depend on ephemeral ponds in pine flatwoods to reproduce. Source: Peter Pattavina, USFWS, Digitalmedia.fws.gov

Flora and Fauna

Plants

As the name suggests, pine trees make up the canopy in pine flatwoods. A single species or multiple different ones can make up the pine canopy and can include trees such as the longleaf pine, slash pine, and pond pine in wetter areas. Historically, longleaf pines dominated the pine flatwoods throughout Florida. Logging has significantly reduced the longleaf pine's range and slash pine has often replaced it. Wildlife will use these tall pines for nesting and feed on the seeds. The needles that these trees drop are also flammable and help promote fire in the understory of pine flatwoods.

The understory is almost completely covered by a variety of grasses and shrubs, which offer many wildlife species sources of food, cover, and nesting habitat. Shrubs such as saw palmetto, gallberry, fetterbush, flatwoods plum, and hawthorn remain short because of the frequent fires. Grasses dominate in areas that burn even more frequently and can include species such as wiregrass and cutthroat grass.

Gallberry (*Ilex glabra*) plants are a preferred food of white-tailed deer. Source: Rebekah D. Wallace, University of Georgia, Bugwood.org

Wiregrass (*Aristida stricta*) will only flower and produce seeds after it has been burned. Source: Rebekah D. Wallace, University of Georgia, Bugwood.org

There are many plants that are only found in Florida's pine flatwoods. This includes the beautiful pawpaw, white birds-in-a-nest, and pine-woods aster. These plants rely on the open canopies, frequent fire, and seasonal flooding to maintain them.

Animals

Many different animals use pine flatwoods. The continuous groundcover of shrubs and grasses provide wildlife with food, refuge, and nesting habitat. The tall pines provide perches for predatory and foraging birds as well as nesting habitats.

The Florida black bear (*Ursus americanus* var. *floridanus*) loves to eat the many fruits and acorns produce by shrubs in pine flatwoods. Source: UF IFAS

Mammals such as the Florida panther and Florida black bear use pine flatwoods to travel from one place to another. Black bears and white-tailed deer take advantage of the plentiful food the shrubs and grasses provide. Smaller mammals like cottontail rabbits, skunks, gray foxes, and cotton rats hide among the shrubs and grasses.

Amphibians make use of seasonally flooded areas of pine flatwoods and include the reticulated flatwoods salamander, the frosted flatwoods salamander, and the pinewoods treefrog. Reptiles such as the diamondback rattlesnake, pigmy rattlesnake, and gopher tortoise also frequent pine flatwoods.

Birds make use of all parts of pine flatwoods ecosystems. Ground-dwellers like northern bobwhite quails and Bachman's sparrows will nest on the ground among the shrubs. Tree-

dwellers like pine warblers make their nests in standing trees; the brown-headed nuthatch use holes in standing dead trees. Red-shouldered hawks and bald eagles will perch high above and look over the pine flatwoods for prey.

Pine flatwoods host many rare and endangered species, including indigo snakes, Sherman's fox squirrels, and red-cockaded woodpeckers. Red-cockaded woodpeckers are an endangered species found only in the pine forests of the southeastern United States. These birds carve their nests into very large pine trees. Below their nest, the woodpeckers also make sap wells that ooze out a sticky resin that coats the bark below the bird's nest. This resin helps protect the bird's young from predators like rat snakes that would otherwise try to climb the tree.

The red-cockaded woodpecker (*Picoides borealis*) makes its home in live pine trees and uses the leaking sap to protect their nest from predators. Source: Steve Morello, UF IFAS

Human Impacts

Florida's pine flatwoods have been logged since the 1800s. In the early 1900s, it was discovered that the resin longleaf pine produced was useful for making turpentine, a substance that helped waterproof ships. The logging and turpentine industry took its toll on the longleaf pine and much of it has been replaced by slash pine. Pine flatwoods have also been threatened by development. The flat terrain makes it easy to build residential, agricultural, and commercial structures. Much of the pine flatwoods left today are fragmented into smaller tracts.

Many areas of pine flatwoods are still used for timber today. Foresters today follow Best Management Practices (BMPs), which are rules about how tree planting, harvesting, and site preparation are carried out to reduce the negative impacts on the environment. BMPs allow people to continue to make timber products while protecting the environment.

Organizations like the Florida Park Service, Florida Fish and Wildlife Conservation Commission, and the USDA Forest Service manage and protect pine flatwoods throughout Florida. These entities manage the area by conducting prescribed burns, removing invasive plants, and protecting wildlife species.

Places to see examples of pine flatwoods:

- Apalachicola National Forest
- St. Marks National Wildlife Refuge
- Fred C. Babcock/Cecil M. Webb Wildlife Management Area
- Jonathan Dickinson State Park

Links to learn more:

- UF IFAS Extension: https://programs.ifas.ufl.edu/florida-land-steward/forest-resources/upland-forest-ecosystems/pine-flatwoods/
- Florida Natural Areas Inventory: https://www.fnai.org/species-communities/natcom-accounts#pineflatwoods
- Florida Native Plant Society: https://www.fnps.org/natives/native-plant-communities (See Scrubby Flatwoods, Mesic Flatwoods, and Wet Flatwoods)