USDA Natural Resources Conservation Service

Ecological site F156AY210FL
Subtropical Freshwater Forested Wetlands of Everglades

Last updated: 2/07/2025
Accessed: 05/12/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 156A–Florida Everglades and Associated Areas

This area makes up about 7,749 square miles (20,071 square kilometers) and is entirely in Florida. It is located at the southern tip of the State and has shoreline on both the Atlantic Ocean and the Gulf of Mexico. Lake Okeechobee borders the MLRA to the north. Aside from sugar cane plantations in the north, the Everglades National Park, Big Cypress National Preserve, and the Big Cypress Seminole Indian Reservation comprise this area. Historical ditching, berming, and canals prevent natural water flow through this delicate ecosystem. To mitigate this, extensive restoration efforts have been implemented. Urban sprawl from Miami and cities to its north on the Atlantic Ridge has encroached along the eastern boundary of this area. Most of the MLRA has resisted urbanization because of a water table that is at or near the surface, a considerable acreage of unstable organic soils, and its identity as a national treasure.

About one-third of this area is in Native American reservations, national parks, game refuges, or other large holdings. Cypress forests are extensive in the area, but mangrove forests are widespread along the eastern and southern coasts. A large part of the area is open marsh. Much of the area is used for hunting, fishing, and other recreational activities. The cropland in the area is used mainly for winter vegetables, but citrus fruits, avocado, and papaya are grown on the better drained soils. Sugarcane is an important crop on the organic soils south of Lake Okeechobee. The acreage of improved pasture is increasing. Beef cattle are the principal kind of livestock, but dairying is an important enterprise locally. Urbanization is extensive along the eastern coast.

The major soil resource concerns are wind erosion, maintenance of the content of organic matter and productivity of the soils, and management of soil moisture and soil subsidence. Conservation practices on cropland generally include conservation crop rotations, cover crops, nutrient management, pest management, water-control structures, surface drainage systems (field ditches, mains, and laterals), pumping plants, and irrigation water management (including micro irrigation systems and surface and subsurface irrigation systems). Conservation practices on pasture and rangeland generally include prescribed grazing, brush management, pest management, prescribed burning, and watering facilities. Conservation practices on forestland generally include forest stand improvement, firebreaks, pest management, prescribed burning, and management of upland and wetland wildlife habitat.

LRU notes

There is not an official LRU for the MLRA 156A area. For the time being the technical team recommended to add the four terrestrial physiographic provinces ecoregions (Big Cypress, Everglades, Southern Coast and Islands, and Miami Ridge / Atlantic Coastal Strip) and one subaqueous ecoregion (Coastal Marine and Estuarine) on this section. This PES occurs within the Everglades ecoregion.

The Everglades region, 1 to 7 m (3 to 23 ft) in elevation and begins south of Lake Okeechobee to include the Everglades Agricultural Area, the water conservation areas, and the sawgrass and sloughs of the national park. The flat plain of saw-grass marshes, tree-islands, and marsh prairies, with cropland in the north, ranges in elevation from sea level to twenty feet. Peat, muck, and some clay are the main surficial materials over the limestone. Wide sloughs, marshes, and some small ponds contain most of the surface waters in this "River of Grass" region. Canals drain much of the water in some areas.

Classification relationships

All portions of the geographical range of this site falls under the following ecological / land classifications including:

-Environmental Protection Agency's Level 3 and 4 Ecoregions of Florida: 76 Southern Florida Coastal Plain; 76A Everglades (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013)

-Florida Natural Area Inventory, 2010 Edition: Freshwater Forested Wetlands (FNAI ,2010)

-Soil Conservation Service, 26 Ecological Communities of Florida: 14- Tropical Hardwood Hammocks,16- Scrub Cypress, 21- Swamp Hardwoods (Florida Chapter Soil and Water Conservation Society, 1989)

-Everglades National Park Ecosystems, National Park Service: Cypress, Hardwood Hammock (National Park Service, 2021)

Ecological site concept

The Subtropical Freshwater Forested Wetlands of Everglades are forested communities that occur as a rise surrounded by the adjacent marsh landscape, often giving the appearance of a "tree island". It is solely influenced via freshwater inputs from summer rainfall as well as flooding conditions from the lower marsh communities. They will occur sporadically across the landscape and may consist of both mineral and organic soils. The major threat to this ecological site is urban development, and was primarily traditionally used by Native American tribes when traversing across the Everglades. With European colonization, many of these islands have been converted to hunting camps or urban areas. These sites are very fragile and maintain high ecological diversity and are highly protected.

It is important to note there are multiple reference vegetative communities that may exist as tree islands (expressed in the State and Transition Model). They are all included in one ESD due to the similar management considerations, flooding frequency, soil components, geomorphic positions, and mapping constraints which may be amended with a higher detail survey in future projects.

Associated sites

R156AY220FL	**Subtropical Freshwater Non-Forested Glades Marshes and Slough Wetlands of Everglades** The Subtropical Freshwater Non-Forested Glades Marshes and Slough Wetlands of Everglades are found in the lower landscape positions and attribute to the flooding frequency and duration of the forested wetlands.
R156AY230FL	**Subtropical Marl Prairies of Everglades** The Subtropical Marl Prairies of Everglades are found in lower landscape positions and attribute to the flooding frequency and duration of the forested wetlands.

Similar sites

F156AY030FL	**Subtropical Moist Hammocks of Big Cypress** The Subtropical Moist Hammocks of Big Cypress is found in a separate ecoregion in greater extent and landscape positions outside of knolls as tree islands. Resource concerns are different and require different management needs.
F156AY050FL	**Subtropical Freshwater Cypress Swamps of Big Cypress** The Subtropical Freshwater Cypress Swamps of Big Cypress is found in a separate ecoregion in greater extent and landscape positions outside of knolls as tree islands. Resource concerns are different and require different management needs.
F156AY350FL	**Subtropical Forested Rocklands of Miami Ridge / Atlantic Coastal Strip** The Subtropical Forested Rocklands of Miami Ridge / Atlantic Coastal Strip is found in a separate ecoregion in greater extent and landscape positions outside of knolls as tree islands. Resource concerns are different and require different management needs.

F156AY360FL	**Subtropical Moist Hammocks of Miami Ridge / Atlantic Coastal Strip** The Subtropical Moist Hammocks of Miami Ridge / Atlantic Coastal Strip is found in a separate ecoregion in greater extent and landscape positions outside of knolls as tree islands. Resource concerns are different and require different management needs.
F156AY020FL	**Subtropical Forested Rocklands of Big Cypress** The Subtropical Forested Rocklands of Big Cypress is found in a separate ecoregion in greater extent and landscape positions outside of knolls as tree islands. Resource concerns are different and require different management needs.

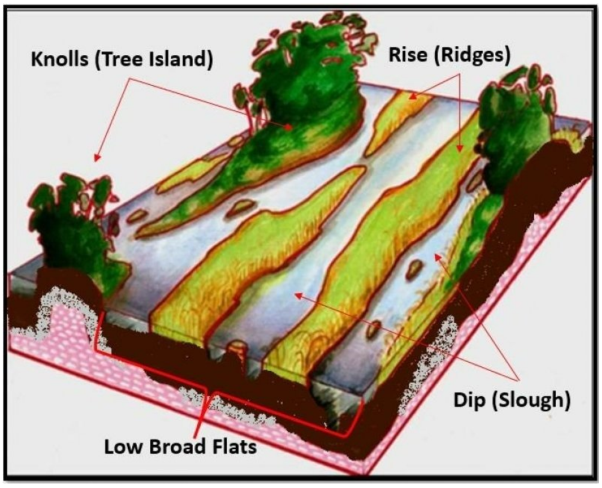


Figure 1. Similar and Associated Sites usually found in conjunction with this ESD.

Figure 2. Associated site aerial Google Earth snippet of tree islands (F156AY210FL) in surrounding glades marsh (R156AY220FL) near Shark Valley in Everglades National Park.

Table 1. Dominant plant species

Tree	(1) *Persea palustris* (2) *Magnolia virginiana*
Shrub	(1) *Chrysobalanus icaco* (2) *Morella cerifera*
Herbaceous	(1) *Osmunda cinnamomea* (2) *Crinum americanum*

Physiographic features

These areas will occur as variable sized convex - linear and convex - convex knolls and rises in an otherwise extremely flat landscape. These communities will develop over the topographic highs in the underlying limestone on recent (Pliocene and Pleistocene) marine deposits and organic deposits. Islands can often be teardrop or oblong shaped from aerial views in a north to south direction due to directional flow of the water around the island, leaving the backside more sheltered, allowing for more development of organic materials. Small circular pop-up islands may occur in lesser extent, and over time will provide shelter along the backside of the island, allowing for organic matter accumulation. Due to extended hydroperiods, there is often no sharp transitional boundary between island and marsh, and often will have smaller stunted trees growing along the outer edge.

The geology of the Everglades ecoregion falls under two separate geologic formations: the Pliocene epochs shell-bearing sediments and the most recent Pleistocene epochs Miami Limestone. These Pliocene shell-bearing sediments are complex, varying from unconsolidated, variably calcareous and fossiliferous quartz sands to well indurated, sandy, fossiliferous limestones (both marine and freshwater). Clayey sands and sandy clays are present. The Miami Limestone consists of two facies, an oolitic facies and a bryozoan facies. The oolitic facies consists of white to orangish gray, poorly to moderately indurated, sandy, oolitic limestone (grainstone) with scattered concentrations of fossils. The bryozoan facies consists of white to orangish gray, poorly to well indurated, sandy, fossiliferous limestone (grainstone and packstone). Beds of quartz sand are also present as un-indurated sediments and indurated limey sandstones. Fossils present include mollusks, bryozoans, and corals. Molds and casts of fossils are common (Scott, 2001).

Figure 3. The Everglades ecoregion, extending from the Everglades Agriculture Area (EAA) in the north to the tidal extent of Everglades National Park in the south.

Table 2. Representative physiographic features

Slope shape across	(1) Convex
Slope shape up-down	(1) Convex (2) Linear
Geomorphic position, terraces	(1) Riser
Geomorphic position, flats	(1) Rise
Landforms	(1) Coastal plain (2) Everglades > Marine terrace > Rise (3) Marine terrace > Knoll
Runoff class	Very low to low
Flooding duration	Extremely brief (0.1 to 4 hours) to long (7 to 30 days)
Flooding frequency	Occasional
Ponding frequency	None
Elevation	3–23 ft
Slope	0–2%

Ponding depth	0–61 in
Water table depth	3–6 in
Aspect	Aspect is not a significant factor

Climatic features

The climate of MLRA 156A is subtropical, with mild winters and hot wet summers. The average annual precipitation of this MLRA is 37 to 62 inches (950 to 1,565 millimeters). About 60 percent of the precipitation occurs from June through September. Most of the rainfall occurs during moderate intensity, tropical storms that produce large amounts of rain from late spring through early autumn. Late autumn and winter are relatively dry. The average annual temperature of the MLRA is 74 to 78 degrees F (23 to 26 degrees C). The freeze-free period of the MLRA averages 355 days and ranges from 345 to 365 days.

The following tables and graphs consist of specific climate stations found within the range of this ecological site within this MLRA.

Table 3. Representative climatic features

Frost-free period (characteristic range)	365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	50-58 in
Frost-free period (actual range)	365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	42-62 in
Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	53 in

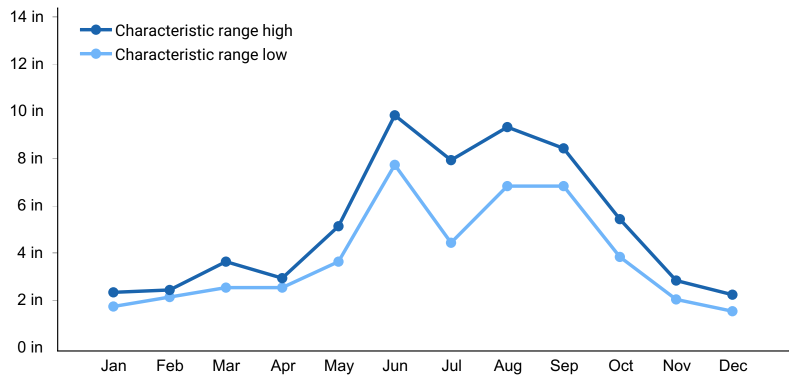


Figure 4. Monthly precipitation range

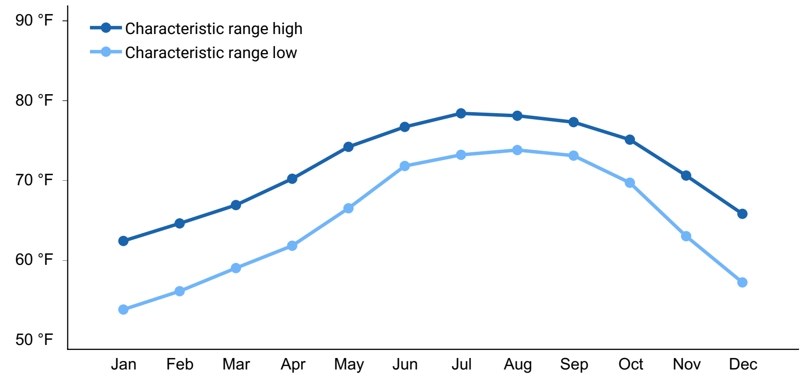


Figure 5. Monthly minimum temperature range

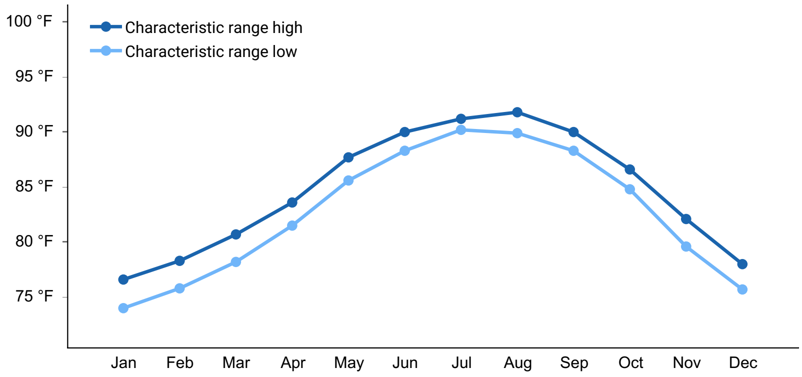


Figure 6. Monthly maximum temperature range

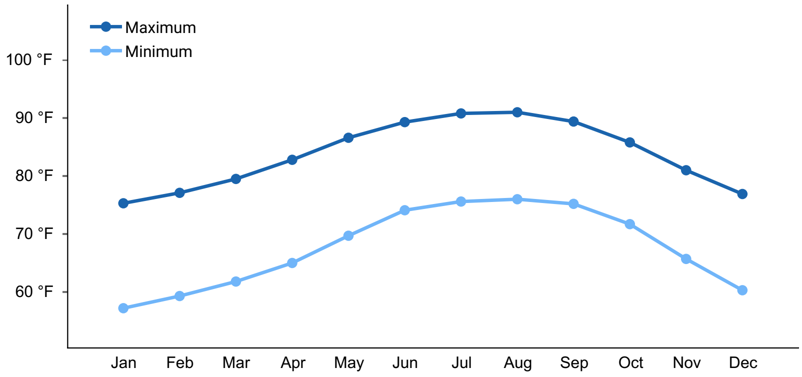


Figure 7. Monthly average minimum and maximum temperature

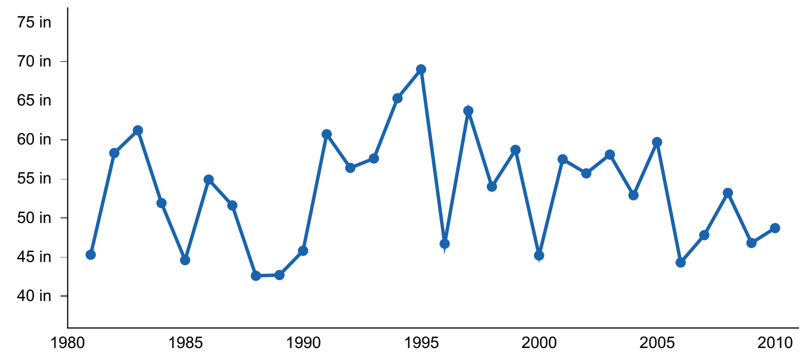


Figure 8. Annual precipitation pattern

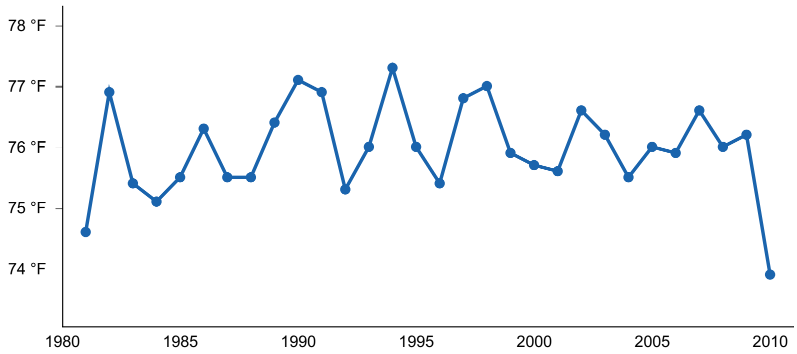


Figure 9. Annual average temperature pattern

Climate stations used

- (1) ISLAMORADA [USC00084320], Islamorada, FL
- (2) TAMIAMI TRL 40 MI BEND [USC00088780], Miami, FL
- (3) DRY TORTUGAS [USC00082418], Key West, FL
- (4) OASIS RS [USC00086406], Ochopee, FL
- (5) EVERGLADES [USC00082850], Naples, FL
- (6) SOUTH BAY 15 S [USC00088368], Southwest Palm Beach Co, FL
- (7) CANAL POINT USDA [USC00081276], Belle Glade, FL
- (8) HOMESTEAD GEN AVIATION [USC00084095], Homestead, FL
- (9) HOLLYWOOD NORTH PERRY AP [USW00092809], Hollywood, FL
- (10) MIAMI WSO CITY [USW00012859], Miami, FL

Influencing water features

Much of the water for this ecosite comes from rainfall and flooding from adjacent glades marsh and slough wetlands (R156AY220FL). Rainfall is dominant during the summer months (June to October), which attribute to the ponding conditions of the surrounding marshes. Once the surrounding area has ponded to a specific height (locality dependent due to changes in microtopography), it will begin to slowly move as massive sheet water flow. This is very slow moving water, moving about 1 meter per hour. As these slow moving flooding conditions begin throughout the landscape, with Lake Okeechobee as the biggest source of overflow, conditions will often last throughout the summer months and completely saturate and flood the tree islands for extended periods of time. Often many of the hunter camps were built on stilts to avoid the flooded conditions, or have brought in fill to artificially raise the ground level.

The Everglades were often only accessible by boat during the summer seasons, and were used primarily during the dry season by Native Americans and wildlife. During the dry season, the marshes may still retain standing water, whereas the tree islands may be wet but not inundated under natural conditions. However, much of these areas towards the headwaters of the Everglades have been drained and/ or channelized, altering the natural hydrologic flows of the area. Many projects are underway, including those from the National Park System and US Army Corp of Engineers to restore natural hydroperiods and maintain community structure. These include removing the roads, which block water flow except for a few culverts, and replacing them with low bridges expanding across large areas, or filling in canals and creating large berms to restore natural hydrologic conditions.

Wetland description

Wetland Description: Cowardian
System: Palustrine
Subsystem: N/A
Class: Forested Wetland

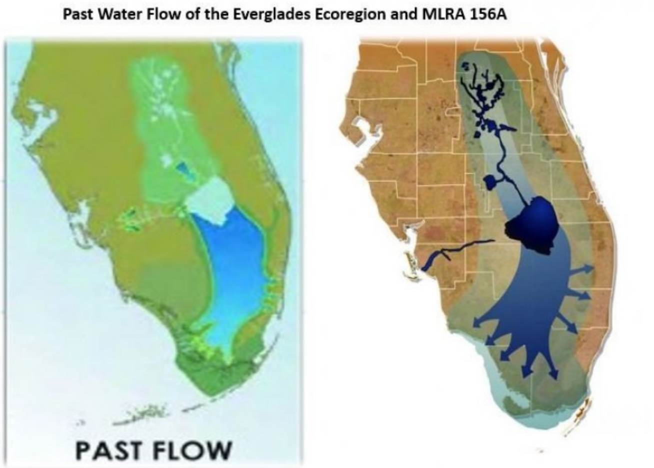


Figure 10. Past Water Flow of the Everglades Ecoregion and MLRA 156A before anthropogenic interference.

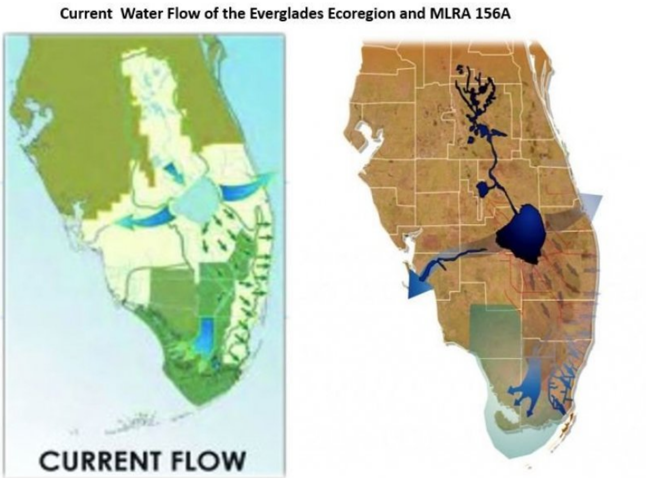


Figure 11. Current Water Flow of the Everglades Ecoregion and MLRA 156A.

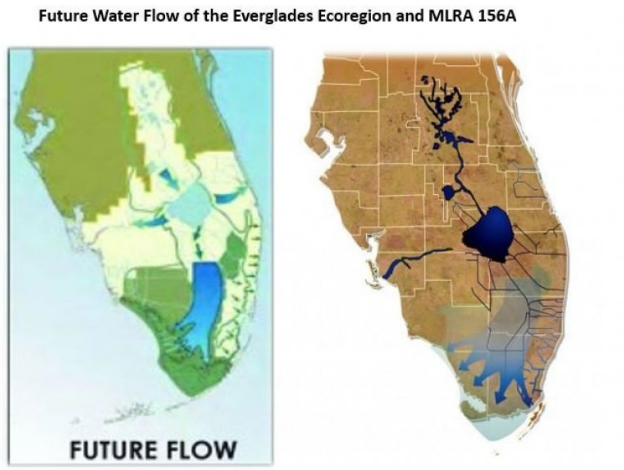


Figure 12. Future Water Flow of the Everglades Ecoregion and MLRA 156A following hydrologic restoration proposals.

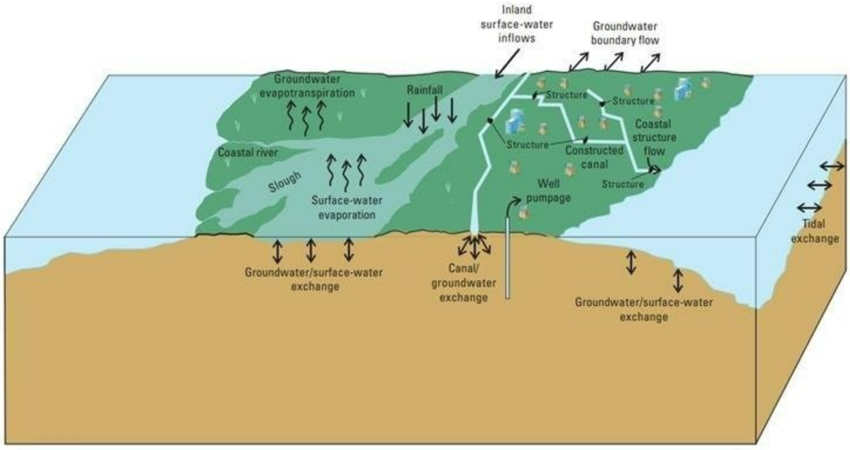


Figure 13. Conceptual hydrologic system model of South Florida. Image modified from Swain et al. 2019.

Soil features

Soils associate with this ecological site occur in the isohyperthermic soil temperature regime of MLRA 156A. The isohyperthermic soil temperature regime has mean annual soil temperatures of 22 °C (72ºF) or more and a difference between mean summer and mean winter soil temperatures of less than 5 °C (41ºF) at 50 cm (20 inches) below the surface.

Much of the Florida peninsula south of Lake Okeechobee is a flat limestone plain of recent (Pliocene/Pleistocene) origin with peat and marl substrates deposited directly on the limestone platform. Dominantly shallow to very deep, nearly level, soils formed in organic sapric materials range from 18 to 300 centimeters (7 to 120 inches) thick. Sapric materials fiber content range from 30 to 60% of unrubbed fiber content and from 1 to 17% of rubbed fiber content. Drainage is very poorly drained. Unless limed, the reaction in the surface layer ranges from extremely acid to slightly alkaline. In many areas where the hydroperiod is shorter mineral soil materials like sandy, loamy, and/or marl materials may be present. Mineral content thickness on the tree islands thickness range from 18 to 51centimeters (7 to 20 inches) to the limestone contact. A few members have either a mollic or umbric horizon. Areas where the hydroperiods are longer and stay saturated due to the surrounded wetlands longer hydroperiods will support organic sapric materials ranging from 18 to 203 centimeters (7 to 80 inches). Coral limestone bedrock underlies most of the area which is Karstic in nature, with depth to the bedrock ranging from 18 to greater than 204 centimeters (7 to 80 + inches). Representative soils may include Loxahatche, BuffaloTiger, MacksCamp, SharkValley, Gator Lake, and CooperTown.

Figure 14. Buffalo Tiger - Cooper Town - Biscayne Soils

Figure 15. Macks Camp - Jupiter Soils

Table 4. Representative soil features

Parent material	(1) Herbaceous organic material (2) Marl–calcareous sandstone (3) Marine deposits–limestone
Surface texture	(1) Mucky, peaty, marly fine sand
Drainage class	Very poorly drained
Permeability class	Moderate to rapid
Depth to restrictive layer	10–80 in
Soil depth	10–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-30in)	0.15–14.5 in
Calcium carbonate equivalent (0-30in)	0–95%
Clay content (0-30in)	0–10%
Electrical conductivity (0-30in)	0–32 mmhos/cm
Sodium adsorption ratio (0-30in)	0–30
Soil reaction (1:1 water) (0-80in)	3.5–7.8
Subsurface fragment volume <=3" (0-80in)	0%
Subsurface fragment volume >3" (0-80in)	0%

Ecological dynamics

The information presented in this ecological site description (ESD) and state-and-transition model (STM) were developed using archaeological and historical information, published and unpublished scientific reports, professional experience, consultation with technical experts, and NRCS inventories and studies. The information presented represents a complex set of plant community dynamic and environmental variables. Not all scenarios or plants are represented and included. Key indicator plants, animals, and ecological processes are described to help guide land management decisions and actions.

The Subtropical Freshwater Forested Wetland of the Everglades are isolated areas of mineral soil or organic materials on knolls (Tree Islands) above the sawgrass prairie that have shorter hydroperiods and are subject to frequent flooded conditions (3 weeks [8 to 30 cm (3 to 12")]) that support hardwood and “dry” tree islands vegetation. A heavy canopy closure, causing deep interior shade, is prevalent. These conditions contribute with the control of the temperature and moisture retention. The vegetation is dense, heavy, strong wood, and shallow spreading root system which adapt them to harsh wind, periodic droughts and flooding conditions.

The Subtropical Freshwater Forested Wetland of the Everglades mainly occurs in the Florida peninsula of the Everglades, and probably do not occur north of Lake Okeechobee. The extent covers Palm Beach County, Collier County, Monroe County, Broward County, and Miami-Dade County with only small occurrences further west immediately adjacent to salt marshes. It is less widespread on the east coast but may be found on the St. John’s River floodplain and just inland of salt marshes along the northeastern coast.

Natural Process:
Hydric Hammock; short hydroperiods and flooding frequency are the primary factors in species composition. While most hydric hammock trees are at least somewhat adapted to flooding, the ranges of tolerance vary according to timing and depth of inundation. Fire is not considered an important component of hydric hammock dynamics; however, they do burn occasionally.

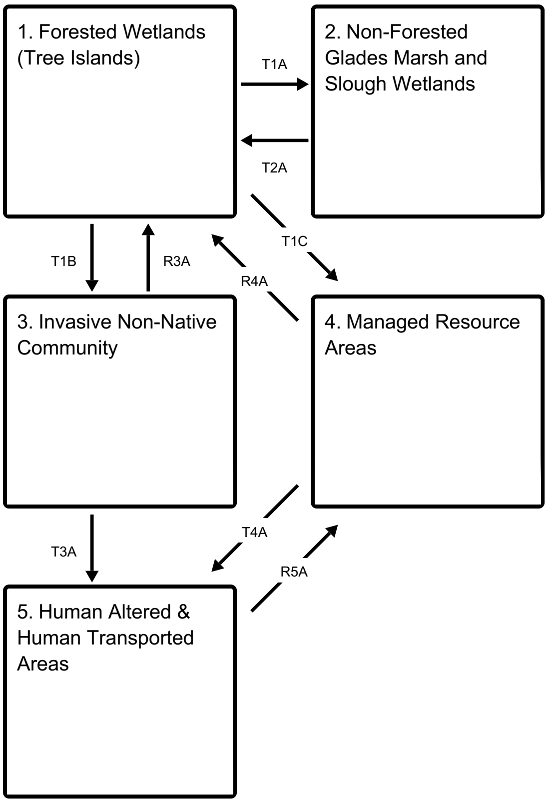
Strands Swamps; longer hydroperiods and fire occurs rarely in strand swamps, with the largest trees on the deepest peat towards the center of the strand burning least frequently. However, fires from surrounding sawgrass marsh communities can frequently burn into the outer edges of strand swamps. In this way, occasional fire contributes to the maintenance of a cypress dominated community. Cypress is very tolerant of light surface fires, but muck fires burning into the peat can kill the trees and lower the ground surface, transforming a strand swamp into a slough. Where severe fires have killed cypress, coastal plain willow commonly establishes as a thicket.

Baygall; short hydroperiods and flooding frequency are the primary factors in species composition. Leaf litter accumulation raises the soil level, allowing bay species that require a shorter hydroperiod to become established. As the broad-leaved species proliferate, the shade-intolerant cypress and swamp tupelo seedlings are inhibited, shifting vegetation and soil conditions to favor broadleaf species that can germinate and grow in low light. The dominant baygall species are fire-intolerant, and a mature canopy indicates the lack of destructive fire for many years. Although the saturated soils and humid conditions within baygalls typically inhibit fire, droughts may create conditions that allow them to burn catastrophically. These fires not only destroy the canopy, but also may ignite the deep peat layers that can smolder for weeks, or even months. This occurs perhaps only a few times each century in the deepest baygalls. Where the peat layer is destroyed, the lower soil level may collect open water that can be re-colonized by marsh or cypress swamp vegetation.

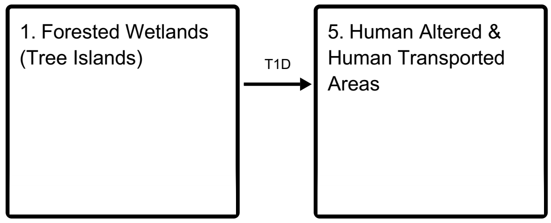
Thus, certain vegetation types (baygall, basin swamp, shrub bog, and open water) have been described as a “moving mosaic” of vegetation determined by fire history and hydrology. In South Florida bayheads, severe fires that consume the peat can convert a bay-dominated forest to a lower thicket of coastalplain willow (*Salix caroliniana*).

State and transition model

Ecosystem states



States 1 and 5 (additional transitions)



T1A - Island Destruction

T1B - Invasion of Non-Native / Exotic Species

T1C - Modified for Desired Land Use

T1D - Human Alteration / Transportation of Materials

T2A - Organic Matter Accumulation / Woody Species Development

R3A - Mechanical / Biological / Chemical Removal of Species

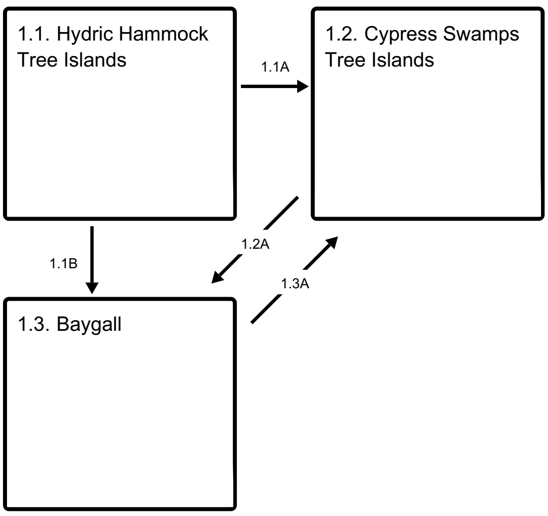
T3A - Human Alteration / Transportation of Materials

R4A - Landscape and Habitat Restoration

T4A - Human Alteration / Transportation of Materials

R5A - Modified Land Restoration

State 1 submodel, plant communities



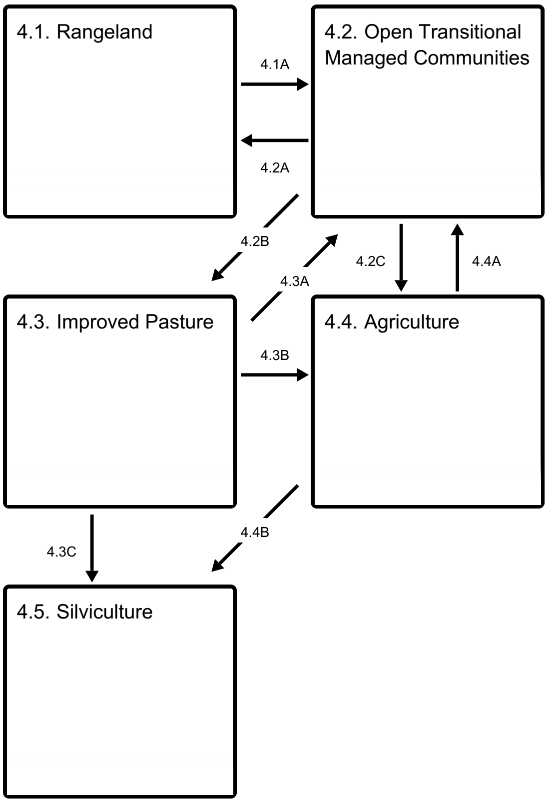
1.1A - Increase in Long-Term Hydroperiod

1.1B - Organic Matter Accumulation

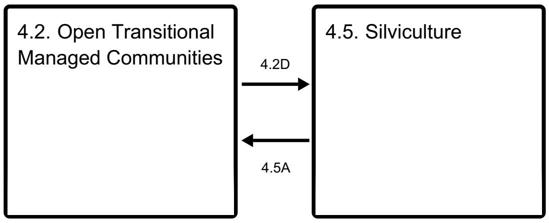
1.2A - Decrease in Long-Term Hydroperiod

1.3A - Peat Fires/ Increase in Long-Term Hydroperiod / Cypress Seedbank Propagation

State 4 submodel, plant communities

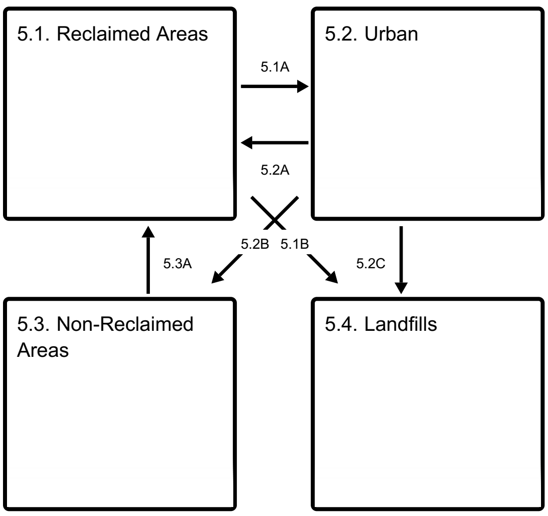


Communities 2 and 5 (additional pathways)



4.1A - Land Clearing Practices
4.2A - Habitat Restoration
4.2B - Pasture Preparation
4.2C - Agricultural Preparation
4.2D - Silvicultural Preparation
4.3A - Land Clearing Practices
4.3B - Agricultural Preparation
4.3C - Silvicultural Preparation
4.4A - Land Clearing Practices
4.4B - Silvicultural Practices
4.5A - Land Clearing Practices

State 5 submodel, plant communities



5.1A - Urban Development
5.1B - Waste Accumulation
5.2A - Land Reclamation

5.2B - Urban Development

5.2C - Waste Accumulation

5.3A - Land Reclamation

State 1
Forested Wetlands (Tree Islands)

Figure 16. Tree Island in WCA 2, seen from airboat travelling through sawgrass marsh. From a distance these often appear as densely vegetated areas with sparse trees growing out along the periphery. This island is dominated by cypress.

These occur as isolated areas of mineral soil or organic materials on knolls which support freshwater forested wetland species. These are the "Tree Islands" seen throughout the Everglades that rise above the sawgrass prairies and are subject to frequent flooding conditions during the wet season. They are dominated by a heavy canopy closure, causing deep interior shade, which help control the temperature and moisture retention. The vegetation is dense, heavy, strong wood, and shallow spreading root systems which adapt these species to harsh wind, periodic droughts, fire, and flooding conditions. It is important to note there are multiple vegetative communities that may exist as tree islands (expressed in the submodel). They are all included in one ESD due to the similar management considerations, flooding frequency, soil components, geomorphic positions, and mapping constraints which may be amended with a higher detail survey in future projects.

Characteristics and indicators. These are the tree islands which rise above the landscape within the Everglades ecoregion. They are generally small in size and orientated in a north south direct in aerial images. During the dry season (November to June) the island may be completely dry and support understory vegetation. During the wet season, the surrounding sawgrass marshes may create flooding conditions which submerge the understory of these islands. These are highly protected communities and hold high cultural importance with the local Native American tribes.

Resilience management. Resilience for these communities is dependent on the specific vegetative community (described in the submodel). However, extended hydroperiods and fire frequency and intensity are the two most important factors in this environment. Extended hydroperiods may cause erosion problems to the mineral islands, destroying this community. Extreme fires may destroy the organic islands, with the absence of fire allowing expansion of the community. Typically once a mineral island is destroyed it cannot be restored, but may be replaced by an organic island (baygall / willow head). Hydrologic management would need to be addressed from the source of flooding, the extensive canals and ditches used to drain the Everglades Agricultural Areas immediately adjacent off the south side of Lake Okeechobee.

Dominant plant species

- coastal plain willow (*Salix caroliniana*), tree
- coco plum (*Chrysobalanus icaco*), tree
- bald cypress (*Taxodium*), tree
- Florida strangler fig (*Ficus aurea*), tree
- pond apple (*Annona glabra*), tree
- live oak (*Quercus virginiana*), tree
- cabbage palmetto (*Sabal palmetto*), tree
- false tamarind (*Lysiloma latisiliquum*), tree
- Florida fishpoison tree (*Piscidia piscipula*), tree
- false mastic (*Sideroxylon foetidissimum*), tree
- common buttonbush (*Cephalanthus occidentalis*), tree
- island marlberry (*Ardisia escallonoides*), shrub
- West Indian milkberry (*Chiococca alba*), shrub
- Seminole balsamo (*Psychotria nervosa*), shrub
- panicgrass (*Panicum*), grass
- hilograss (*Paspalum conjugatum*), grass
- Jamaica swamp sawgrass (*Cladium mariscus ssp. jamaicense*), grass
- airplant (*Tillandsia*), other herbaceous
- inland leatherfern (*Acrostichum danaeifolium*), other herbaceous
- polypody (*Polypodium*), other herbaceous

Dominant resource concerns

- Wind erosion
- Bank erosion from streams, shorelines, or water conveyance channels
- Subsidence
- Organic matter depletion
- Seasonal high water table

Community 1.1
Hydric Hammock Tree Islands

These are evergreen, hardwood, and / or palm forests with a variable understory typically dominated by palms and ferns occurring on moist mineral soils, often with limestone very near the surface. While species composition varies, the community generally has a closed canopy of oaks and palms, and open understory, and a sparse to a moderate groundcover of grasses and ferns. The species composition is mainly influenced by flooding patterns. In saturated and frequently flooded environments, more hydrophytic trees become more abundant. Frequency and depth of inundation have a pronounced effect on oak canopy composition as well, with saturated soils supporting more swamp laurel oak, and areas of infrequent flooding supporting more live oak. Flooding conditions contribute to hydric conditions and sapric organic material retention. Soils are variable, usually somewhat acidic to slightly alkaline with sapric organic matter, and mineral soils materials overlie a layer of Oligocene limestone near the surface and in some case deeper than 204 cm.

Forest overstory. The canopy is dominated by swamp laurel oak (Quercus laurifolia) and/or live oak (Q. virginiana) with varying amounts of cabbage palm (Sabal palmetto), American elm (Ulmus americana), sweetbay (Magnolia virginiana), red cedar (Juniperus virginiana), red maple (Acer rubrum), sugarberry (Celtis laevigata), sweetgum (Liquidambar styraciflua), and water oak (Q. nigra). Cabbage palm is a common to dominant component of hydric hammock throughout most of Florida. Loblolly pine (Pinus taeda) may be frequent in some areas, but slash pine (Pinus elliottii) is less frequently encountered.

Forest understory. In addition to saplings of canopy species, the understory may contain a number of small trees and shrubs. American hornbeam (Carpinus caroliniana) is often frequent, and various other woody species may be present including swamp dogwood (Cornus foemina), small-leaf viburnum (Viburnum obovatum), common persimmon (Diospyros virginiana), swamp bay (Persea palustris), wax myrtle (Myrica cerifera), dwarf palmetto (Sabal minor), American beautyberry (Callicarpa americana), and needle palm (Rhapidophyllum hystrix). Vines may be frequent and diverse; common species are eastern poison ivy (Toxicodendron radicans), peppervine (Ampelopsis arborea), rattan vine (Berchemia scandens), trumpet creeper (Campsis radicans), climbing hydrangea (Decumaria barbara), yellow jessamine (Gelsemium sempervirens), greenbriers (Smilax spp.), summer grape (Vitis aestivalis), and muscadine (Vitis rotundifolia). Herb cover, when present includes mostly graminoids and ferns with the following species commonly encountered: sedges (Carex spp.), woodoats (Chasmanthium spp.), smooth elephantsfoot (Elephantopus nudatus), Carolina scalystem (Elytraria caroliniensis), woodsgrass (Oplismenus hirtellus), maiden ferns (Thelypteris spp.), cinnamon fern (Osmunda cinnamomea), royal fern (Osmunda regalis var. spectabilis), toothed midsorus fern (Blechnum serrulatum), netted chain fern (Woodwardia areolata), and Virginia chain fern (Woodwardia virginica). Epiphytes such as golden polypody (Phlebodium aureum), air-plants (Tillandsia spp.), and shoestring fern (Vittaria lineata) increase in frequency to the south along with other more subtropical shrubs such as myrsine (Rapanea punctata), and wild coffee (Psychotria nervosa).

Dominant plant species

- laurel oak (*Quercus laurifolia*), tree
- live oak (*Quercus virginiana*), tree
- cabbage palmetto (*Sabal palmetto*), tree
- American elm (*Ulmus americana*), tree
- sweetbay (*Magnolia virginiana*), tree
- eastern redcedar (*Juniperus virginiana*), tree
- red maple (*Acer rubrum*), tree
- sugarberry (*Celtis laevigata*), tree
- sweetgum (*Liquidambar styraciflua*), tree
- water oak (*Quercus nigra*), tree
- pine (*Pinus*), tree
- American hornbeam (*Carpinus caroliniana*), shrub
- stiff dogwood (*Cornus foemina*), shrub
- small-leaf arrowwood (*Viburnum obovatum*), shrub
- swamp bay (*Persea palustris*), shrub
- wax myrtle (*Morella cerifera*), shrub
- American beautyberry (*Callicarpa americana*), shrub
- eastern poison ivy (*Toxicodendron radicans*), other herbaceous
- peppervine (*Nekemias arborea*), other herbaceous
- Alabama supplejack (*Berchemia scandens*), other herbaceous
- trumpet creeper (*Campsis radicans*), other herbaceous
- woodvamp (*Decumaria barbara*), other herbaceous
- evening trumpetflower (*Gelsemium sempervirens*), other herbaceous
- greenbrier (*Smilax*), other herbaceous
- summer grape (*Vitis aestivalis*), other herbaceous
- muscadine (*Vitis rotundifolia*), other herbaceous
- maiden fern (*Thelypteris*), other herbaceous
- cinnamon fern (*Osmunda cinnamomea*), other herbaceous
- royal fern (*Osmunda regalis var. spectabilis*), other herbaceous
- toothed midsorus fern (*Blechnum serrulatum*), other herbaceous
- airplant (*Tillandsia*), other herbaceous
- resurrection fern (*Pleopeltis polypodioides*), other herbaceous
- golden polypody (*Phlebodium aureum*), other herbaceous
- shoestring fern (*Vittaria lineata*), other herbaceous

Community 1.2
Cypress Swamps Tree Islands

These areas are cypress dominated forests with longer hydroperiods and mainly flooded. They are dominated primarily by bald cypress (*Taxodium distichum*). Smaller cypress swamps and shallow edges may instead contain pond cypress (*T. ascendens*). Small, young cypress trees at the outer edge of swamps grade into large old ones in the deeper interior, giving a strand a distinctly rounded cross-sectional profile. The warm, humid climate in cypress swamps make it ideal habitat for epiphytic orchids and bromeliads. While the greatest diversity of these epiphytes may be found along the oldest swamps, several are common throughout the swamp. Cypress swamp soils are sapric soils materials and mineral materials over limestone. Swamps with larger cypress and a more diverse understory are on deep sapric soils materials that acts as a wick to draw moisture from groundwater up into the root zone during droughts. The normal hydroperiod ranges from 100 to 300 days. Water levels rise with increasing rainfall around June and then decrease to their lowest levels during winter and early spring.

Forest overstory. The overstory is dominated primarily by bald cypress (Taxodium distichum). Smaller swamps and shallow edges may instead contain pond cypress (T. ascendens). A variety of air-plants (Tillandsia spp.), particularly common wild-pine (Tillandsia fasciculata), are often abundant on trees.

Forest understory. The variable woody understory contains a mixture of temperate and tropical elements, mainly red maple (Acer rubrum), pond apple (Annona glabra), swamp laurel oak (Quercus laurifolia), cabbage palm (Sabal palmetto), strangler fig (Ficus aurea), swamp bay (Persea palustris), sweetbay (Magnolia virginiana), coastalplain willow (Salix caroliniana), wax myrtle (Myrica cerifera), myrsine (Rapanea punctata), and common buttonbush (Cephalanthus occidentalis), Florida royal palm (Roystonea regia) may also be present in the subcanopy. Herbs include string lily (Crinum americanum), giant leather fern (Acrostichum danaeifolium), toothed midsorus fern (Blechnum serrulatum), royal fern (Osmunda regalis var. spectabilis), sawgrass (Cladium jamaicense), and waterhyssops (Bacopa spp). Vines such as eastern poison ivy (Toxicodendron radicans) and white twinevine (Sarcostemma clausum) may be common.

Dominant plant species

- bald cypress (*Taxodium distichum*), tree
- pond cypress (*Taxodium ascendens*), tree
- red maple (*Acer rubrum*), shrub
- pond apple (*Annona glabra*), shrub
- laurel oak (*Quercus laurifolia*), shrub
- cabbage palmetto (*Sabal palmetto*), shrub
- Florida strangler fig (*Ficus aurea*), shrub
- swamp bay (*Persea palustris*), shrub
- sweetbay (*Magnolia virginiana*), shrub
- coastal plain willow (*Salix caroliniana*), shrub
- wax myrtle (*Morella cerifera*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- airplant (*Tillandsia*), other herbaceous
- shoestring fern (*Vittaria lineata*), other herbaceous
- seven sisters (*Crinum americanum*), other herbaceous
- inland leatherfern (*Acrostichum danaeifolium*), other herbaceous
- toothed midsorus fern (*Blechnum serrulatum*), other herbaceous
- royal fern (*Osmunda regalis var. spectabilis*), other herbaceous
- eastern poison ivy (*Toxicodendron radicans*), other herbaceous
- greenbrier (*Smilax*), other herbaceous

Community 1.3
Baygall

These areas are evergreen forested wetland of bay species situated at the knolls or tree islands in the Everglades Ecoregion. Baygall typically develops on wet soils at the bases of slopes, edges of tree islands, in depressions, and in stagnant drainages. Rainfall, and/or capillary action from adjacent wetlands maintains a saturated peat substrate. While baygalls are not generally influenced by flowing water, they are often drained by the surrounding slow moving water. Within the slough and glades marsh communities of the Everglades in South Florida, baygall may develop on elevated islands of peat (often called “bay heads”). Although most baygalls are small in acreage, some form large, mature forests, often called “bay swamps.” The canopy and understory do not generally form distinct strata but may appear as a dense, tall thicket.

Forest overstory. Slash pine (P. elliottii), and/or pond pine (P. serotina), sweetbay (Magnolia virginiana), and/or swamp bay (Persea palustris) form an open too dense tree canopy and are also dominant in the understory along with fetterbush (Lyonia lucida), large gallberry (Ilex coriacea), dahoon (I. cassine), myrtle dahoon (I. cassine var. myrtifolia), wax myrtle (Myrica cerifera), coastal doghobble (Leucothoe axillaris), swamp doghobble (L. racemosa), red maple (Acer rubrum), Florida anisetree (Illicium floridanum), coco plum (Chrysobalanus icaco), and/or Virginia willow (Itea virginica). Wetter baygalls may contain cypress species (Taxdium spp.).

Forest understory. Vines, especially laurel greenbrier (Smilax laurifolia), coral greenbrier (S. walteri), and muscadine (Vitis rotundifolia), may be abundant and contribute to the often-impenetrable nature of the understory. Herbs are absent or few, and typically consist of ferns such as cinnamon fern (Osmunda cinnamomea), netted chain fern (Woodwardia areolata), and Virginia chain fern (W. virginica). Sphagnum mosses (Sphagnum spp.) are common.

Dominant plant species

- sweetbay (*Magnolia virginiana*), tree
- swamp bay (*Persea palustris*), tree
- pond pine (*Pinus serotina*), tree
- bald cypress (*Taxodium*), tree
- sweetbay (*Magnolia virginiana*), shrub
- swamp bay (*Persea palustris*), shrub
- fetterbush lyonia (*Lyonia lucida*), shrub
- large gallberry (*Ilex coriacea*), shrub
- dahoon (*Ilex cassine*), shrub
- Virginia sweetspire (*Itea virginica*), shrub
- airplant (*Tillandsia*), other herbaceous
- greenbrier (*Smilax*), other herbaceous
- muscadine (*Vitis rotundifolia*), other herbaceous
- osmunda (*Osmunda*), other herbaceous
- toothed midsorus fern (*Blechnum serrulatum*), other herbaceous
- chainfern (*Woodwardia*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

Hydric hammock tree islands may transition to cypress swamp tree islands with an increase in long-term hydroperiod. This shift in hydroperiod will create longer flooding durations which only extreme hydrophytic trees such as cypress can endure.

Pathway 1.1B
Community 1.1 to 1.3

Hydric hammock tree islands may transition to baygalls if organic matter is allowed to accumulate from lack of fire. Leaf litter accumulation raises the soil level, allowing bay species that require a shorter hydroperiod to become established. As the broad-leaved species proliferate, the shade-intolerant cypress and swamp tupelo seedlings are inhibited, shifting vegetation and soil conditions to favor broadleaf baygall species that can germinate and grow in low light.

Pathway 1.2A
Community 1.2 to 1.3

Cypress swamp tree islands may transition to baygalls with a decrease in long-term hydroperiod. This may be the result of organic matter accumulation from the exclusion of light surface fires over time. Leaf litter accumulation raises the soil level, allowing bay species that require a shorter hydroperiod to become established. As the broad-leaved species proliferate, the shade-intolerant cypress and swamp tupelo seedlings are inhibited, shifting vegetation and soil conditions to favor broadleaf species that can germinate and grow in low light.

Pathway 1.3A
Community 1.3 to 1.2

Baygalls may transition to cypress swamp tree islands with an increase in long-term hydroperiod from peat fires. Droughts may create conditions that allow for the highly organic soils to burn catastrophically. These fires not only destroy the baygall canopy, but may also ignite the deep peat layers, destroying them and lowering the soil surface to be recolonized by marsh or cypress swamp vegetation, depending on the seedbank present.

State 2
Non-Forested Glades Marsh and Slough Wetlands

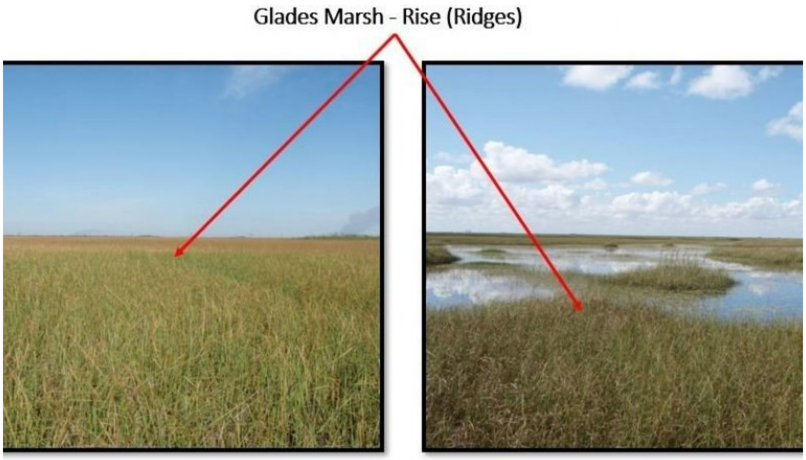


Figure 17. Glades Marsh wetlands

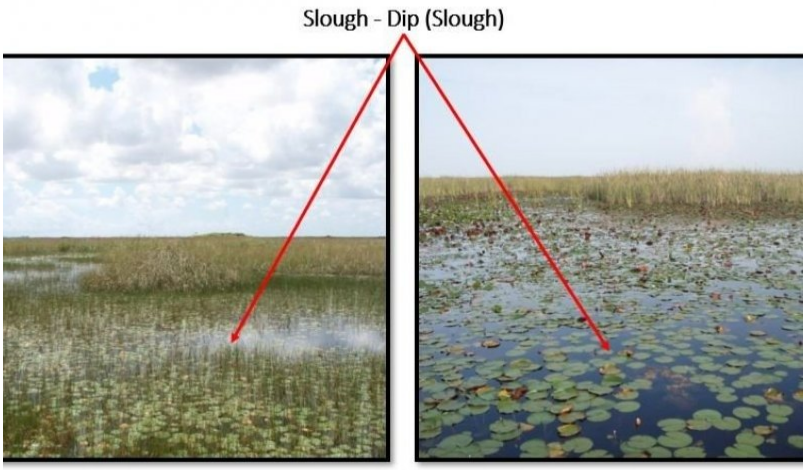


Figure 18. Slough wetlands

This state directly correlates with the Non-Forested Glades Marsh and Slough Wetlands Ecological Site and all information regarding this ESD should be referred to in R156AY220FL. This state becomes dominant in replacement of tree islands when they become destroyed. This can be due to hydrologic erosion of mineral soil tree islands by increased hydrologic flow due to human alteration or via destruction from intense fire during drought in the organic soil tree islands.

Characteristics and indicators. These are the sawgrass marsh and slough wetlands that are dominated by vast expanses of sawgrass with open drainageways throughout.

Dominant plant species

- Jamaica swamp sawgrass (*Cladium mariscus ssp. jamaicense*), grass

Dominant resource concerns

- Wind erosion
- Subsidence
- Organic matter depletion

- Concentration of salts or other chemicals
- Seasonal high water table

State 3
Invasive Non-Native Community

This state consists of Florida Department of Agriculture and Consumer Services (FDACS) Non-Native Category 1 Species list . More information on these species list can be found: https://www.fdacs.gov/content/download/63140/file/Florida%E2%80%99s_Pest_Plants.pdf or by contacting the UF / IFAS Center for Aquatic and Invasive Plants (http://plants.ifas.ufl.edu/), the UF / IFAS Assessment of Non-native Plants in Florida's Natural Areas (https://assessment.ifas.ufl.edu/), or the FWC Invasive Plant Management Section (http://myfwc.com/wildlifehabitats/invasive-plants/). This community will not represent every possibility of invasive species but rather the most common in these areas.

Characteristics and indicators. Non-native species include species that exist outside of Florida's natural range and introduced to the state by people, weather, or any other means.

Resilience management. This state can be found as a part of any other state and can completely destroy the native habitat if not properly managed. Restoration to natural communities after exotic invasion include practices such as mechanical, biological, and chemical removals.

Dominant plant species

- cattail (*Typha*), other herbaceous

Dominant resource concerns

- Subsidence
- Concentration of salts or other chemicals
- Nutrients transported to surface water
- Plant productivity and health
- Plant structure and composition

State 4
Managed Resource Areas

The following communities comprise the major land uses in the United States and the land uses receiving the majority of the conservation treatment that address soil, water, air, plant, and animal resources within the USDA. This state may not occupy a large role in this ecological site, but areas in the northern Everglades ecoregion have been extensively altered and managed for range, agriculture, and silviculture in present day uses. Any conversion to these communities have been done over a large landscape setting, primarily the Everglades Agricultural Area. Often the small tree islands will be destroyed and the area will be managed based off the (drained) highly organic soils of the surrounding glades marsh (R156AY220FL).

Characteristics and indicators. These land uses consist of areas that are not completely naturalized (i.e. native habitat) but are not completely altered by anthropogenic means.

Dominant resource concerns

- Sheet and rill erosion
- Wind erosion
- Subsidence
- Organic matter depletion
- Concentration of salts or other chemicals
- Seasonal high water table
- Nutrients transported to surface water
- Inadequate livestock shelter

Community 4.1

Rangeland

Rangelands are described as lands on which the indigenous vegetation is predominately grasses, grass-like plants, forbs, and possibly shrubs or dispersed trees. Existing plant communities can include both native and introduced plants. Primary export from Florida ranges are cattle and have been present in the state since their first introduction by Spanish explorers in 1521. This is the reference community for this state because it requires very little alterations to the landscape for grazing species. Rangelands provide a diversity of ecosystems and also provide a diverse and significant production of economic benefits and ecosystem goods and services. Livestock production along with sustainable wildlife populations provide for the major direct economic benefits, but also tourism, recreational uses, minerals/energy production, renewable energy, and other natural resource uses can be very significant. Vital ecosystem contributions include clean water, clean air, fish/wildlife habitat, as well as intangible considerations such as historical, cultural, aesthetic and spiritual values.

Resilience management. Grazing, by both domestic livestock and wildlife, is the most common ecological management process, with fire and weather extremes also being significant ecological factors. For information regarding specific cattle grazing techniques please contact your local NRCS office.

Community 4.2
Open Transitional Managed Communities

This is an area that is managed to maintain open land before shifting to another community. These communities are often used as transitional periods from one practice to another and could lead to an abandoned / fallow field.

Community 4.3
Improved Pasture

Pasture is a land use type having vegetation cover comprised primarily of introduced or enhanced native forage species that is used for livestock grazing. Pasture vegetation can consist of grasses, legumes, other forbs, shrubs or a mixture. The majority of these forages are introduced, having originally come from areas in other states or continents. Most are now naturalized and are vital components of pasture based grazing systems. Pasture lands provide many benefits other than forage for livestock. Wildlife use pasture as shelter and for food sources. Well managed pasture captures rainwater that is slowly infiltrated into the soil which helps recharge groundwater. Many small pasture livestock operations are near urban areas providing vistas for everyone to enjoy.

Resilience management. Pastures receive periodic renovation and cultural treatments such as tillage, fertilization, mowing, weed control, and may be irrigated. For more information regarding specific pasture management please contact your local NRCS office.

Community 4.4
Agriculture

The agriculture industry includes cultivated crops, aquaculture, and apiculture. Cultivated cropland includes areas used for the production of adapted crops for harvest. These areas comprises land in row crops or close-grown crops that are in a rotation with row or close-grown crops. Primary export from Florida consists of fruits, greenhouse and nursery products, sugar cane, and the signature export of citrus. Aquaculture includes the cultivation and maintenance of aquatic plants, aquatic reptiles, crustaceans, food/ ornamental fish, shellfish, and other miscellaneous species for harvesting. Apiculture includes the maintenance of honeybees and hives to provide beeswax, honey/ other edible bee products, crop pollination services, and sales of bees to other beekeepers. These areas have been modified resulting in land clearing practices and hydrologic management to fit the growers needs.

Resilience management. Major natural resource concerns facing agricultural lands include: (1) erosion by wind and water, (2) maintaining and enhancing soil quality, (3) water quality from nutrient and pesticides runoff and leaching, and (4) managing the quantity of water available for irrigation. For more specific information regarding cropland please contact your local NRCS office.

Community 4.5
Silviculture

Silviculture is land used in controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis. These are forestry practices that include thinning, harvesting, planting, pruning, prescribed burning and site preparation, for managed goals such as wildlife habitat creation or harvesting. Many managed silvicultural lands in Florida include tree plantations for growth of tropical ornamental species such as palms; and lumber, pulp, and paper species such as slash pine, longleaf pine, cypress, and eucalyptus. This community also include management practices of agroforestry, the intentional mixing of trees and shrubs into crop and/or animal production systems to create environmental, economic and social benefits. This is included in this community and not any other state because the primary management is for tree species. This may include practices such as riparian forest buffers, windbreaks, forest farming, silvopasture, and alley cropping.

Resilience management. Management of silvicultural lands require specific prescriptions based on the management goals for the stand, and may include thinning, harvesting, planting, pruning, prescribed burning and site preparation. For more information regarding specific management for silviculture practices please contact your local NRCS office.

Pathway 4.1A
Community 4.1 to 4.2

This pathway is driven by land clearing practices that consists of removing the existing vegetation from the habitat and altering the habitat to prepare for modified land use.

Pathway 4.2A
Community 4.2 to 4.1

This pathway is driven by the restoration of the native habitat for the use of rangeland. This includes restoration of both the hydrology and landscape in advance of replanting native species. This is a time-consuming process and often results in second-hand community structure. Once restored to a natural capacity the introduction of grazing species to the system creates a managed rangeland.

Pathway 4.2B
Community 4.2 to 4.3

This pathway is driven by preparing the land for pasteurization. This includes the planting of vegetation consisting of grasses, legumes, other forbs, shrubs or a mixture that will provide preferred forage for managed grazing species.

Pathway 4.2C
Community 4.2 to 4.4

This pathway is driven by the preparation of land for agricultural uses. This change is dependent on the type of agricultural community is being created, but often depends on the growing, maintenance, and cultivation of an agricultural product for consumers. This community may require modification to the land to fit the hydrologic requirement of the growing crop.

Pathway 4.2D
Community 4.2 to 4.5

This pathway is driven by the preparation of the land for silvicultural purposes. This change is dependent on the type of silvicultural product being cultivated, as many different practices require different growth requirement.

Pathway 4.3A
Community 4.3 to 4.2

This pathway is driven by land clearing practices that consists of removing the existing vegetation from the habitat and altering the habitat to prepare for modified land use.

Pathway 4.3B
Community 4.3 to 4.4

This pathway is driven by the preparation of land for agricultural uses. This change is dependent on the type of agricultural community is being created, but often depends on the growing, maintenance, and cultivation of an agricultural product for consumers. This community may require modification to the land to fit the hydrologic requirement of the growing crop.

Pathway 4.3C
Community 4.3 to 4.5

This pathway is driven by the preparation of the land for silvicultural purposes. This change is dependent on the type of silvicultural product being cultivated, as many different practices require different growth requirements.

Pathway 4.4A
Community 4.4 to 4.2

This pathway is driven by land clearing practices that consists of removing the existing vegetation from the habitat and altering the habitat to prepare for modified land use.

Pathway 4.4B
Community 4.4 to 4.5

This pathway is driven by the preparation of the land for silvicultural purposes. This change is dependent on the type of silvicultural product being cultivated, as many different practices require different growth requirements.

Pathway 4.5A
Community 4.5 to 4.2

This pathway is driven by land clearing practices that consists of removing the existing vegetation from the habitat and altering the habitat to prepare for modified land use.

State 5
Human Altered & Human Transported Areas

These areas include soils that were intentionally and substantially modified by humans for an intended purpose, commonly for terraced agriculture, building support, mining, transportation, and commerce. The alteration is of sufficient magnitude to result in the introduction of a new parent material (human-transported material) or a profound change in the previously existing parent material (human-altered material). They do not include soils modified through standard agricultural practices or formed soils with unintended wind and water erosion. When a soil is on or above an anthropogenic landform or microfeature, it can be definitely be associated with human activity and is assigned to a unique taxa, usually found as an "Urban land complex" within that communities natural soil properties (e.g., Macks Camp muck, ponded-Urban land complex, 0-2% slopes, occasionally flooded).

Characteristics and indicators. Evidence of these areas include soils with manufactured items (e.g. artifacts) present in the profile, human altered-materials (e.g., deeply excavated or deeply plowed soil) or human-transported material (e.g., fill), and position on or above anthropogenic landforms (e.g., flood-control levees) and microfeatures (e.g., drainage ditches). Detailed criteria regarding the identification of anthropogenic (artificial) landforms, human-altered materials, and human-transported material are in the "Keys to Soil Taxonomy" (Soil Survey Staff, 2014).

Dominant resource concerns

- Compaction
- Ponding and flooding
- Seasonal high water table
- Emissions of greenhouse gases (GHGs)
- Objectionable odors
- Plant productivity and health

- Plant structure and composition

Community 5.1
Reclaimed Areas

Reclaimed areas are areas that have been modified through anthropogenic means that are restored to a natural or second-hand natural community. Areas that can be reclaimed are any intensely urbanized areas, and may be required to be reclaimed after urban use (e.g., active mines must be reclaimed). Examples of reclaimed lands may be shut down phosphate mining operations, superfund sites, or brownfields. These practices include the identification, removal, and stockpiling soil materials before altering the land, and revegetation and replacement of soil materials after altering the land. This also applies to nearby urban areas that have been adversely affected by the anthropogenic activities.

Community 5.2
Urban

This urban community consists of development for human use. Urban areas include a variety of land uses, e.g., inner city or urban core, industrial and residential areas, cemeteries, parks, and other open spaces; the overall function which may benefit the quality of human life. These often form an urban soil mosaic, where the natural landscape has been fragmented into parcels with distinctive disturbance and management regimes and, as a result, distinctive characteristic soil properties. Within this community there are three different levels of urbanization, based off population dynamics, residential density, and intensity of development. These are labeled as low-intensity, medium-intensity, and high-intensity urban areas, which can eventually be split apart into its own separate state. Low-intensity urban areas may consist of single dwelling homes with little impact on the surrounding community which still somewhat represents the natural community (e.g., represents natural landscape, hydrology, and vegetation) , other examples of this are urban parks, cemeteries, or campgrounds with little urban development. Medium-intensity urban areas consist of larger urban dwellings with some natural features, but have been modified to meet urban needs (e.g., towns). High-intensity urban areas are areas of heavily modified areas with complete alterations of the natural landscape, hydrology, and vegetation to support a very large population, which once constructed is permanently altered (e.g., metropolis areas).

Community 5.3
Non-Reclaimed Areas

Non-reclaimed areas are areas that have been modified through anthropogenic means that are unable to be restored to a natural or second-hand natural community. Areas that cannot be reclaimed are areas under active mining status or mined areas before the Phosphate Land Reclamation Act in 1975, which leaves shut down operations alone. These areas also include fallow mines that have been flooded and are now permanent bodies of water.

Community 5.4
Landfills

This is an anthropogenic site for the disposal of waste material. It includes manufactured layers (artificial, root limiting layer below the soil surface) that are representative of human altered and human transported sites. These layers are often alternative between natural fill material and geotextile liners, asphalt, concrete, rubber or plastic that are built up and can rise above the surrounding landscape by 30 meters or more often impeding water, gas, or roots from moving through the profile.

Pathway 5.1A
Community 5.1 to 5.2

This shift in communities is driven by clearing and developing the land for the desired community.

Pathway 5.1B
Community 5.1 to 5.4

This transition is driven by the deposition of manufactured layers along with anthropogenic waste which is consistently built upon.

Pathway 5.2A
Community 5.2 to 5.1

This transition is driven by the revegetation, reestablished hydrology, and replacement of displaced soil materials after altering the land.

Pathway 5.2B
Community 5.2 to 5.3

This transition is driven from heavy industrial or urban development which causes the land to become non-reclaimable. This transition is rare due to the many environmental laws and regulations that must be followed when developing.

Pathway 5.2C
Community 5.2 to 5.4

This transition is driven by the deposition of manufactured layers along with anthropogenic waste which is consistently built upon.

Pathway 5.3A
Community 5.3 to 5.1

This transition is driven by the revegetation, reestablished hydrology, and replacement of displaced soil materials after altering the land.

Transition T1A
State 1 to 2

Forested Wetlands (Tree Islands)

Non-Forested Glades Marsh and Slough Wetlands

This transition is driven by a disturbance which may be natural or anthropogenic, resulting in destruction of the island. Mineral soil tree islands may be lost from anthropogenic activities such as channelization and altering the natural hydroperiod of the landscape, which may permanently flood or erode the mineral soils of the island. Organic islands may be destroyed during periods of drought when fire enters the system and burns the organic material.

Transition T1B
State 1 to 3

The invasion of non-native or exotic species can be driven by a multitude of different environmental factors such as changes in natural hydroperiods or in fire regimes. Typically once a change in one of the two factors mentioned above occurs, non-native or exotic invasive species become established and begin to compete with native species for habitat and nutrients.

Constraints to recovery. Recovery from non-native or exotic invasive species may be difficult due to many adaptations which allow them to outcompete and survive in altered conditions. Localized knowledge for each species must be known for best removal of it without harming the native environment, and often different treatments must be applied over one given area.

Context dependence. Growth of non-native and exotic invasive species can be rapid following a change in a natural stressor such as fire frequency or natural hydroperiods which might have once kept the invasive species at bay.

Transition T1C
State 1 to 4

Modify the land for the desired land use. This may include the establishment of grazing species or the modification of land for the cultivation of crops of other desired products.

Transition T1D
State 1 to 5

This transition is driven by the alteration and/ or transportation of materials via anthropogenic means.

Transition T2A
State 2 to 1

Non-Forested Glades Marsh and Slough Wetlands **Forested Wetlands (Tree Islands)**

This transition is only for the formation of organic soil tree islands. Once a mineral soil tree island is destroyed that ecological community is lost, and may only be replaced with organic soil tree islands. The formation of organic tree islands (specifically ballgalls or willow heads), results from the accumulation of organic matter. Floating mats of organic matter may travel down the drainageways (sloughs) and become stuck, building organic material as sawgrass decomposes over long periods of time. If woody seeds are introduced into the system, this may grow and allow for the development of baygall or willow head.

Context dependence. Note this is a very time depending process and may take hundreds to thousands of year to accumulate organic matter and is dependent on local fire frequency.

Restoration pathway R3A
State 3 to 1

Mechanical, biological, and chemical removal strategies include removing the non-native and exotic invasive species through various mechanisms. Localized knowledge for individual non-native or exotic invasive species is needed for specific management. Sometimes introduction of fire regimes may prevent or stop the growth of non-native or exotic invasive species, but many species are fire tolerant. Mechanical removal might include cutting and removal of invasive species. Chemical removal might include spot spraying or basal bark injection treatments.

Context dependence. Mechanical, biological, and chemical removal of non-native and exotic invasive species is a time dependent process, with both removal types taking long times to be considered effective.

Transition T3A
State 3 to 5

This transition is driven by the alteration and/ or transportation of materials via anthropogenic means.

Restoration pathway R4A
State 4 to 1

These practices include the restoration of both the natural hydroperiods and landscape in advance of revegetating the area (if needed).

Transition T4A
State 4 to 5

This transition is driven by the alteration and/ or transportation of materials via anthropogenic means.

Restoration pathway R5A
State 5 to 4

This transition is driven by the restoration of a reclaimed land towards a naturally managed resource such as agriculture, rangeland, silviculture, or improved pasture.

Additional community tables

Animal community

These areas serve as habitat for a variety of wildlife species, many of which are not found elsewhere. They are highly suitable for wildlife habitat because they are home of permanent resident species and fulfill the requirements of migratory wildlife. They play an important role during periods of high hydroperiods offering shelter. Some of these species are:

Mammals: Everglades’ mink (Neovison vison evergladensis), Florida black bear (Ursus americanus floridanus), Florida panther (Puma concolor coryi), Gray squirrel (Sciurus carolinensis), Key deer (Odocoileus virginianus clavium), Key Largo cotton mouse (Peromyscus gossypinus allapaticola), wood rat (Neotoma floridana) and marsh rabbit (Sylvilagus palustris).

Reptiles: American alligator (Alligator mississippiensis), eastern indigo snake (Drymarchon couperi)

Many wading birds depend on the mosaic of habitats found in strands for feeding and nesting, especially wood storks (Mycteria americana). Many of these islands are rookery habitats for migratory birds.

Hydrological functions

This ecoregion has an abundant amount of surface and ground water of good quality and provides the main source of ground water in Brevard County via the Floridan Aquifer. This aquifer consists of deep limestone and dolomite beds. The water in this aquifer is a calcium bicarbonate type and is hard. With hydrologic alterations such as extensive ditching and draining of the northern portion of this ecoregion to create the present day Everglades Agricultural Area (EAA), the water flow into the southern Everglades ecoregion has been highly altered. Excess water is pumped out during the rainy season, and irrigation water is applied during the growing season. Restoration projects with the U.S. Army Corps of Engineers in the Water Conservation Area (WCA) have greatly improved hydrologic conditions of the Everglades ecoregion.

Recreational uses

Islands with already existing camps can be used for hunting, fishing and camping, these are privately owned. Any tree islands under natural conditions and any that are considered a cultural recourse are protected.

Other information

The Freshwater Forested Wetlands ecological site are probably an endangered ecological site in Florida. The endangerment lies in the change of hydroperiods, anthropogenic activities, natural disasters and introduction of invasive species. Special consideration of preservation should be given to these areas such as the use of these communities for hurricane protection, natural landscape and greenbelt areas, conservation parks and wildlife habitat.

Inventory data references

Information presented was derived from NRCS clipping data, current and historical literature, field observations, and personals contacts with local, state and federal partners. This is a provisional level ESD and is subject to change as more information becomes available, for any questions please contact your local NRCS office.

The WCA \ FL615 initial soil survey filed data collection started in FY 2009 and ended in FY 2019. The entire soil survey area is inside of the Everglades Ecoregion. We have collected over 2,500-point data sites, which at least 75 percent are full Pedon descriptions and 25 percent are filed notes including dominant existing vegetation, landscape, landform, and correlated soil name. Using collected field documentation in conjunction with reference information from partner agencies (EPA, WMD and DEP); we have developed a soil survey of the initial mapped areas to date. Using the historical information of the 26 Ecological Communities of Florida Publication, Florida Natural Areas Inventory Natural Communities Gide and field data collected; the MLRA 7-FOR Staff developed the PESD for the Soil survey area and the Everglades Ecoregion.

The areas visited or surveyed are inside of the Initial Soil Survey Project of the Water Conservation Area and will include those areas that remain within the Everglades Ecoregion area. This area is South of the Everglades Agricultural Areas, East of Big Cypress National Park, west of US 27 and North of the Everglades National Park. .

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Acknowledgments

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Florida Natural Areas Inventory

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/12/2025
Approved by	Charles Stemmans
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**