USDA Natural Resources Conservation Service

Ecological site F156BY060FL
High Sandy Pine and Scrub on Knolls and Ridges

Last updated: 2/07/2025
Accessed: 05/20/2025

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): 156B–Southern Florida Lowlands

This area is in the Floridian section of the Coastal Plain province of the Atlantic Plain. It is on nearly level lowlands. A few hummocks rise 3 to 6 feet (1 to 2 meters) above the general level of the landscape. Elevation ranges from near sea level to 26 feet (8 meters).This area is a dominantly wetland ecosystem that has been heavily influenced by human activity. It supports hummock and slough wetland vegetation. Remaining native savanna and scrub areas consist of native grasses, forbs, sedges, and a few scattered pines. Slash pine and cabbage palm are the dominant overstory species. Saw palmetto, cordgrasses, and bluestems make up the understory. Major wildlife species include white-tailed deer, feral hog, gray fox, raccoon, opossum, armadillo, rabbit, tree squirrel, wild turkey, bobwhite quail, mourning dove, Florida mallard, and woodpecker.

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: 75 Southern Coastal Plain; 75d Eastern Florida Flatwoods (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013)

-Florida Natural Area Inventory, 2010 Edition: High Pine and Scrub (FNAI, 2010)

-Soil Conservation Service, 26 Ecological Communities of Florida: 3- Sand Pine Scrub (Florida Chapter Soil and Water Conservation Society, 1989)

Ecological site concept

The High Sandy Pine and Scrub on Knolls and Ridges ecological sites are composed of xeromorphic evergreen shrubs, with or without a canopy of pines, found on dry, infertile, sandy ridges. These sites are typically the highest community within this MLRA. Their distribution depends on the deposition of aeolian sand during geographic formation along various ridgelines, differing from interior scrubs in their geologic age, species composition, response to disturbance, and management needs. Scrub habitats within this ecoregion were historically maintained by periodic wind disturbances such as hurricanes as well as periodic fires estimated between 5 and 20 years. Much of these communities have been destroyed, severely fragmented, and degraded due to residential and commercial expansion.

Associated sites

F156BY045FL	**Sandy Scrubby Flatwoods on Rises and Knolls** The Sandy Scrubby Flatwoods on Rises and Knolls ecosite occurs in lower landscape positions and will often be found adjacent to the High Sandy Pine and Scrub on Knolls and Ridges ecosite. It is found on somewhat poorly to moderately well drained soils and will be found on the backslopes and toeslopes hillslope positions.
F156BY050FL	**Hardwood Forested Uplands** The Hardwood Forested Uplands ecosite occurs in lower landscape positions and will often be found adjacent to the High Sandy Pine and Scrub on Knolls and Ridges ecosite. It is found on moderately well to somewhat excessively drained soils and will be found on the backslopes and summit hillslope positions.

Similar sites

F156BY045FL	**Sandy Scrubby Flatwoods on Rises and Knolls** The Sandy Scrubby Flatwoods on Rises and Knolls ecosite may be confused with the High Sandy Pine and Scrub on Knolls and Ridges ecosite, but is distinguished by the presence of somewhat excessively to excessively drained soils on a ridgeline, which often marks the highest point in the landscape, rather than the backslope or toeslopes.
F156BY050FL	**Hardwood Forested Uplands** The Hardwood Forested Uplands ecosite may be confused with the High Sandy Pine and Scrub on Knolls and Ridges ecosite, but is distinguished by the presence of somewhat excessively to excessively drained soils on a ridgeline, which often marks the highest point in the landscape.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Pinus clausa*
Shrub	(1) *Ceratiola ericoides* (2) *Serenoa repens*
Herbaceous	(1) *Aristida* (2) *Bulbostylis*

Physiographic features

This ecosite is found along the highest, dry, infertile sandy ridgelines, summits, shoulders and back slopes of marine terraces which often mark the location of former Plio-Pleistocene shorelines. Within the MLRA 156B this site is very limited in distribution and highly altered due to greatest potential for land use conversion. It is found in greater extent along the Lake Wales Ridge and within Ocala National Forest in MLRA 155 (Southern Florida Flatwoods) and 154X (South-Central Florida Ridge). These are usually the highest ecosite within a community matrix and are known to occur with slopes ranging from 0-15 percent.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Rise
Geomorphic position, terraces	(1) Tread (2) Riser
Slope shape across	(1) Convex
Slope shape up-down	(1) Linear (2) Convex
Landforms	(1) Coastal plain > Marine terrace (2) Marine terrace > Ridge (3) Marine terrace > Knoll (4) Marine terrace > Rise
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	18–24 m
Slope	0–15%
Ponding depth	0 cm
Water table depth	152–203 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of east central Florida is warm and temperate getting an average annual precipitation amount of 40 to 62 inches (1,015 to 1,575 millimeters). About 60 percent of the precipitation occurs from June through September. The center of the area is the driest part. Most of the rainfall occurs as 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 is 73 to 78 degrees F (23 to 25 degrees C). The freeze-free period averages 365 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	1,346-1,499 mm
Frost-free period (actual range)	365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	1,321-1,549 mm
Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	1,422 mm

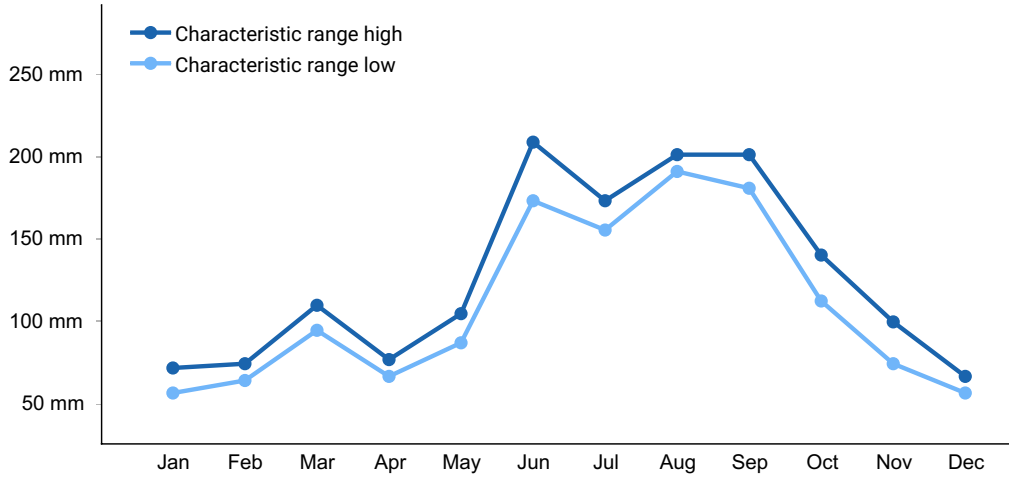


Figure 1. Monthly precipitation range

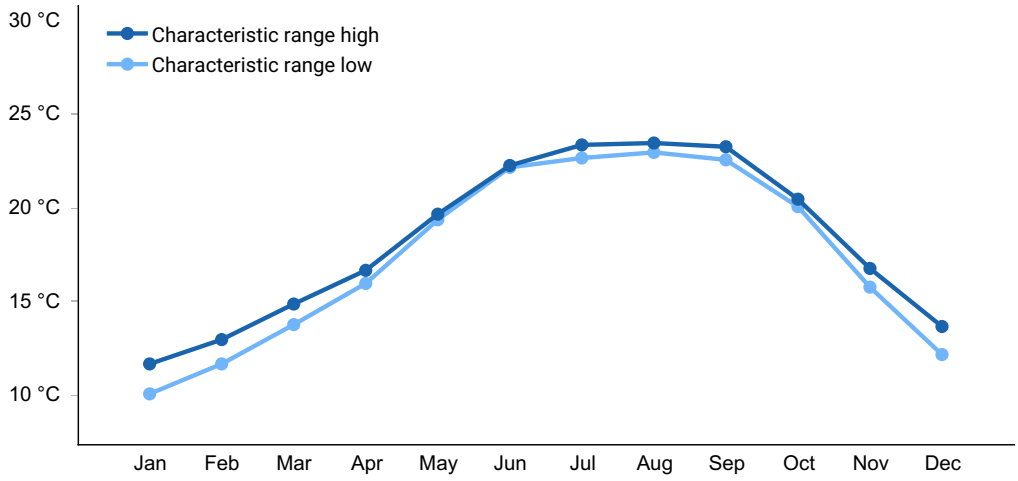


Figure 2. Monthly minimum temperature range

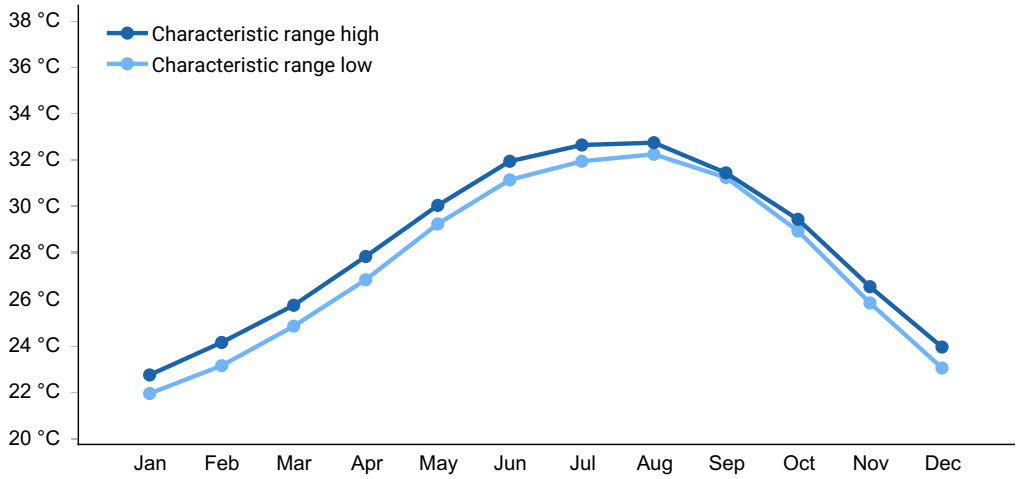


Figure 3. Monthly maximum temperature range

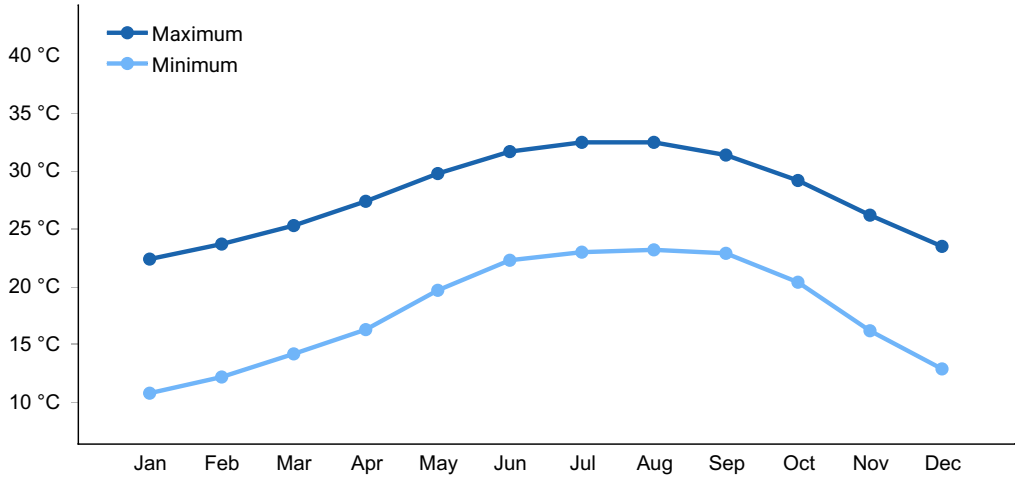


Figure 4. Monthly average minimum and maximum temperature

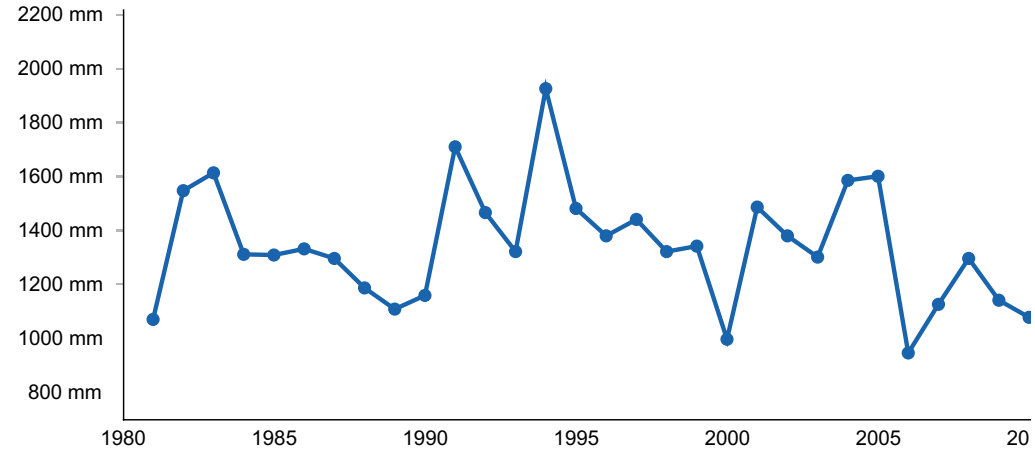


Figure 5. Annual precipitation pattern

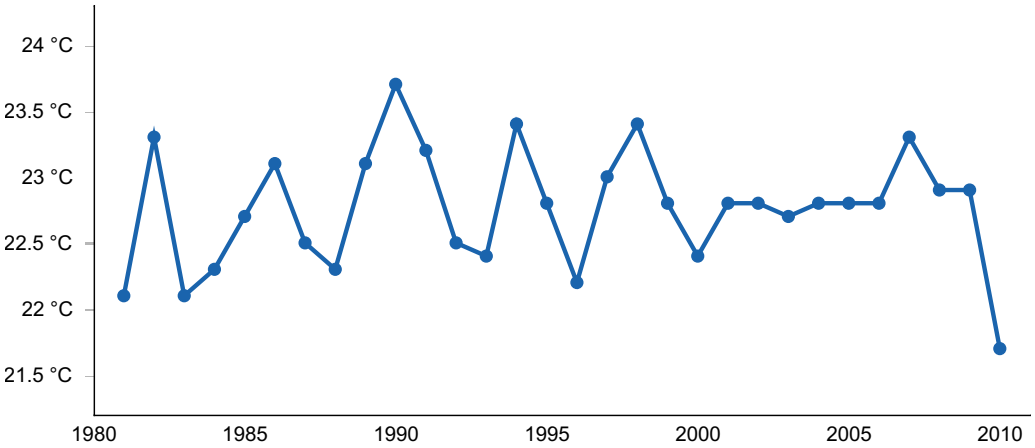


Figure 6. Annual average temperature pattern

Climate stations used

- (1) PALM BEACH GARDENS [USC00086764], Palm Beach Gardens, FL
- (2) CANAL POINT USDA [USC00081276], Belle Glade, FL
- (3) PORT SALERNO 5W [USC00087304], Stuart, FL
- (4) FT PIERCE ST LUCIE CO INTL AP [USW00012895], Fort Pierce, FL
- (5) VERO BEACH 4SE [USC00089219], Vero Beach, FL
- (6) MELBOURNE INTL AP [USW00012838], Melbourne, FL
- (7) TITUSVILLE [USC00088942], Titusville, FL

Influencing water features

This ecosite currently occurs as isolated fragmented scrublands on rises, knolls, and ridges surrounded by urban areas. Soils have very deep seasonal high-water tables and low slope gradient and very rapid infiltration with negligible or very low surface runoff. All external inputs of water into this community are from rainfall, most of which coming from summer rains falling in June through September. Water from these communities will feed into lower communities via subsurface flow or runoff, attributing to other ecosites season high water tables or flooding conditions. Due to the extreme depths to the water table,

these communities often undergo periods of drought conditions when rainfall is absent from the system.

Wetland description

NA

Soil features

These soils are derived from quartz, slightly to strongly acidic, very low in nutrients and well to excessively well drained. These are predominately very deep sand and fine sand, and practically devoid of organic matter, silt and clay. Soils are primarily spodisols and entisols. Found on rises in marine terraces, as sandy soils on rises, knolls, and ridges of mesic uplands, these soils occur on a very limited extent within this MLRA with slopes ranging from 0-15 percent. Representative soils within this MLRA may include Paola and St. Lucie.

Table 4. Representative soil features

Parent material	(1) Eolian deposits (2) Marine deposits–limestone
Surface texture	(1) Fine sand
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Rapid to very rapid
Depth to restrictive layer	203 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-203.2cm)	3.05–7.87 cm
Calcium carbonate equivalent (0-203.2cm)	0%
Electrical conductivity (0-203.2cm)	0–1 mmhos/cm
Sodium adsorption ratio (0-203.2cm)	1
Soil reaction (1:1 water) (0-203.2cm)	5–5.3
Subsurface fragment volume <=3" (0-203.2cm)	0%

Subsurface fragment volume >3" (0-203.2cm)	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 representative of and included. Key indicator plants, animals, and ecological processes are described to help guide land management decisions and actions.

The High Sandy Pine and Scrub is a community composed of xeromorphic evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. This habitat is very limited within this MLRA and is most seen within the adjacent MLRA 155 and 154X, occurring on old ridgelines that have been heavily altered for anthropogenic and agronomic uses within MLRA 156B. Similar species are characteristic of scrub throughout the state and no one species is endemic to scrub habitat alone. Signature species of scrub habitats include shrubby oaks; myrtle oak (*Quercus myrtifolia*), sand live oak (Q. geminate), and Chapman's oak (*Q. chapmanii*), as well as Florida rosemary (*Ceratiola ericoides*), sand pine (*Pinus clausa*), rusty staggerbush (*Lyonia ferruginea*) and saw palmetto (*Serenoa repens*). These species can either form a sparse or dense canopy interspersed with openings that consist of bare sand with a sparse cover of herbs. Species include threeawns (Aristida spp.), hairsedges (Bulbostylis spp.), sandyfield beaksedge (*Rhynchospora megalocarpa*), pinweeds (Lechea spp.), jointweeds (Polygonella spp.), and ground lichens (Cladonia leporine, C. prostrata, *Cladina subtenuis*, and *C. evansii*). When sand pines are present, they do not typically form a continuous canopy like pine flatwoods but occur as scattered individuals or clumps of individuals. Most scrub habitats occur on white sand and patches of bare sand with or without scattered clumps of ground lichens.

Differences in vegetation composition and structure are the result of the frequency of fire within this community, which was historically determined by the local topography is now done through prescribed burning. These fires were typically started through lightning strikes during the growing season of March, April, or May and burned from surrounding grassland or forests into this community, where it would be naturally extinguished due to the absence of litter on the surface or flammability of certain species. Natural fires are not believed to burn entire habitats at once, but rather burn in patches. Fires that cause heterogeneity help influence the subsequent community recovery, allowing unburned patches to grow larger and provide cover, nest-sites, and acorns for wildlife species. In scrubs dominated by oak species, the fire interval is estimated to be between 5 and 20 years to promote suitable habitat requirement for the Florida scrub-jay (Aphelocoma coerulescens), where habitat dominated by Florida rosemary is estimated to be intervals

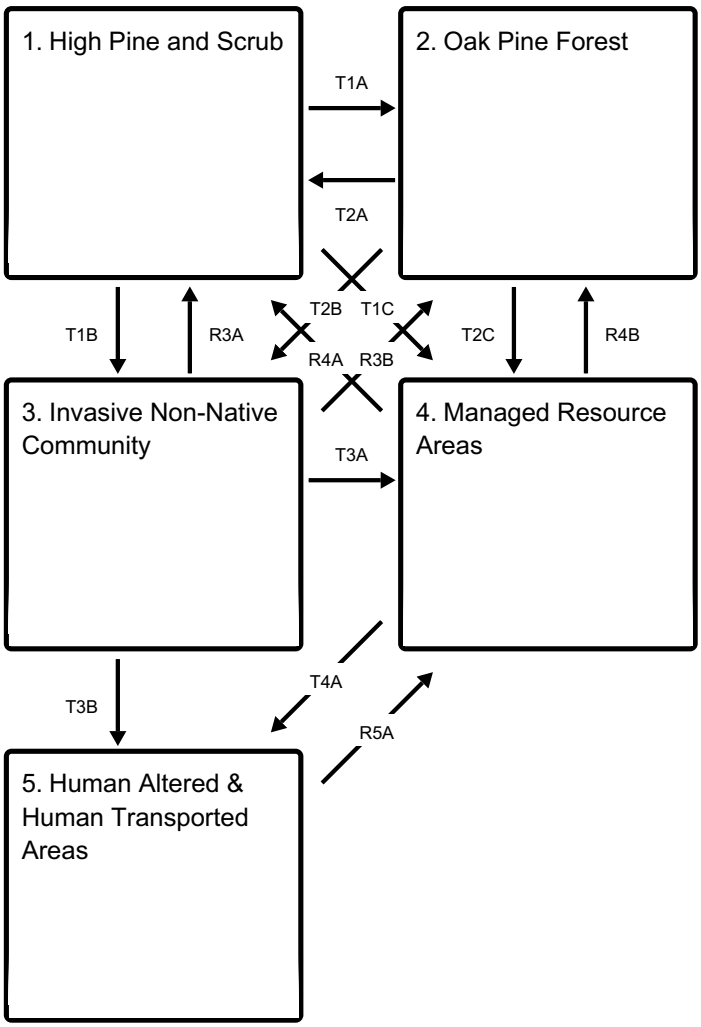
between 10 and 40 years based off the life history characteristics of Florida rosemary. The lower limit is set by the age at which rosemary begins to produce seed and the upper limit by the age at which the shrub begins to die back and seed production declines. Due to lack of fire for long periods, the understory is typically very dense and difficult to move through, and often has high accumulations of undecayed litter. This habitat perpetuates itself through the occasional fires, in the meantime allowing evergreen shrubs to grow that release allopathic toxins or shade the bare ground, preventing flammable grasses from growing. Periodic wind disturbances from hurricanes also affect the vegetative structure of this community, primarily by killing larger trees which opens the canopy allowing regrowth of new species.

Sand pines require fire to open their seeds for germination, and over time (average life span of 80 years) they become more susceptible to root rot and can die off allowing oaks to grow. When scrubs are prevented from burning for a long period of time, some of the oak species may grow up to tree size and create a closed canopy, transitioning the community into a xeric hammock. Without fire, scrub habitats lose plant and wildlife diversity, with dominant shrubs and trees increasing in cover percent. If a native scrub site has been replaced for agriculture or urban development but is abandoned, a pioneer scrub site may develop, and is dominated by invasive weed but also reference plants such as Florida rosemary, sand pine, and sand live oak. Due to the dry upland nature of these sites, the scrub habitat within this MLRA has succumbed to agriculture or rangeland practices, and remaining areas have been fragmented via roads, railroads, fire lines, and other man-made paths that interrupt the flow of fire and natural hydrology. While few fragmented scrub habitats still occur along this ecoregion, fire regimes and hydrology have been altered to create less productive and natural habitats. In areas that are highly urbanized and prescribed fires and smoke act as a nuisance upon the community, mechanical disturbance has been suggested as an alternative management practice as chopping or mowing. Scrubs that have been restored and are recent in origin due to manmade activities are coined pioneer scrubs, showing similar species with slightly more invasive and slight hydrologic alterations and fire regimes.

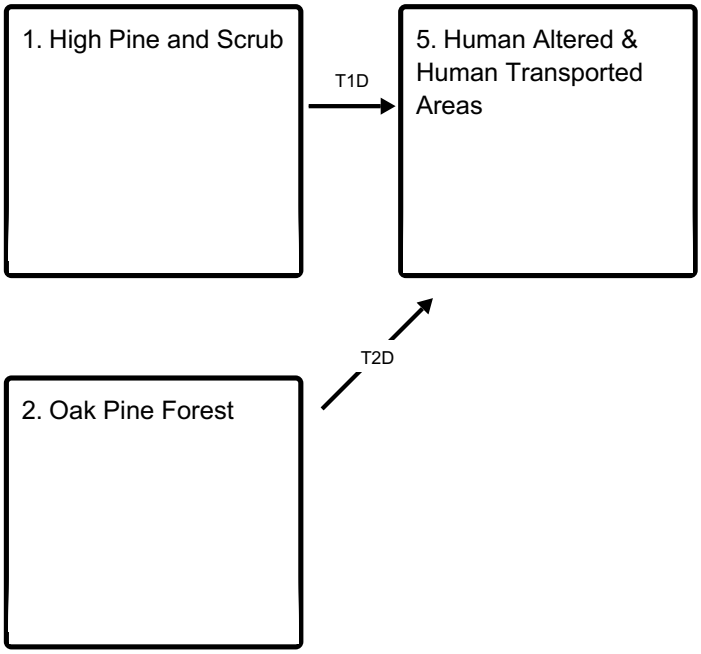
Management for scrub habitat should properly reflect the natural community, consisting of a mosaic of different scrub microhabitats maintained by different time periods since last burned. Seeking to impose an artificial uniformity may pose problems since many scrub species have different microhabitat growth requirements.

State and transition model

Ecosystem states



States 1, 5 and 2 (additional transitions)



T1A - Long-Term Fire-Suppression

T1B - Introduction of Non-Native / Exotic Species

T1C - Modify for Desired Land Use

T1D - Human Alteration / Transportation of Materials

T2A - Overstory Mortality

T2B - Introduction of Non-Native / Exotic Species

T2C - Modify for Desired Land Use

T2D - Human Alteration / Transportation of Materials

R3A - Removal of Undesirable Species

R3B - Removal of Undesirable Species

T3A - Modify for Desired Land Use

T3B - Human Alteration / Transportation of Materials

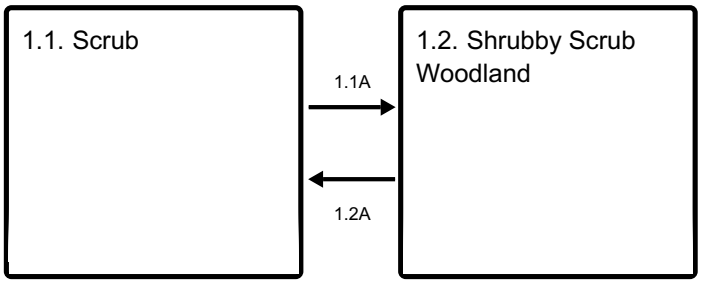
R4A - Landscape and Habitat Restoration

R4B - Landscape and Habitat Restoration

T4A - Human Alteration / Transportation of Materials

R5A - Landscape and Habitat Restoration

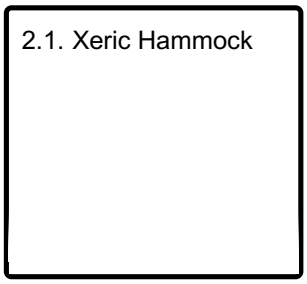
State 1 submodel, plant communities



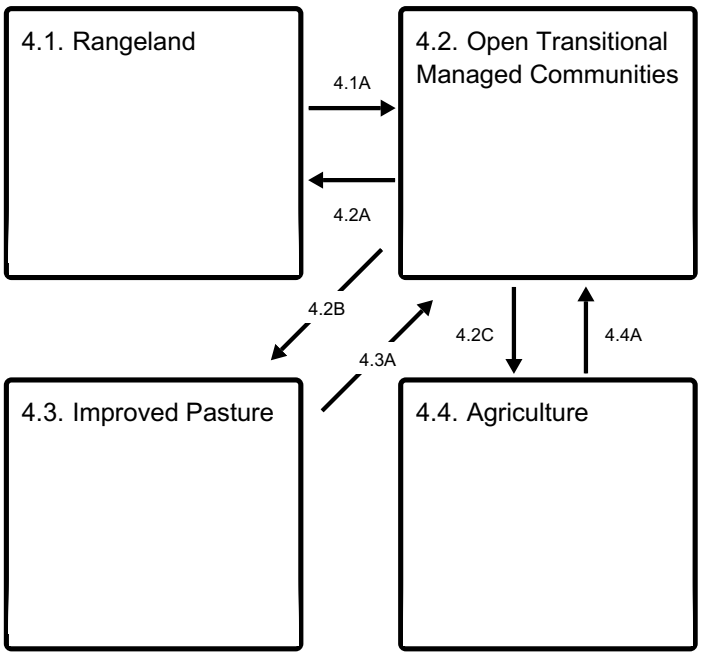
1.1A - Long-Term Fire-Suppression

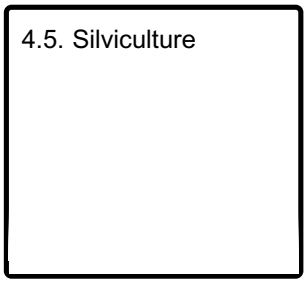
1.2A - Proper Management Techniques

State 2 submodel, plant communities

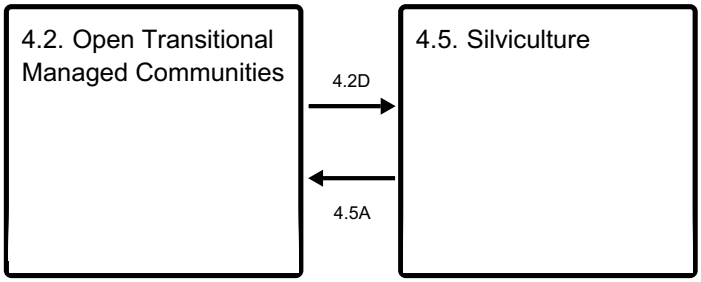


State 4 submodel, plant communities





Communities 2 and 5 (additional pathways)



4.1A - Land Use Conversion Practices

4.2A - Habitat Restoration

4.2B - Pasture Establishment

4.2C - Agricultural Preparation

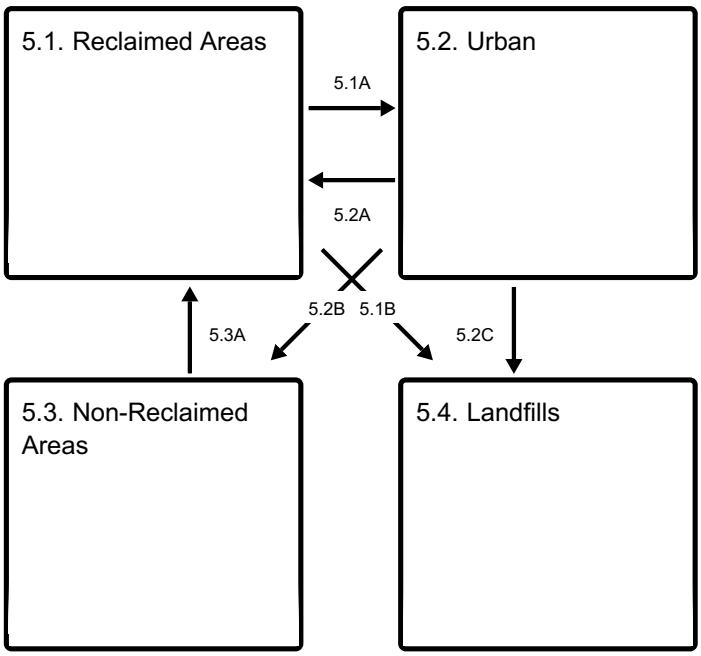
4.2D - Silvicultural preparation

4.3A - Land Use Conversion Practices

4.4A - Land Use Conversion Practices

4.5A - Land Use Conversion Practices

State 5 submodel, plant communities



5.1A - Urban Development

5.1B - Waste Accumulation

5.2A - Land Restoration

5.2B - Industrial / Urban Development

5.2C - Waste Accumulation

5.3A - Land Restoration

State 1
High Pine and Scrub

This state consists of xeric woodlands or shrublands found on dry infertile sandy ridges with a canopy, if present, open and consisting of pine or a mixture of pine and deciduous hardwoods.

Characteristics and indicators. No one species is charactistic of this state as similar species in scrub habitat are found throughout the state. Most scrub habitat occur with patches of bare sand with or without scattered clumps of ground lichens.

Community 1.1
Scrub

This community is composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. These communities are the oldest natural communities in Florida and were formed as sea levels retreated during the Pliocene era. They were formed from sandy island ridges of stabilized coastal dunes when the Atlantic Ocean was retreating, creating these patches of higher isolated areas.

Resilience management. This is a fire maintained community, but is not easily ignitable

and has average fire return intervals of 10 to 40 years. They burn less frequently due to lower grassy groundcover as well as bare spots which cause the habitat to burn unevenly. Without fire in the system, this scrub habitat may begin to allow woody species to become established.

Dominant plant species

- sand pine (*Pinus clausa*), tree
- sand heath (*Ceratiola ericoides*), shrub
- myrtle oak (*Quercus myrtifolia*), shrub
- sand live oak (*Quercus geminata*), shrub
- Chapman oak (*Quercus chapmanii*), shrub
- rusty staggerbush (*Lyonia ferruginea*), shrub
- saw palmetto (*Serenoa repens*), shrub
- fetterbush lyonia (*Lyonia lucida*), shrub
- threeawn (*Aristida*), grass
- hairsedge (*Bulbostylis*), grass
- beaksedge (*Rhynchospora*), grass
- cup lichen (*Cladonia*), other herbaceous

Community 1.2
Shrubby Scrub Woodland

This community is a transition of the natural scrub community when fire has been excluded for a long period of time (>40 years). It is characterized by a sparse, open overstory of pines, usually sand pine or slash pine, and a low cover of scrubby species such as sand live oak and Chapman's oak. This community is similar in vegetative structure and composition to a scrubby flatwoods, but is found on somewhat excessively to excessively drained soils rather than somewhat poorly to moderately well drained soils.

Dominant plant species

- sand pine (*Pinus clausa*), tree
- live oak (*Quercus virginiana*), tree
- Chapman oak (*Quercus chapmanii*), tree
- sand live oak (*Quercus geminata*), tree
- saw palmetto (*Serenoa repens*), shrub
- staggerbush (*Lyonia*), shrub
- threeawn (*Aristida*), grass
- hairsedge (*Bulbostylis*), grass
- beaksedge (*Rhynchospora*), grass

Pathway 1.1A
Community 1.1 to 1.2

This transition is driven by the absence of fire from the scrub community. Natural fire

return intervals are estimated every 10 to 40 years for the proper management of scrub jay habitat. As fire is excluded from the system woody species begin to grow and become established.

Pathway 1.2A
Community 1.2 to 1.1

This transition is driven by proper management techniques for the scrub habitat. This may include the reestablishment of fire into the community which removes the woody shrubs, returning to a scrub habitat. In high density areas where fire is not allow, this management technique can be replaced with the mechanical removal of species through mechanical roller chopping. While effective at removing undesirable species the effects of mechanical removal may disturb the soil and allow for the invasion of non-native or exotic species.

State 2
Oak Pine Forest

This state describes the transition from scrub to an established closed oak community with emergent pines. This state is formed when fire has been absent from the scrub community for a long period of time (>100 yr.).

Community 2.1
Xeric Hammock

This is an evergreen forest on well-drained sandy soils. The low canopy is closed and dominated by oak species with an emergent canopy of pine. Emergent pine is typically characterizing of a transitioned scrub habitat that hasn't been burned in a long time (>100 yrs). As fire becomes more absent, oaks and other woody species eventually shade the understory and creates a layer of leaf litter, covering open patches of sand and leading to more shaded, mesic ground conditions.

Dominant plant species

- myrtle oak (*Quercus myrtifolia*), tree
- sand live oak (*Quercus geminata*), tree
- Chapman oak (*Quercus chapmanii*), tree
- sand pine (*Pinus clausa*), tree
- staggerbush (*Lyonia*), shrub
- American beautyberry (*Callicarpa americana*), shrub
- saw palmetto (*Serenoa repens*), shrub
- threeawn (*Aristida*), grass
- beaksedge (*Rhynchospora*), grass
- rosette grass (*Dichanthelium*), grass
- grape (*Vitis*), other herbaceous
- greenbrier (*Smilax*), other herbaceous

- airplant (*Tillandsia*), other herbaceous

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/). These species are common in areas where natural processes are interrupted via hydrology or fire regimes. The introduction of these species pose serious threats to endangered and threatened habitats and plants within Florida as they become outcompeted for habitats and nutrients.

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.

Characteristics and indicators. These land uses consist of areas that are not completely naturalized (i.e. native habitat) and have been anthropogenically altered for commodity production.

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. This community correlates with the 1994 FOTG Range Site Description 156BY003FL- 156B Sand Pine Scrub. Plant species composition list and values are derived from this description.

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.

Dominant plant species

- sand pine (*Pinus clausa*), tree
- hybrid hickory (*Carya*), tree
- turkey oak (*Quercus laevis*), tree
- live oak (*Quercus virginiana*), tree
- oak (*Quercus*), tree
- Carolina holly (*Ilex ambigua*), tree
- sweetbay (*Magnolia virginiana*), tree
- saw palmetto (*Serenoa repens*), shrub
- dwarf huckleberry (*Gaylussacia dumosa*), shrub
- summer grape (*Vitis aestivalis*), shrub
- saw greenbrier (*Smilax bona-nox*), shrub
- Adam's needle (*Yucca filamentosa*), shrub
- pricklypear (*Opuntia*), shrub
- sea lavender (*Limonium*), shrub
- gopher apple (*Licania michauxii*), shrub
- lopsided Indiangrass (*Sorghastrum secundum*), grass
- beaked panicgrass (*Panicum anceps*), grass
- creeping bluestem (*Schizachyrium scoparium var. stoloniferum*), grass
- purple bluestem (*Andropogon glaucopsis*), grass
- broomsedge bluestem (*Andropogon virginicus*), grass
- panicgrass (*Panicum*), grass
- threeawn (*Aristida*), grass
- dropseed (*Sporobolus*), grass
- sedge (*Carex*), grass
- grassleaf goldaster (*Pityopsis oligantha*), other herbaceous
- morning-glory (*Ipomoea*), other herbaceous

Table 5. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	0-5%
>0.3 <= 0.6	–	–	0-23%	–
>0.6 <= 1.4	–	0-30%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	0-12%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

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. It is especially important as livestock grazers continues to experience extraordinarily high fuel and other input costs. This ecological site correlates with the 2013 Florida Forage Suitability Groups G156BC111FL (Sandy Soils on Ridges and Dunes of Xeric Uplands) and G156BC113FL (Sandy Soils on Strongly Sloping to Steep Side Slopes of Xeric Uplands). All species composition and production values are derived from these forage suitability groups.

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.

Dominant plant species

- bahiagrass (*Paspalum notatum*), grass
- Bermudagrass (*Cynodon dactylon*), grass
- bluestem (*Andropogon*), grass
- switchgrass (*Panicum virgatum*), grass
- browntop millet (*Urochloa ramosa*), grass
- pearl millet (*Pennisetum glaucum*), grass
- sorghum (*Sorghum bicolor*), grass
- rhizoma peanut (*Arachis glabrata*), other herbaceous
- white moneywort (*Alysicarpus vaginalis*), other herbaceous
- cowpea (*Vigna unguiculata*), other herbaceous
- hairy indigo (*Indigofera hirsuta*), other herbaceous

Dominant resource concerns

- Wind erosion

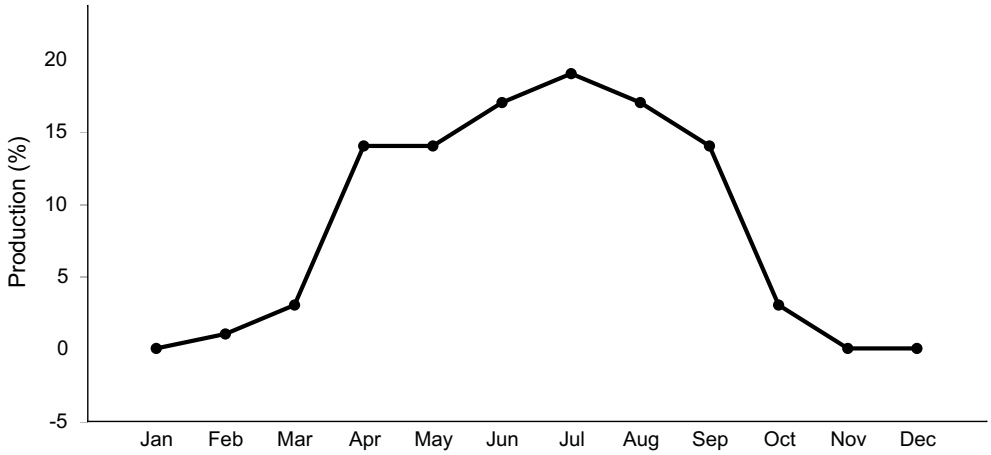


Figure 8. Plant community growth curve (percent production by month). FL0002, Bahiagrass (Pensacola). Growth Curves and Dry Matter Distribution for Introduced Warm Season Perennial Grass: Bahiagrass (Pensacola) (Paspalum notatum, pH 5.0 – 6.5).

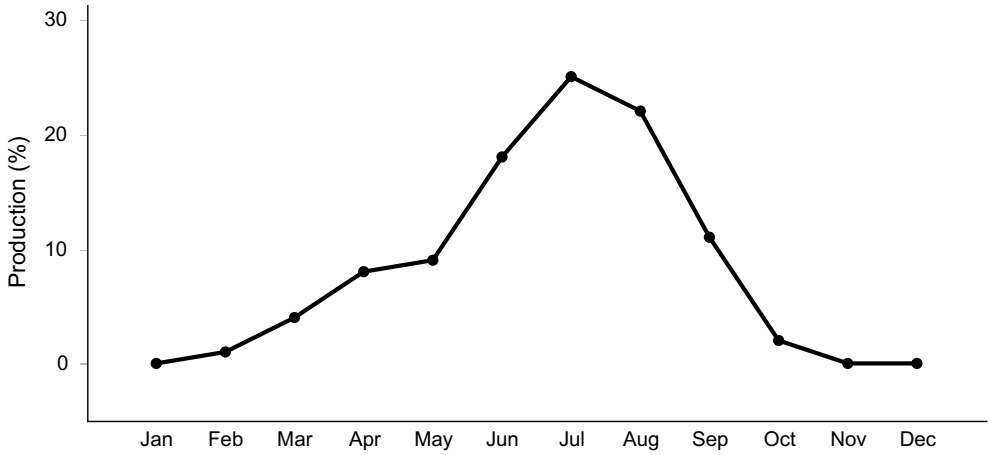


Figure 9. Plant community growth curve (percent production by month). FL0003, Bahiagrass (Argentine). Growth Curves and Dry Matter Distribution for Introduced Warm Season Perennial Grass: Bahiagrass (Argentine)

(Paspalum notatum, pH 5.0 – 6.5).

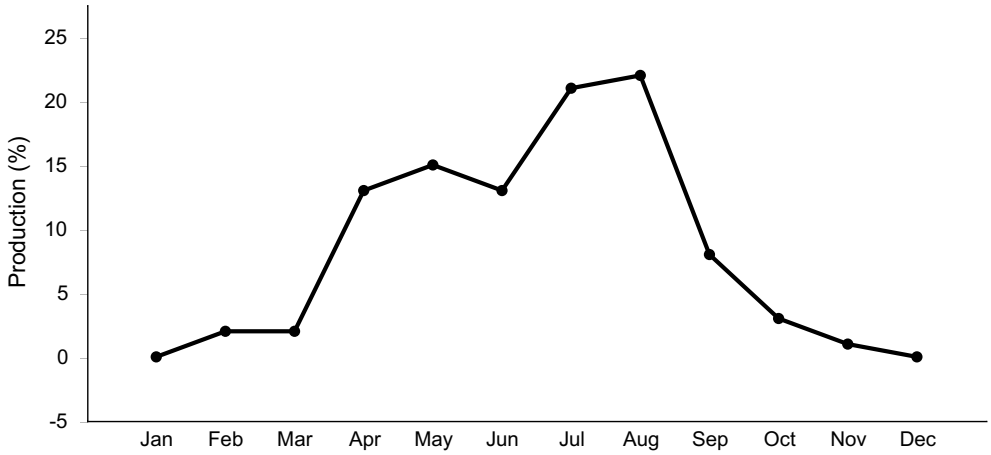


Figure 10. Plant community growth curve (percent production by month). FL0004, Bermudagrass (Tifton 85). Growth Curves and Dry Matter Distribution for Introduced Warm Season Perennial Grass: Bermudagrass (Tifton 85) (Cynodon dactylon).

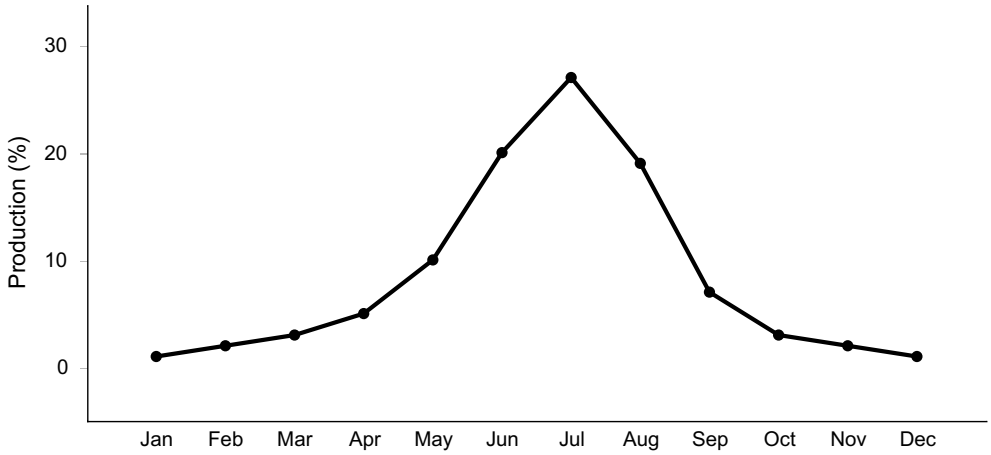


Figure 11. Plant community growth curve (percent production by month). FL0005, Native Warm Season Perennial Grasses. Growth Curves and Dry Matter Distribution for Native Warm Season Perennial Grasses.

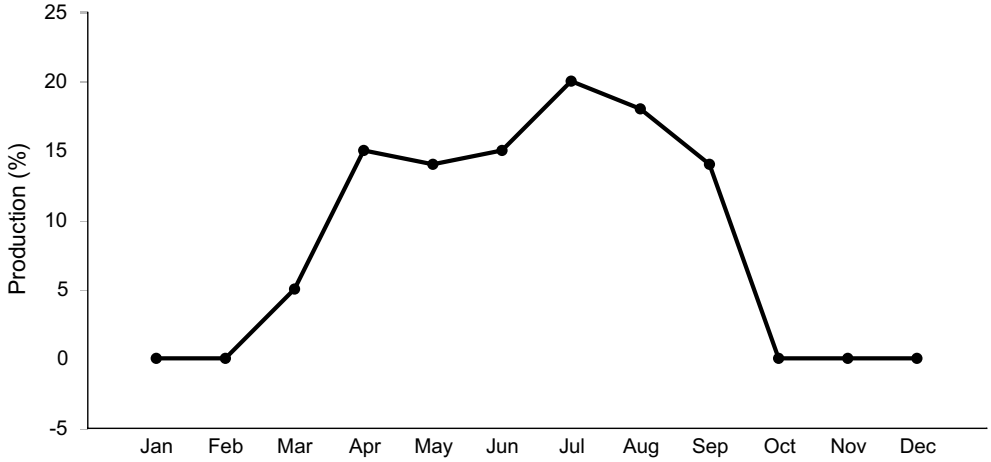


Figure 12. Plant community growth curve (percent production by month). FL0006, Rhizoma Perennial Peanut. Growth Curves and Dry Matter Distribution for Legume or Legume/ Grass Combination: Rhizona Perrenial Peanut (Arachis glabrata, pH 5.8-7.0).

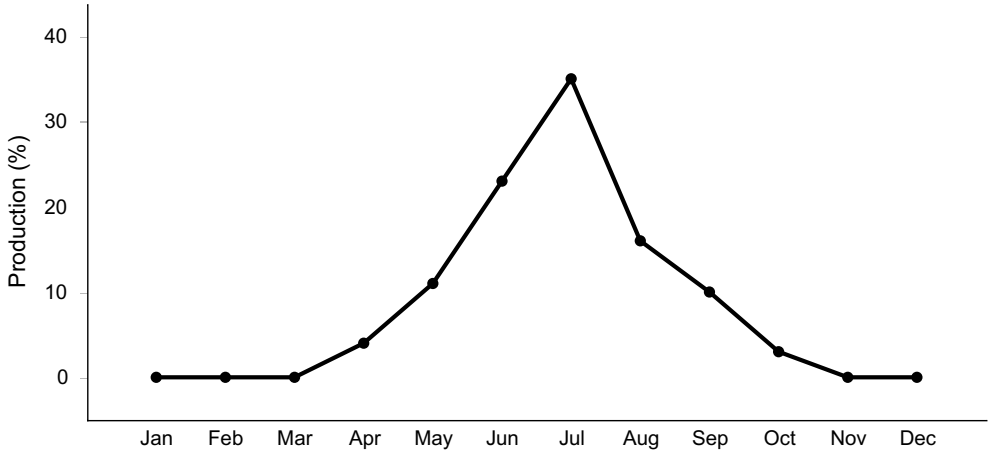


Figure 13. Plant community growth curve (percent production by month). FL0007, Introduced Warm Season Annual Grasses. Growth Curves and Dry Matter Distribution for Introduced Warm Season Annual Grasses.

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 exports from Florida consist 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 use conversion practices that prepare for modified land use. In some circumstances, conversion might include the removal of existing vegetation and habitat.

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 re-establishing native species. This is a time-consuming process and often results in slightly altered community structure and composition more susceptible to invasive or undesirable plant establishment. 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 pasture. 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 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 use conversion practices that prepare for modified land use. In some circumstances, conversion might include the removal of existing vegetation and habitat.

Pathway 4.4A
Community 4.4 to 4.2

This pathway is driven by land use conversion practices that prepare for modified land use. In some circumstances, conversion might include the removal of existing vegetation and habitat.

Pathway 4.5A
Community 4.5 to 4.2

This pathway is driven by land use conversion practices that prepare for modified land use. In some circumstances, conversion might include the removal of existing vegetation and habitat.

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., Immokalee sand-Urban land complex, 0 to 2 percent slopes).

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 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).

Community 5.1
Reclaimed Areas

Reclaimed areas are areas that have been modified through anthropogenic means that are restored to a 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

This transition is driven by an absence of fire within a scrub community for a long time. This allows the establishment of woody species and over time, they grow upwards to form a canopy that shades the understory and creates a layer of leaf litter, covering open patches of sand and more mesic ground conditions.

Constraints to recovery. The natural fire return interval for scrub communities is estimated from 10 to 40 years, the absence of fire to let this community be established would be around 100 years without the presence of fire in the community.

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 hydrology or changes 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 intolerable 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 or hydrology which might have once kept the invasive specie 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

This restoration is driven by overstory mortality which will open the canopy and allow for the reestablishment of scrub species. Overstory mortality may be natural or anthropogenic, and can include extreme storm events, insect or fungal diseases, clear cutting, or catastrophic fires.

Transition T2B
State 2 to 3

The invasion of non-native or exotic species can be driven by a multitude of different environmental factors such as hydrology or changes 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 intolerable 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 or hydrology which might have once kept the invasive specie at bay.

Transition T2C
State 2 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 T2D
State 2 to 5

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

Restoration pathway R3A
State 3 to 1

Mechanical, biological, and chemical removal strategies include removing the unwanted species through various mechanisms. Localized knowledge for community species composition is needed for specific management. Mechanical removal might include roller chopping, harvesting, or cutting and removal of invasive species. Chemical removal might include aerial dispersal from planes, or basal bark injection treatments.

Context dependence. Mechanical, biological, and chemical removal of unwanted species is a time dependent process, with removal types taking long times to be considered effective.

Restoration pathway R3B
State 3 to 2

Mechanical, biological, and chemical removal strategies include removing the unwanted species through various mechanisms. Localized knowledge for community species composition is needed for specific management. Mechanical removal might include roller chopping, harvesting, or cutting and removal of invasive species. Chemical removal might include aerial dispersal from planes, or basal bark injection treatments.

Context dependence. Mechanical, biological, and chemical removal of unwanted species is a time dependent process, with removal types taking long times to be considered effective.

Transition T3A
State 3 to 4

Modify the land for the desired use.

Transition T3B
State 3 to 5

Human Alteration and / or Human Transportation of Materials for desired land use.

Restoration pathway R4A
State 4 to 1

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

Restoration pathway R4B
State 4 to 2

These practices include the restoration of both the hydrology 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

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

Additional community tables

Table 6. Community 4.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Introduced Warm Season Perennial Grasses**			5753–11021	
	Bermudagrass	CYDA	*Cynodon dactylon*	11769–22417	–
	bahiagrass	PANO2	*Paspalum notatum*	3363–6725	–
	bahiagrass	PANO2	*Paspalum notatum*	2130–3923	–
2	**Native Warm Season Perennial Grasses**			5044–8967	
	switchgrass	PAVI2	*Panicum virgatum*	5044–8967	–
3	**Introduced Warm Season Annual Grasses**			7846–11208	
	pearl millet	PEGL2	*Pennisetum glaucum*	7846–11208	–
Forb					
4	**Introduced Warm Season Perennial Legumes**			5884–11208	
	rhizoma peanut	ARGL18	*Arachis glabrata*	5884–11208	–
5	**Introduced Warm Season Annual Legumes**			5044–9527	
	hairy indigo	INHI	*Indigofera hirsuta*	6725–13450	–
	white moneywort	ALVA2	*Alysicarpus vaginalis*	3363–5604	–

Animal community

This ecosite provides habitat and forage for multiple species of animals, some of which are on the federally endangered list. Some species that can be found within scrub habitat include:

Mammals: Least shrew (Cyyptotis parva), eastern yellow bat (Lasiurus intermedius), evening bat (Nycticeius humeralis), nine-banded armadillo (Dasypus novemcinctus), cottontail rabbit (Sylvilagus palustris), Florida mouse (Podomys floridana), oldfield mouse (Peromyscus polionotus), cotton mouse (P. gossypinus), spotted skunk (Spilogale putorius)

Birds: Florida scrub-jay (Aphelocoma coerulescens), southeastern American kestrel (Falco sparvenius paulus), mourning dove (Zenaida macroura), common ground dove (Columbina passerine), eastern screech owl (Otus asio), common nighthawk (Chordeilas minor), tufted titmouse (Parus bicolor), blue-gray gnatcatcher (Polioptila caerulea), ruby-crowned kinglet (Regulus calendula), northern mockingbird (Mimus polyglottos), gray

catbird (Dumetalla carolinensis), brown thrasher (Toxostoma rufium), northern parula (Parula americana), pine warbler (Dendroica pinus), yellow rumped warbler (D. coronate), palm warbler (D. palmarus), common yellowthroat (Geothlypis trichas), northern cardinal (Cardinalis cardinalis), rufous-sided towhee (Piplio erythrophthalmus), and chipping sparrow (Spizella passerine).

Reptiles: Gopher tortoise (Gopherus polyphemus), Florida worm lizard (Rhineura floridana), scrub lizard (Sceloporus woodi), peninsula mole skink (Eumeces egregious onocrepis), blue-tailed mole skink (E. e. lividus), Sand skink (Neoseps reynoldsi), short-tailed snake (Stilosoma extenuatum), rough green snake (Opheodrys aestivus), crowned snake (Tantilla relicta), and pygmy rattlesnake (Sistrurus milarius).

Amphibians: greenhouse frog (Eleutherodatylus planirostris), eastern spadefoot toad (Scaphiopus holbrooki), southern toad (Bufo terrestris), oak toad (B. quercicus), pinewoods treefrog (Hyla femoralis), narrow-mouthed toad (Gastrophyne carolinensis), gopher frog (Rana capito).

The Florida scrub-jay is endemic to this habitat with most management plans revolving around this federally threatened species. Presence of the scrub-jay is used as an indicator species for healthy, natural scrub, and its preferred habitat as the management goals. The species depends on fires to leave behind patches of unburned fuels for forage and nesting sites, and scrub habitats left unburned for too long the scrub-jays will abandon the habitat.

Gopher tortoises are considered keystone species that are critically important within scrub and other upland habitats such as mesic flatwoods or mesic hammocks. They create large underground burrows throughout the landscape that serve as refuges for multiple species during fires. Studies done through Florida Fish and Wildlife have shown over 350 species use their burrows which can vary up to 40 feet long and up to 10 feet deep. Due to anthropogenic effects many tortoises are displaced, and become recipients for relocation, with requirements from Florida Fish and Wildlife Conservation Commission following below. Acceptable criteria thresholds for Gopher Tortoise habitat within recipient sites have greater than 40 acres and more than 12-18 inches depth to water table, and >30% herbaceous cover, <60% canopy cover, and <40% improved pasture. Desired criteria thresholds for Gopher Tortoise habitat within recipient sites have greater than 250 acres and more than 51.6 inches depth to water table, and >50% herbaceous cover, <40% canopy cover, and no improved pasture.

Hydrological functions

This ecosite is primarily influenced by freshwater inputs from rain, with the majority of rain being deposited during the months of June through September. Primarily consisting of deep, less developed sandy soils, these sites are excessively well drained with little to no runoff.

Recreational uses

This habitat is primarily used for outdoor recreation such as hiking and bird watching. Many of the remaining few scrub habitats along the Atlantic Coastal Strip are owned by towns or counties which have been converted into parks with proper management.

Wood products

Due of the protected nature of this site within this MLRA it is not recommended for commercial wood production, however, sites in northern Florida and along the Lake Wales Ridge have been altered from native longleaf pine community to slash pine for pulp and lumber production.

Other products

Due to the well-drained soils in this ecological site, much of this community has been completely or partially cleared for rangeland and agricultural uses for crops such as citrus.

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.

Other references

Ashton, K. G., Engelhardt, B. M., & Branciforte, B. S. 2008. Gopher tortoise (Gopherus polyphemus) abundance and distribution after prescribed fire reintroduction to Florida scrub and sandhill at Archbold Biological Station. Journal of Herpetology, 42(3), 523-529.

Breininger, D. R., Larson, V. L., Duncan, B. W., Smith, R. B., Oddy, D. M., & Goodchild, M. F. 1995. Landscape patterns of Florida scrub jay habitat use and demographic success. Conservation Biology, 9(6), 1442-1453.

Ewel, J. J., & Myers, R. L. (Eds.). 1990. Ecosystems of Florida. University of Central Florida Press.

Florida Chapter Soil and Water Conservation Society. 1989. 26 Ecological Communities of Florida.

Florida Natural Areas Inventory (FNAI). 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL

Gann, G.D., Bradley, K.A. and Woodmansee, S.W. 2009. Floristic Inventory of South

Florida Database. Institute for Regional Conservation.

Hokit, D. G., Stith, B. M., & Branch, L. C. 1999. Effects of landscape structure in Florida scrub: a population perspective. Ecological Applications, 9(1), 124-134.

Kambly, S., Moreland, T.R., 2009, Land cover trends in the Southern Florida Coastal Plain: U.S. Geological Survey Scientific Investigations Report 2009–5054, 16 p.

McNab, W.H.; Cleland, D.T.; Freeouf, J.A.; Keys, Jr., J.E.; Nowacki, G.J.; Carpenter, C.A., comps. 2007. Description of ecological subregions: sections of the conterminous United States [CD-ROM]. Gen. Tech. Report WO-76B. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p

McPherson, B. F., Hendrix, G. Y., Klein, H., & Tyus, H. M. 1976. The environment of south Florida: a summary report (Vol. 1011). US Government Printing Office.

Menges, E. S. 1999. Florida scrub. The Savanna, Barren, and Rock Outcrop Plant Communities of North America. Cambridge University Press, Cambridge, UK, 7-22.

Scott, T. M. 2001. Text to accompany the geologic map of Florida. Florida Geologic Survey, Tallahassee, Florida.

U.S. Fish & Wildlife Service Southeast Region (FWS). 1998. Florida Scrub. Multi-Species Recovery Plan for South Florida.

Contributors

Jack Ferrara
Craig Prink
Martin Figueroa
Jamie Bean

Approval

Charles Stemmans, 2/07/2025

Acknowledgments

St. Johns River Water Management District
Florida State Parks
Florida Department of Environmental Protection

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	05/20/2025
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:**