Florida 4-H Forest Ecology Contest
Forest Ecosystems
Sandhill 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.

Updated December 2021

Overview and History

Sandhill forests are upland, savanna-like habitats on gently rolling terrain with an open overstory of longleaf pines. While there are many similarities between scrub forests and sandhills (such as dry, sandy soil), sandhills are easily distinguished by the tall, longleaf pines and open, grassy groundcover. Interspersed with the pines are turkey oaks and other hardwood species such as sand post oak, bluejack oak, and persimmon. Sandhills burn more frequently than scrub habitats and so have fewer woody shrubs. The widely spaced trees and soft groundcover makes these open woodlands easily recognizable.

The soil in sandhill forests is deep, sandy, and well-drained but lacks distinct layers. There may be a variety of textures and types of soil as one travels to different regions within the state. Sandhills in the northern peninsula and Panhandle generally have more coarse soils with some loam and clay mixed in. As you travel south along the ridges of the peninsula, the soil is a finer texture and lacks the clay and loam. The sandy soil allows water and nutrients to leach out easily, so the soil tends to be infertile. Although sandhill systems have nutrient-poor soils, the open canopy allows plenty of sunlight to reach the forest floor, so a large variety of grasses and other herbaceous plants grow well in these habitats.

As early as 20 million years ago, vast expanses of longleaf pines covered the coastal plains from Virginia to Florida and as far west as eastern Texas. At one time, there were an estimated 25 million hectares of longleaf forest in the Southeast. While some of this land was low-lying flatwoods, much of it consisted of higher elevation sandhill ecosystems.

Most of the original longleaf forests have been replaced by unmanaged forest, pine plantations, citrus groves, rangeland, and residential and commercial development. Only a few large tracts of intact sandhill ecosystems still exist in Florida today. The largest expanses are in northern Florida; sandhills can also be found along high ridges in the interior peninsula of Florida. These beautiful relics of ancient Florida offer aesthetic, environmental, and economic benefits that cannot be replaced if these last stands disappear.

Environmental Factors

The Role of Fire in Sandhills

Figure 1: A young longleaf pine or "furry stick."

The sandhill forest ecosystem depends on fire. Frequent (every 2-5 years), low-intensity fires are necessary to maintain the ecosystem and prevent hardwood tree species from taking over. Fire also stimulates the flowering and germination of some sandhill plants. Wiregrass, one of the most common groundcover species in sandhills, needs the heat of a summer fire to reproduce. Shortly after a spring burn, many plant species can be seen blossoming.

Longleaf pine is a fire-tolerant tree species. This pine depends on frequent fires to remove competing vegetation and expose bare mineral soil so their seeds can germinate. Mature longleaf pines act as lighting rods and help to ignite the underbrush. Young plants go through a "grass" stage when the bud is surrounded and protected by a clump of grass-like leaves. During this grass stage, longleaf pines can survive a low-intensity fire. The fire eliminates neighboring vegetation (mostly hardwoods) that might compete with the young tree. After a burn, the seedling can access available nutrients and may grow very quickly into a young tree. This second growth stage is called a "furry stick" because the tall, skinny seedlings have long needles that come off the main stem and give it a fuzzy appearance (Figure 1). Since young trees in this stage are susceptible to fire, the seedlings grow quickly until they are out of the fire zone—up to 10 feet in height in 3-5 years. As the longleaf pines grow, they develop wide plates of bark that disperse the heat of a fire and flake off as they burn. This protects the living cambium (the woody layer of the tree inside the young bark that makes new cells).

In areas where fire is suppressed, woody shrubs and other hardwood trees, such as laurel oak and sweetgum, can become established and alter the composition and structure of the ecosystem. Without fire, sandhill forests will evolve to become upland hardwood stands of oaks and hickories.

Vegetation of Sandhill Communities

The main species in sandhill ecosystems, longleaf pine, may live from 300 to 500 years. If regular fires occur, an open grassy park like environment will form that can include turkey oak, herbaceous grasses, and ferns. Wiregrass, lop-sided Indian grass, pineywoods dropseed, and bracken fern are common in regularly burned sandhills. A variety of wildflowers decorate the open landscape. Among these are blazing star (Figure 2), butterfly weed, and goldenrod.

Figure 2: Eastern black swallowtail butterfly on blazing star.

In sandhills where fire has been suppressed, laurel oak and a few other hardwood species can be seen along with woody shrubs and plants such as deerberry, blackberry, and running oak. Saw palmetto is another familiar feature in less-frequently burned sandhills.

As one travels farther south to Central Florida, slash pines often replace longleaf pines as the dominant species in sandhill ecosystems. Most of the other species of hardwoods and plants are similar to those in North Florida sandhills.

Several endangered plant species can be found in sandhills, including clasping warea and Florida golden aster (both federally listed endangered species).

Wildlife of Sandhill Ecosystem

Sandhill ecosystems support a wide variety of wildlife. However, most of these animals also use neighboring habitats and are not found exclusively in sandhills. Many burrowing and digging species live in the deep sandy soils. These animals are known as *fossorial* species because of their digging ability. Many of them have shovel-like feet to help remove the dirt as they dig. Gopher tortoises and skinks move so well through the soil that they are called *sand swimmers***.**

As with the plants in sandhill communities, the wildlife that live in this habitat may vary according to how frequently the area is burned. In areas where regular fires occur, species that prefer an open understory, such as pocket gophers, gopher tortoises (Figure 3), and Sherman's fox squirrel, can thrive.

Figure 3: Gopher tortoise.

As many as 300 species of insects and animals have been known to use tortoise burrows. They are called *commensal* species because they live together. Several of the co-habitants of these burrows are listed as threated or endangered, including the indigo snake, gopher frog, and sand skink. Other endangered animals that live in sandhills are the Florida mouse and scarab beetle.

In addition, the Red-cockaded Woodpecker (a federally listed endangered species) is a keystone species of sandhills because their cavities are used by many other animals, contributing to the species richness of the ecosystem. Red-cockaded Woodpeckers require older pines and an open understory. If fire is suppressed, Red-cockaded Woodpeckers cannot move about freely and are forced to relocate to more open forests. Northern Bobwhite are another species that depends on the open understory of fire-maintained sandhills.

Without fire, sandhills will have more small trees and shrubs. These habitats support several different wildlife species. Many birds use the hardwoods and pines in overgrown sandhill systems. These include Ground Dove, Eastern Kingbird, Eastern Bluebird, White-breasted Nuthatch, and Red-bellied Woodpecker.

Human Impacts

Sandhill forest ecosystems are generally found on level, well-drained ground which makes the land ideal for home sites and many agricultural uses. European settlers cleared much of the land to grow tobacco, cotton, and food crops. Thousands of acres of original sandhill habitat have already been cleared and developed. Other areas have been converted to citrus groves, planted as commercial pine plantations, or allowed to change into hardwood hammocks.

Figure 5: Prescribed fire.

Other than development, the most important factor in the decline of sandhill ecosystems is the suppression of fire. Without frequent fire, the fire-dependent pines and other plants will be crowded out by woody shrubs and hardwood trees. The plants and animals of the sandhill system are unable to survive in the thick understory.

Suppression of fire in these habitats also allows the vegetation to build up and increases the risk of high-intensity wildfires. Such wildland fires may burn out of control and threaten homes, farms, and livestock in the vicinity. Managing sandhill habitats with regular, prescribed burns reduces the risk of destructive fires while preserving the land for native plants and wildlife.

Summary

Sandhill ecosystems represent one of the oldest types of native habitats in Florida. Easily recognized by tall longleaf pines and an open, park-like understory, these ecosystems support a variety of plants and animals. Many of the species found in sandhills are threatened or endangered. Once covering vast expanses of land in the Southeast, all that remains of these systems now are a few scattered areas, mainly in the Panhandle and along the ridges of the peninsula.

In addition to providing valuable wildlife habitat, sandhills are a source of timber. Some landowners are planting longleaf pines to restore this ecosystem and may be able to harvest the trees for their economic value.

Suppression of fire is the main cause of decline in sandhill ecosystems since many of the native species found here are fire dependent. In the absence of fire, the pines, grasses, and ferns cannot continue to thrive and will be replaced by woody shrubs and hardwood trees. Many species of wildlife in sandhills depend on the open understory. They are unable to thrive without regular burns to control vegetation and stimulate flowering and seed dispersal of fire-dependent plants.

Sandhill ecosystems and the wildlife that use them need to be protected and managed if they are to continue to provide natural beauty as well environmental and economic benefits.

Some beautiful examples of natural sandhills may be seen in the Apalachicola National Forest, Blackwater River State Forest, Eglin Air Force Base, Wekiwa Springs State Park, Torreya State Park, Gold Head Branch State Park, San Felasco Hammock Preserve State Park, and the Janet Butterfield Brooks Preserve.

Links to learn more

Sandhill: Florida Natural Areas Inventory:
https://www.fnai.org/PDFs/NC/Sandhill_Final_2010.pdf

The Longleaf Alliance: Sandhills:
https://longleafalliance.org/what-is-longleaf/the-ecosystem/habitats/#sandhills