

# **Ecological site PX138X00Y120**

## **Loamy and Clayey Lowland Flats**

Last updated: 6/09/2025

Accessed: 03/18/2026

---

### **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): 138X–North-Central Florida Ridge

The MLRA notes section provides a brief description of the entire MLRA. This description is intended to provide some context about the MLRA within which this ecological site is associated. A more complete description of the MLRA can be found in Ag Handbook 296 (USDA-NRCS, 2022).

This MLRA is on a limestone upland that is mantled with sandy marine deposits and has an irregular, gently rolling topography. Because of the underlying karst topography, there are a moderate number of limestone sinkholes, some filled with water. Production of cash crops, hay, and pasture is the primary land use. This area comprises about 2,196 square miles (5,688 square kilometers) and is entirely within Florida.

This area is underlain by sediments of the Quaternary Period (present to 2.58 million years ago) that overlie the Neogene (2.53 to 23.03 million years ago) and Paleogene (23.03 to 66 million years ago) formations of the Hawthorn Group (Green et al., 2006). The rocks are progressively older to the south. The Quaternary sediments are largely undifferentiated marine deposits consisting of fine to coarse sands that are poorly to moderately sorted with variable mixtures of clay and organic material. The formations of the Hawthorn Group are, from youngest to oldest, the Statesville Formation, Coosawatchie Formation, Suwannee Limestone, and Ocala Limestone. The Statesville Formation consists of thinly interbedded, and commonly cross-bedded, dolostone and clay alternating with beds of sand. Phosphate grains are common to abundant. The Coosawatchie Formation is made up of poorly to moderately sorted sandy clay or clayey sand with phosphate grains, limestone, and dolostone. The Suwannee Limestone is a cream colored to tan, crystalline, vuggy and muddy, fossiliferous, variably dolomitic

carbonate. It has chert nodules in some areas. The Ocala Limestone was deposited in the Eocene (33.9 to 56 million years ago) and is the oldest rock formation exposed in Florida. It is a white to cream-colored, fossiliferous limestone and has chert nodules in some areas.

This area borders MLRA 133A to the north, which has only slight differences in use and management due to the underlying karst topography. Its boundaries with MLRA 152A to the west and MLRA 153A to the east are distinguishable by an abrupt scarp on a lower, younger marine terrace. Its boundary with MLRA 154 is a gradual transition to slightly younger marine sediments to the south.

Elevation of the MLRA ranges from 26 to 197 feet (8 to 60 meters). Local relief is generally 10 to 20 feet (3 to 6 meters) but can be as much as 35 feet (10 meters).

The dominant soil orders are Ultisols, Entisols, and Alfisols. The soils in the area dominantly have a thermic temperature regime, a udic moisture regime, and siliceous mineralogy.

This area supports open pine and oak vegetation. Major wildlife species include white-tailed deer, raccoon, skunk, opossum, rabbit, gray squirrel, fox squirrel, turkey, bobwhite quail, and mourning dove.

The abundant rainfall and the Floridan aquifer are the principal sources of water in the area. The many lakes and ponds are used for recreation. Most of the river water is suitable for almost all uses. Shallow and deep wells in the Floridan aquifer provide water for public supply, domestic use, industry, mining, livestock, and irrigation. This aquifer is one of the most productive sources of ground water in the United States. Its water is hard but of good quality. Wells yield large quantities of the calciumbicarbonate type of water. The Floridan aquifer is a thick sequence of Tertiary limestone and dolomite. The Eocene Avon Park Formation and Ocala Limestone are the thickest and most productive units in the aquifer system.

A significant portion of this MLRA along riparian areas remains wooded with some larger holdings used exclusively for forestry. Pulpwood and lumber are the principal forest products. Hay and pasture are of great extent throughout this MLRA. The cropland in the area is used mainly for corn, peanuts, tobacco, soybeans, vegetables, and melons.

The major resource concerns are maintenance of organic matter and productivity of the soils, management of soil moisture, and management of animal waste. Conservation practices on cropland generally include crop rotations, cover crops, nutrient management, pest management, and irrigation water management.

(USDA, NRCS, 2022)

## Classification relationships

Most of this area is in the East Gulf Coastal Plain section of the Coastal Plain province of the Atlantic Plain. The southern one-quarter is in the Floridian section of the same province and division. (McNab et al., 2007; USDA, NRCS, 2022)

MLRA 138 is relatively small and comprises the eastern half of EPA level IV ecoregion 650, Tallahassee Hills and Valdosta Limesink, which is part of level III ecoregion 65, Southeastern Plains. (U.S. EPA, 2013)

The reference community of this site corresponds approximately with the Bottomland Forest community (FNAI, 2010).

The improved pasture community of the managed grassland state corresponds well with Forage Suitability Group G138XA341FL. The improved drained pasture community also corresponds well with Forage Suitability Group G138XA341FL. (USDA, NRCS, 2013)

## Ecological site concept

This site is on very poorly to somewhat poorly drained soils in mesic lowland flats to hydric uplands where the dominant hydrology is a fluctuating water table. The land is gently sloping with slopes mostly from 2 to 12 percent.

Soils are mostly loamy and clayey, have an argillic horizon within 20 inches. Some soils may have a mollic or umbric horizon.

This site often supports Bottomland Forest, Improved Pasture, and Coniferous Plantation communities.

## Associated sites

PX138X00Y100	<b>Sandy Lowland Flats</b> These soils are in a similar landscape position but have different physical properties and productivity.
PX138X00Y110	<b>Sandy Over Loamy Lowland Flats</b> These soils are in a similar landscape position but have different physical properties and productivity.

## Similar sites

PX138X00Y060	<b>Loamy and Clayey Bottomland Forests on Stream Terraces</b> These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
--------------	---

PX138X00Y090

**Loamy and Clayey Depression Bottomland Forests**

These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.

**Table 1. Dominant plant species**

Tree	(1) <i>Liquidambar styraciflua</i> (2) <i>Pinus taeda</i>
Shrub	Not specified
Herbaceous	Not specified

**Legacy ID**

F138XY120AL

**Physiographic features**

This site occurs in landscape positions that are not along major rivers and stream, or if it does occur near major rivers and streams it is not influenced by regular flooding events, even in the absence of water control structures. This site occurs on mesic or hydric lowlands. Dominant hydrology on this site is typically a fluctuating water table. Slope is typically 2 to 12 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Marine terrace (2) Marine terrace > Flat (3) Marine terrace > Ridge
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	9–61 m
Slope	2–12%
Water table depth	15–46 cm
Aspect	Aspect is not a significant factor

**Table 3. Representative physiographic features (actual ranges)**

Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None

Elevation	9–61 m
Slope	0–12%
Water table depth	0–46 cm

## Climatic features

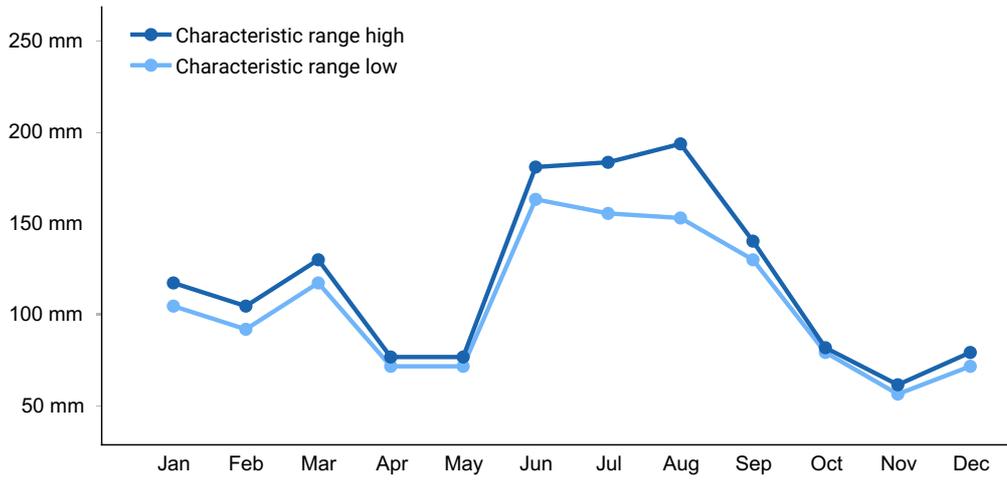
The maximum precipitation occurs in summer, and the minimum occurs in winter and late autumn. Rainfall occurs during high-intensity, convective thunderstorms in summer. The average annual temperature is 68 to 69 degrees F (20 to 21 degrees C).

An additional hazard of concern during late summer through early fall are tropical cyclones. While most impacts from hurricanes and tropical storms are confined along the coastal zone, heavy rainfall, severe flooding, and high winds can occur well into Florida when such systems pass through the area. To the extreme, the region is susceptible to the effects of a strong Bermuda High during the summer, which can cause devastating drought conditions for weeks and even months in some years.

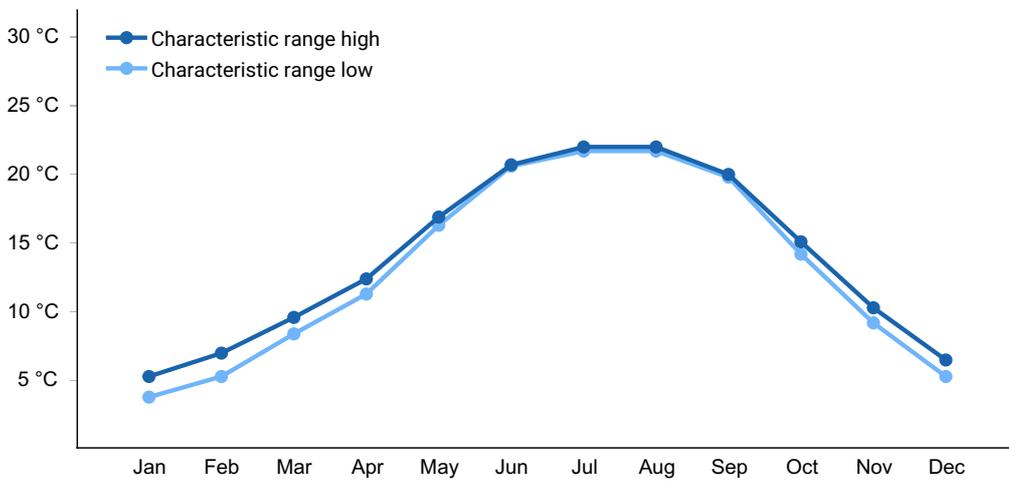
(USDA, NRCS, 2022)

**Table 4. Representative climatic features**

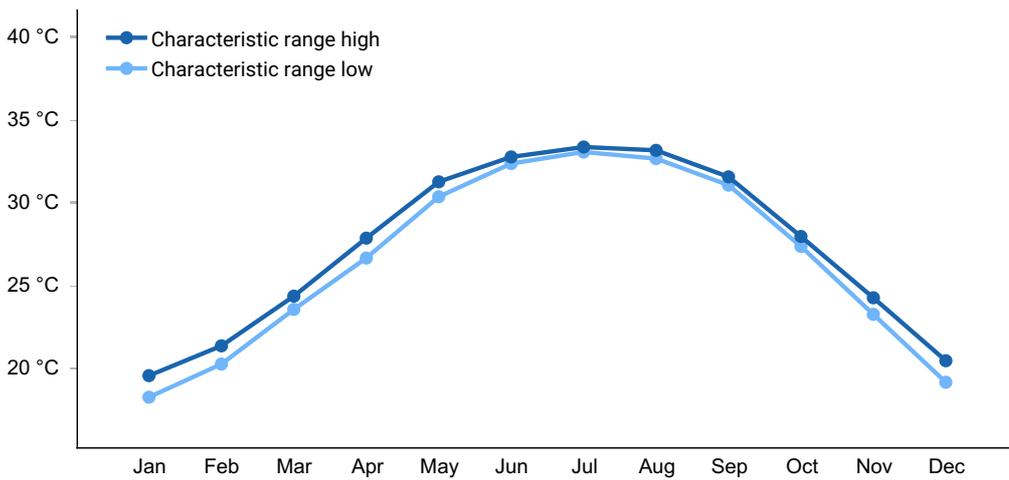
Frost-free period (characteristic range)	217-225 days
Freeze-free period (characteristic range)	253-263 days
Precipitation total (characteristic range)	1,321-1,372 mm
Frost-free period (actual range)	213-231 days
Freeze-free period (actual range)	241-274 days
Precipitation total (actual range)	1,321-1,372 mm
Frost-free period (average)	221 days
Freeze-free period (average)	258 days
Precipitation total (average)	1,346 mm



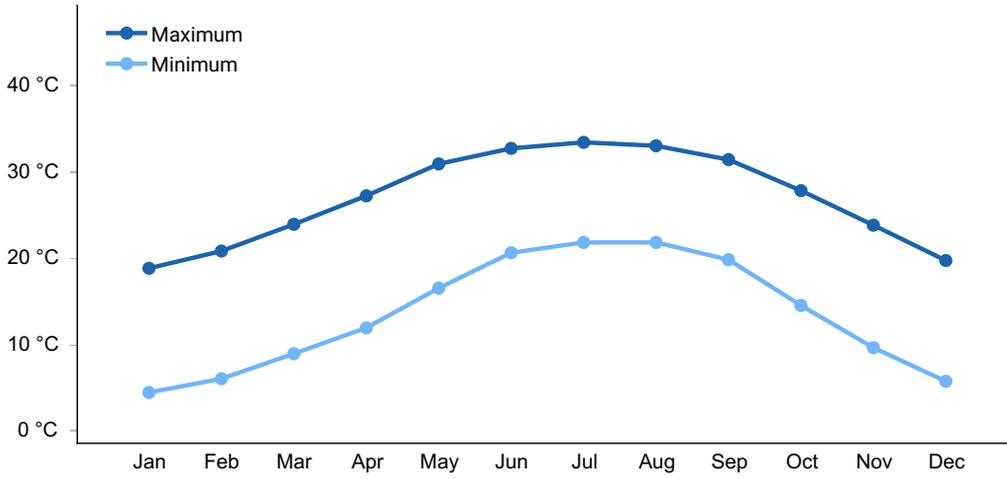
**Figure 1. Monthly precipitation range**



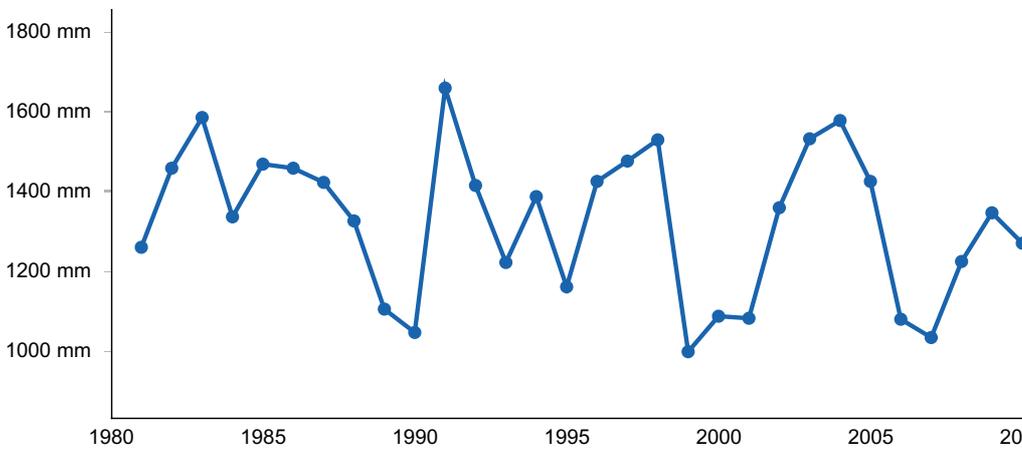
**Figure 2. Monthly minimum temperature range**



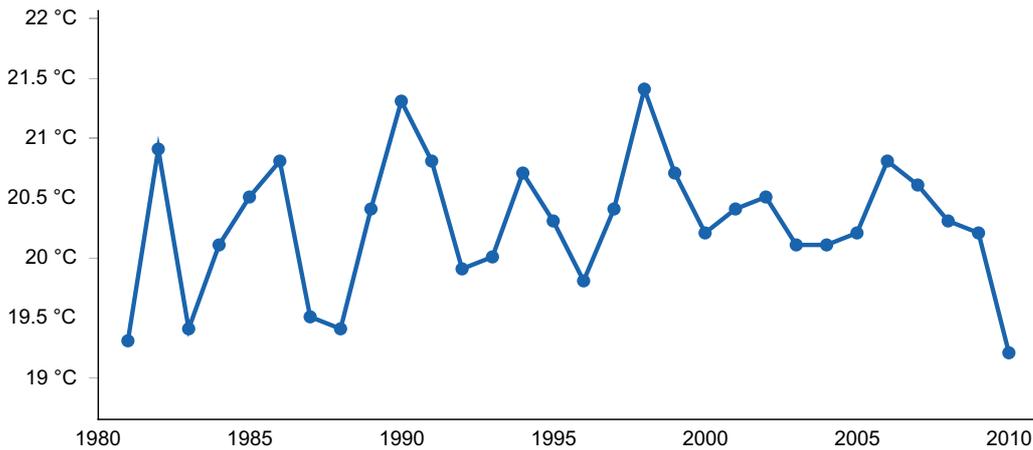
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) JASPER [USC00084394], Jasper, FL
- (2) LIVE OAK [USC00085099], Live Oak, FL
- (3) MAYO [USC00085539], Live Oak, FL
- (4) LAKE CITY 2 E [USC00084731], Lake City, FL

- (5) HIGH SPRINGS [USC00083956], High Springs, FL
- (6) BELL 4NW [USC00080598], Old Town, FL

## Influencing water features

The Suwannee River, which originates in the Okefenokee Swamp to the northeast and is spring-fed, flows through this MLRA. The Alapaha and Withlacoochee Rivers join the Suwannee River in the area. Another Suwannee River tributary, the Santa Fe River, crosses the southern part of the area. (USDA, NRCS, 2022)

## Wetland description

Dominant hydrology on this site is a fluctuating water table. This site is very poorly to somewhat poorly drained. It represents locations where the soils may or may not meet hydric field criteria, and the variation between the two may be exceptionally subtle. In situations where the soil is hydric, this site represents locations that are seasonally saturated and/or ponded, are not typically flooded, and are not exposed to tidal influences, so any wetlands that occur on this site are palustrine in nature.

## Soil features

Please note that the soils listed in this section of the description may not be all inclusive. There may be additional soils that fit the site’s concepts. Additionally, the soils that provisionally form the concepts of this site may occur elsewhere, either within or outside of the MLRA and may or may not have the same geomorphic characteristics or support similar vegetation. Some soil map units and soil series included in this “provisional” ecological site were used as a “best fit” for a particular soil – landform catena during a specific era of soil mapping, regardless of the origin of parent material or the location of MLRA boundaries. Therefore, the listed soils may not be typical for MLRA 138 or a specific location, and the associated soil map units may warrant further investigation in a joint ecological site inventory – soil survey project. When utilizing this provisional description, the user is encouraged to verify that the area of interest meets the appropriate ecological site concepts by reviewing the soils, landform, vegetation, and physical location. If the site concepts do not match the attributes of the area of interest, please review the Similar or Associated Sites listed in the General Information section of this description to determine if another site may be a better fit for your area of interest.

This site is comprised of soils in the Goldhead, Stockade, and Bivans series. These soils are very poorly to somewhat poorly drained, loamy or clayey, and they have an argillic horizon within 20 inches. Some soils may have a mollic or umbric horizon.

**Table 5. Representative soil features**

Parent material	(1) Marine deposits
-----------------	---------------------

Surface texture	(1) Loamy sand (2) Fine sand (3) Fine sandy loam
Drainage class	Very poorly drained to somewhat poorly drained
Permeability class	Very slow to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.11–17.02 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

**Table 6. Representative soil features (actual values)**

Drainage class	Very poorly drained to somewhat poorly drained
Permeability class	Very slow to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.05–17.78 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–12%
Subsurface fragment volume >3" (Depth not specified)	0–1%

## 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 dynamics 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.

Historically, these sites have been drained frequently to support a variety of land uses including pasture. This drained state is included in this STM because this state exists widely today across the landscape. This site may or may not represent a wetland but drainage of wetlands today is significantly regulated. NRCS is required to consider impacts to wetlands according to Federal laws including, but not limited to, the Clean Water Act, the Wetland Conservation provisions of the Food Security Act of 1985, and State, Tribal, and local laws. It is the policy of NRCS to protect and promote wetland functions and values in all NRCS assistance (National Environmental Compliance Handbook (NECH) 610.36).

The complex topography formed by alluvial rivers and some larger blackwater rivers such as the Suwannee River creates a mixture of bottomland forest and more frequently flooded alluvial forest and flood plain swamp. Bottomland forest vegetation may be found not only on higher terraces within the flood plain, but also on natural levees and ridges. Levees are formed during high floods when water from the main channel overtops the banks. As flood waters are slowed by the process of spreading across the flood plain surface, sand and other heavy sediments are the first to be deposited along these ridges, and thus levees are gradually built upward. Along oxbows that have become isolated from the main channel, levees persist as high ridges. In some cases, these levees and ridges may be quite dry and support upland communities such as mesic or xeric hammock. Bottomland forest, while not as prone to prolonged growing season inundations as alluvial forest, is nevertheless influenced by high water tables and peak seasonal flooding as well as irregular high flood events. Variations in seedling establishment are often caused not only by flooding regimes, but also by windthrows and treefall gaps that allow for the establishment of shade intolerant species. Organic debris from bottomland forests is an important nutrient source for downstream ecosystems. Although annual floods do not always inundate bottomland forest, large scale patterns of high water pulses occur periodically and are correlated with a significant increase in commercial fish abundance in their outlet bay. Fire is not a significant factor in bottomland forest, and is primarily limited to individual trees affected by lightning strikes. (FNAI, 2010)

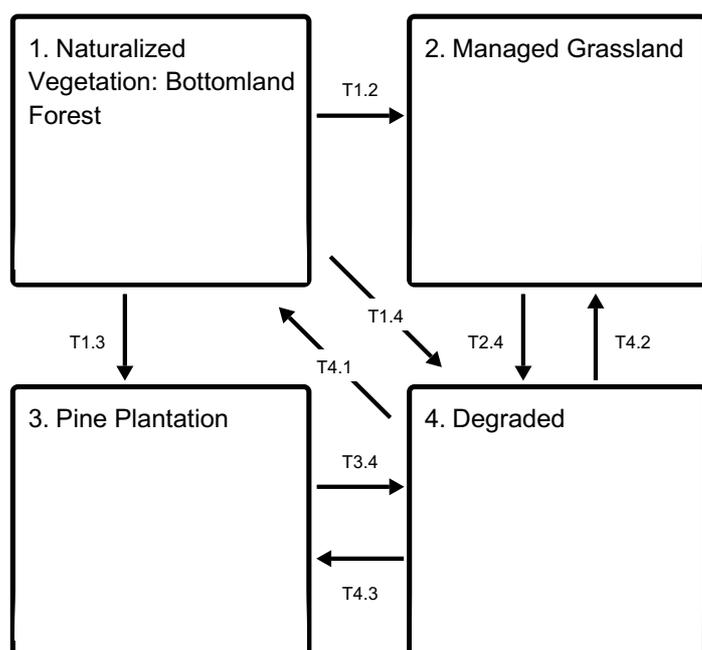
Following this narrative, a “provisional” state and transition model is provided that includes the “perceived” reference state and several alternative (or altered) vegetation states that have been observed and/or projected for this ecological site. This model is based on limited inventories, literature, expert knowledge, and interpretations. Plant communities may differ from one location to the next depending on the severity of local land use activities and rates of deposition. Depending on objectives, the reference plant community may not necessarily be the management goal.

The environmental and biological characteristics of this site are complex and dynamic. As such, the following diagram suggests pathways that the vegetation on this site might take,

given that the modal concepts of climate and soils are met within an area of interest. Specific locations with unique soils and disturbance histories may have alternate pathways that are not represented in the model. This information is intended to show the possibilities within a given set of circumstances and represents the initial steps toward developing a defensible description and model. The model and associated information are subject to change as knowledge increases and new information is garnered. This is an iterative process. Most importantly, local and/or state professional guidance should always be sought before pursuing a treatment scenario.

## State and transition model

### Ecosystem states



**T1.2** - Land clearing, introduction of grasses, and applied grassland management

**T1.3** - Land clearing, site preparation, and tree planting

**T1.4** - Introduction of non-native species

**T2.4** - Introduction of non-native species

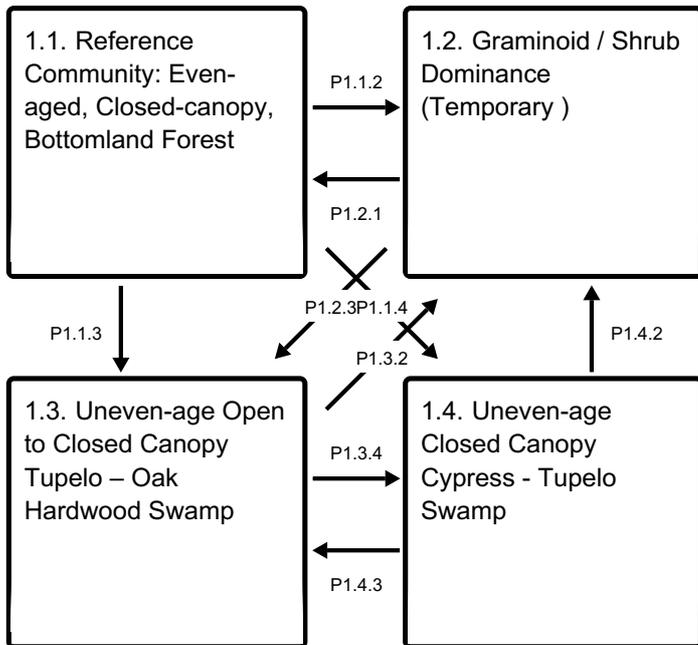
**T3.4** - Introduction of non-native species

**T4.1** - Mechanical, chemical or biological control

**T4.2** - Mechanical, chemical or biological control

**T4.3** - Mechanical, chemical or biological control

**State 1 submodel, plant communities**



**P1.1.2** - Clearcut, widescale blowdown, insect, or disease infestation

**P1.1.3** - Selective logging of cypress

**P1.1.4** - Undisturbed succession, time, and natural die off

**P1.2.1** - Reforestation

**P1.2.3** - Tupelo dominance post disturbance

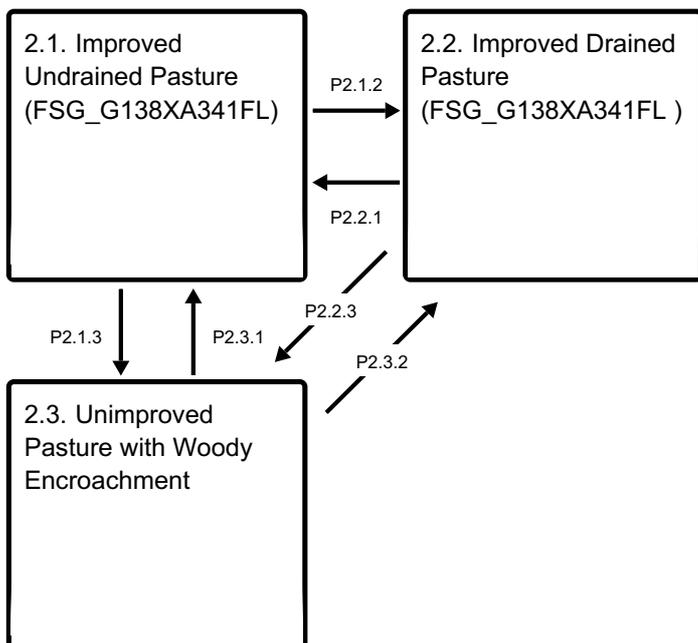
**P1.3.2** - Clearcut, widescale blowdown, insect, or disease infestation

**P1.3.4** - Hardwood reduction, cypress regrowth, and canopy closure

**P1.4.2** - Clearcut, widescale blowdown, insect, or disease infestation

**P1.4.3** - Selective logging of cypress

**State 2 submodel, plant communities**



**P2.1.2** - Drained

P2.1.3 - Pasture abandonment

P2.2.1 - Hydrologic restoration

P2.2.3 - Pasture abandonment

P2.3.1 - Pasture restoration and applied grazing

P2.3.2 - Pasture restoration and applied grazing

## State 1

### Naturalized Vegetation: Bottomland Forest

A bottomland forest is flatland with sand/clay/organic substrate; usually connected or adjacent to a riverine community; occasionally inundated; rare or no fire; closed canopy of mixed hardwoods; deciduous or mixed deciduous/evergreen; tuliptree, sweetbay, water oak, sweetgum, diamond-leaved oak, red maple, loblolly pine, spruce pine, Atlantic white cedar. (FNAI, 2010) According to FNAI (2010) bottomland forest is a deciduous, or mixed deciduous/evergreen, closed-canopy forest on terraces and levees within riverine flood plains and in shallow depressions. Found in situations intermediate between swamps (which are flooded most of the time) and uplands, the canopy may be quite diverse with both deciduous and evergreen hydrophytic to mesophytic trees. Dominant species include sweetgum (*Liquidambar styraciflua*), spruce pine (*Pinus glabra*), loblolly pine (*Pinus taeda*), sweetbay (*Magnolia virginiana*), swamp laurel oak (*Quercus laurifolia*), water oak (*Q. nigra*), live oak (*Q. virginiana*), swamp chestnut oak (*Q. michauxii*), and sugarberry (*Celtis laevigata*). More flood tolerant species that are often present include American elm (*Ulmus americana*) and red maple (*Acer rubrum*), as well as occasional swamp tupelo (*Nyssa sylvatica* var. *biflora*) and bald cypress (*Taxodium distichum*). Evergreen bay species such as loblolly bay (*Gordonia lasianthus*), and sweetbay are often mixed in the canopy and understory in acidic or seepage systems.

#### Dominant plant species

- sweetgum (*Liquidambar styraciflua*), tree
- spruce pine (*Pinus glabra*), tree
- loblolly pine (*Pinus taeda*), tree
- sweetbay (*Magnolia virginiana*), tree
- laurel oak (*Quercus laurifolia*), tree
- water oak (*Quercus nigra*), tree
- live oak (*Quercus virginiana*), tree
- swamp chestnut oak (*Quercus michauxii*), tree
- sugarberry (*Celtis laevigata*), tree

#### Community 1.1

##### Reference Community: Even-aged, Closed-canopy, Bottomland Forest

#### Community 1.2

##### Graminoid / Shrub Dominance (Temporary )

Logging, windthrow, gap dynamics, etc. create an open habitat in which graminoids and shrubs gain temporary importance. Increased light in these areas allow for shade intolerant species to become established, species such as loblolly pine and sweetgum. Then over time, from natural seeding or planting, the shade intolerant forest can have the original hardwood species become present again, with the shade intolerant species as relict or emergent canopy species. Then over time, those large relict species can die off and either leave a large enough gap for it to revert back to a shrubland or grassland of temporary importance or is small gap and will become back to a closed canopy hardwood dominated forest. Fire every 35 to >200 yrs.

### **Community 1.3**

#### **Uneven-age Open to Closed Canopy Tupelo – Oak Hardwood Swamp**

### **Community 1.4**

#### **Uneven-age Closed Canopy Cypress - Tupelo Swamp**

### **Pathway P1.1.2**

#### **Community 1.1 to 1.2**

Clearcut, widescale blowdown, insect, or disease infestation

### **Pathway P1.1.3**

#### **Community 1.1 to 1.3**

Selective logging of cypress

### **Pathway P1.1.4**

#### **Community 1.1 to 1.4**

Undisturbed succession, time, and natural die off

### **Pathway P1.2.1**

#### **Community 1.2 to 1.1**

Reforestation

### **Pathway P1.2.3**

#### **Community 1.2 to 1.3**

Tupelo dominance post disturbance

### **Pathway P1.3.2**

#### **Community 1.3 to 1.2**

Clearcut, widescale blowdown, insect, or disease infestation

### **Pathway P1.3.4** **Community 1.3 to 1.4**

Hardwood reduction, cypress regrowth, and canopy closure

### **Pathway P1.4.2** **Community 1.4 to 1.2**

Clearcut, widescale blowdown, insect, or disease infestation

### **Pathway P1.4.3** **Community 1.4 to 1.3**

Selective logging of cypress

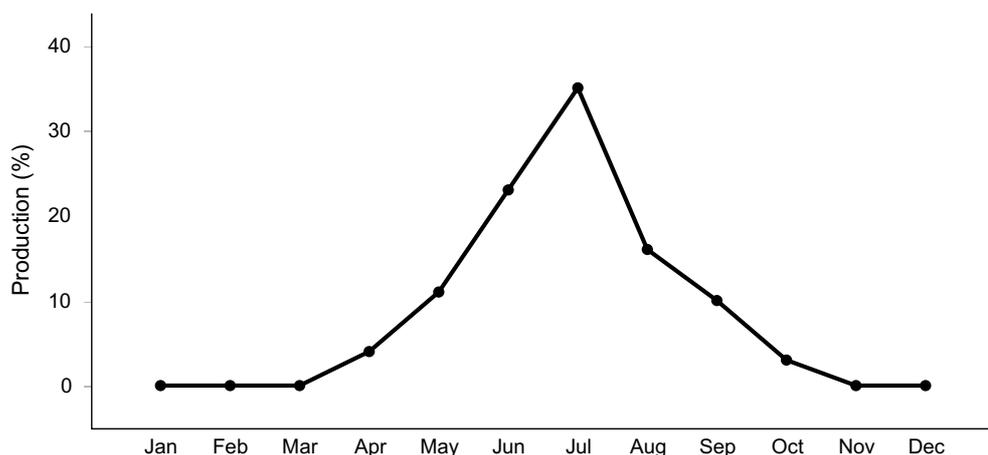
## **State 2** **Managed Grassland**

Managed grassland represents both improved and unimproved pasture including wooded pasture.

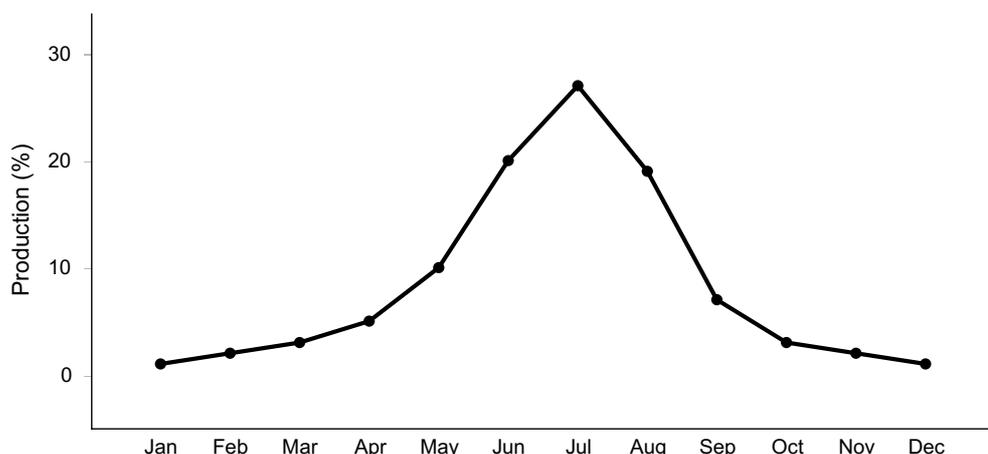
### **Community 2.1** **Improved Undrained Pasture (FSG\_G138XA341FL)**

Dominated by planted non-native or domesticated native forage species and evidence of current or recent pasture activity and/or cultural treatments (mowing, grazing, burning, fertilizing; Agro-Ecology Grazing Issues Working Group 2009). Improved pastures have been cleared of their native vegetation. Weedy native species are often common in improved pastures in Florida and include dogfennel (*Eupatorium capillifolium*), many species of flatsedge (*Cyperus* spp.), carpetgrasses (*Axonopus* spp.), crabgrasses (*Digitaria* spp.), and rustweed (*Polypernum procumbens*) among many others. (FNAI, 2010) The native forage species listed are considered adapted to grow on the soils in this group at their natural pH levels. All introduced grass and legume species will need native pH raised to minimum 5.5 (unless noted) for best production. All forages listed are adapted to dryland conditions. Perennial Species: Grasses Warm season (Introduced) • Bahiagrass (*Paspalum notatum*, pH 5.0 – 6.5) • Bermudagrass (*Cynodon dactylon*) • Limpograss (*Hemarthria altissima*) Warm season (Native) • Big Bluestem (*Andropogon gerardii*) • Purple Bluestem (*Andropogon glomeratus* var. *glaucopsis*) • Yellow Indiangrass (*Sorghastrum nutans*) • Lopsided Indiangrass (*Sorghastrum secundum*) • Switchgrass (*Panicum virgatum*) • Eastern Gamagrass (*Tripsacum dactyloides*) Legumes Warm season • Rhizoma Perennial Peanut (*Arachis glabrata*, pH 5.8-7.0; additional management required for high water table) Annual Species: Grasses Warm season •

Browntop Millet (*Urochloa ramosa*; =*Panicum ramosum*) • Pearl Millet (*Pennisetum glaucum*) • Sorghum (*Sorghum bicolor*; includes forage sorghums, sudangrass, and their hybrids) Cool season • Ryegrass, annual (*Lolium perenne* ssp. multi-florum; =*L. multiflorum*) • Oat (*Avena sativa*) • Rye (*Secale cereale*) • Wheat (*Triticum aestivum*) • Triticale (x *Triticosecale*) Legumes Warm season • Aeschynomene (*Aeschynomene americana*) • Hairy Indigo (*Indigofera hirsuta*) Cool season • White Clover (*Trifolium repens*, pH 6.0-7.5) • Berseem Clover (*Trifolium alexandrinum*, pH 6.5-8.0) • Ball Clover (*Trifolium nigrescens*, pH >6.5) (USDA, NRCS, 2013s)



**Figure 8. 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.**

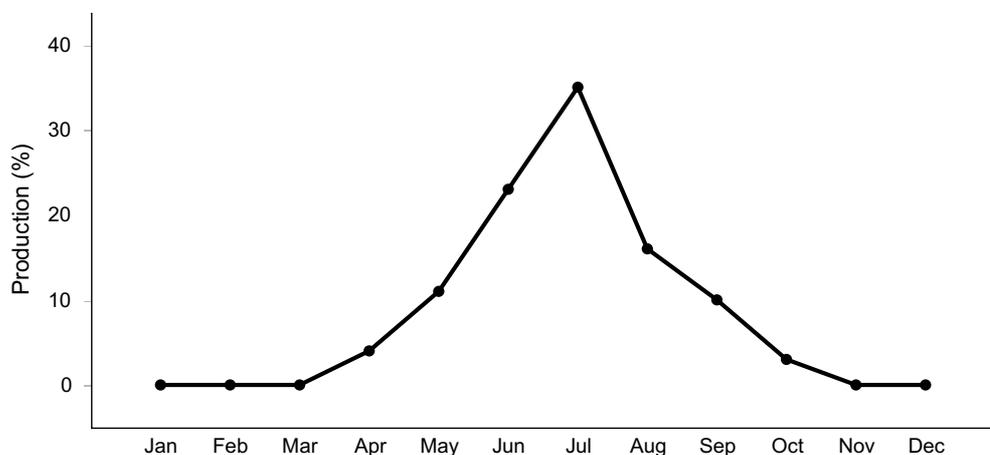


**Figure 9. Plant community growth curve (percent production by month). FL0005, Native Warm Season Perennial Grasses. Growth Curves and Dry Matter Distribution for Native Warm Season Perennial Grasses.**

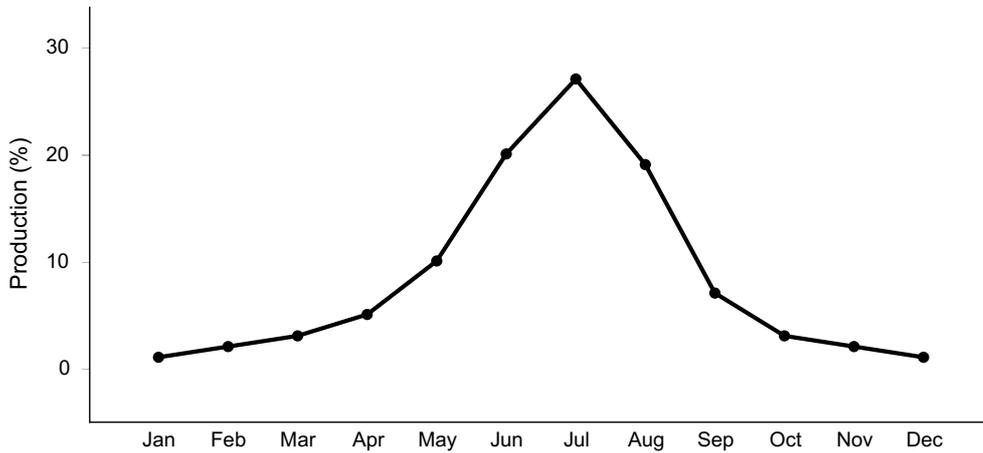
## Community 2.2 Improved Drained Pasture (FSG\_G138XA341FL )

Dominated by planted non-native or domesticated native forage species and evidence of current or recent pasture activity and/or cultural treatments (mowing, grazing, burning, fertilizing; Agro-Ecology Grazing Issues Working Group 2009). Improved pastures have been cleared of their native vegetation. Weedy native species are often common in improved pastures in Florida and include dogfennel (*Eupatorium capillifolium*), many

species of flatsedge (*Cyperus* spp.), carpetgrasses (*Axonopus* spp.), crabgrasses (*Digitaria* spp.), and rustweed (*Polypremum procumbens*) among many others. (FNAI, 2010) Historically, these sites have been drained frequently to support a variety of land uses including pasture. This drained state is included in this STM because this state exists widely today across the landscape. This site may or may not represent a wetland but drainage of wetlands today is significantly regulated. NRCS is required to consider impacts to wetlands according to Federal laws including, but not limited to, the Clean Water Act, the Wetland Conservation provisions of the Food Security Act of 1985, and State, Tribal, and local laws. It is the policy of NRCS to protect and promote wetland functions and values in all NRCS assistance (National Environmental Compliance Handbook (NECH) 610.36). The native forage species listed are considered adapted to grow on the soils in this group at their natural pH levels. All introduced grass and legume species will need native pH raised to minimum 5.5 (unless noted) for best production. All forages listed are adapted to dryland conditions. Perennial Species: Grasses Warm season (Introduced) • Bahiagrass (*Paspalum notatum*, pH 5.0 – 6.5) • Bermudagrass (*Cynodon dactylon*) • Limpograss (*Hemarthria altissima*) Warm season (Native) • Big Bluestem (*Andropogon gerardii*) • Purple Bluestem (*Andropogon glomeratus* var. *glaucopsis*) • Yellow Indiangrass (*Sorghastrum nutans*) • Lopsided Indiangrass (*Sorghastrum secundum*) • Switchgrass (*Panicum virgatum*) • Eastern Gamagrass (*Tripsacum dactyloides*) Legumes Warm season • Rhizoma Perennial Peanut (*Arachis glabrata*, pH 5.8-7.0; additional management required for high water table) Annual Species: Grasses Warm season • Browntop Millet (*Urochloa ramosa*; =*Panicum ramosum*) • Pearl Millet (*Pennisetum glaucum*) • Sorghum (*Sorghum bicolor*; includes forage sorghums, sudangrass, and their hybrids) Cool season • Ryegrass, annual (*Lolium perenne* ssp. *multi-florum*; =*L. multiflorum*) • Oat (*Avena sativa*) • Rye (*Secale cereale*) • Wheat (*Triticum aestivum*) • Triticale (x *Triticosecale*) Legumes Warm season • Aeschynomene (*Aeschynomene americana*) • Hairy Indigo (*Indigofera hirsuta*) Cool season • White Clover (*Trifolium repens*, pH 6.0-7.5) • Berseem Clover (*Trifolium alexandrinum*, pH 6.5-8.0) • Ball Clover (*Trifolium nigrescens*, pH >6.5) (USDA, NRCS, 2013s)



**Figure 11. 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.**



**Figure 12. 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.**

## **Community 2.3 Unimproved Pasture with Woody Encroachment**

This community is characterized by a mixture of native and naturalized non-native species. Forage is usually grazed and/or harvested as stored forage, hay or haylage. Stands are generally productive, and forage and grazing management can maintain the community. Woody species grow quickly on this site and can be difficult and expensive to control. Maintenance of grass stands requires implementing pest management practices to control unwanted weedy and woody species.

### **Pathway P2.1.2 Community 2.1 to 2.2**

If previously drained

### **Pathway P2.1.3 Community 2.1 to 2.3**

Pasture abandonment

### **Pathway P2.2.1 Community 2.2 to 2.1**

Hydrologic restoration

### **Pathway P2.2.3 Community 2.2 to 2.3**

Pasture abandonment

## **Pathway P2.3.1**

### **Community 2.3 to 2.1**

Pasture restoration and applied grazing

## **Pathway P2.3.2**

### **Community 2.3 to 2.2**

Pasture restoration and applied grazing

## **State 3**

### **Pine Plantation**

Pine plantations in Florida are often dominated by evenaged loblolly, sand, or slash pine (*Pinus taeda*, *P. clausa*, or *P. elliottii*, respectively). Dense pine plantations typically have sparse to absent herbaceous vegetation as a result of shading or a cover of deep pine needle duff. These plantations may be very shrubby or vine-dominated or open at ground level. The groundcover in most cases has been severely impacted by mechanical site preparation, such as roller chopping and bedding. However, while perennial grasses such as wiregrass (*Aristida stricta* var. *beyrichiana*) may be greatly reduced, many components of the native groundcover persist even though the relative abundance is altered. Groundcover can be partially restored by thinning and/or frequent burning, although some planting of perennial grasses such as wiregrass may be required. (FNAI, 2010)

#### **Dominant plant species**

- loblolly pine (*Pinus taeda*), tree
- slash pine (*Pinus elliottii*), tree
- sand pine (*Pinus clausa*), tree

## **State 4**

### **Degraded**

The degraded State represents vegetation conditions that have been degraded by the introduction and spread of non-native species.

## **Transition T1.2**

### **State 1 to 2**

Land clearing, introduction of grasses, and applied grassland management

## **Transition T1.3**

### **State 1 to 3**

Land clearing, site preparation, and tree planting

## **Transition T1.4**

### **State 1 to 4**

Introduction of non-native species

## **Transition T2.4**

### **State 2 to 4**

Introduction of non-native species

## **Transition T3.4**

### **State 3 to 4**

Introduction of non-native species

## **Transition T4.1**

### **State 4 to 1**

Mechanical, chemical or biological control

## **Transition T4.2**

### **State 4 to 2**

Mechanical, chemical or biological control

## **Transition T4.3**

### **State 4 to 3**

Mechanical, chemical or biological control

## **Additional community tables**

**Table 7. Community 2.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Graminoids</b>			1009–15692	
	Bermudagrass	CYDA	<i>Cynodon dactylon</i>	14011–15692	–
	limpograss	HEAL5	<i>Hemarthria altissima</i>	11208–14571	–
	pearl millet	PEGL2	<i>Pennisetum glaucum</i>	8406–13450	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	4483–7566	–
	bahiagrass	PANO2	<i>Paspalum notatum</i>	4203–6725	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1009–2018	–
<b>Forb</b>					
2	<b>Legumes</b>			2802–3363	
	shyleaf	AEAM	<i>Aeschynomene americana</i>	2802–3363	–
	hairy indigo	INHI	<i>Indigofera hirsuta</i>	2802–3363	–

**Table 8. Community 2.2 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Graminoids</b>			1009–15692	
	Bermudagrass	CYDA	<i>Cynodon dactylon</i>	14011–15692	–
	limpograss	HEAL5	<i>Hemarthria altissima</i>	11208–14571	–
	pearl millet	PEGL2	<i>Pennisetum glaucum</i>	8406–13450	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	4483–7566	–
	bahiagrass	PANO2	<i>Paspalum notatum</i>	4203–6725	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1009–2018	–
<b>Forb</b>					
2	<b>Legumes</b>			2802–3363	
	shyleaf	AEAM	<i>Aeschynomene americana</i>	2802–3363	–
	hairy indigo	INHI	<i>Indigofera hirsuta</i>	2802–3363	–

## Inventory data references

Data collection and analysis of field data will be performed during the Verification Stage of ESD development.

Production data for pasture communities taken from the USDA, NRCS Florida Field Office Technical Guide, forage suitability groups (USDA, NRCS, 2013).

## **Other references**

Carr, S. C., Robertson, K. M., & Peet, R. K. 2010. A vegetation classification of fire-dependent pinelands of Florida. *Castanea*, 75(2), 153-189.

Casey, W. P., & Ewel, K. C. 2006. Patterns of succession in forested depressional wetlands in north Florida, USA. *Wetlands*, 26(1), 147-160.

Dey, D. C., Brissette, J. C., Schweitzer, C. J., & Guldin, J. M. 2012. Silviculture of forests in the Eastern United States. Cumulative watershed effects of fuel management in the Eastern United States Gen Tech Rep SRS-161. Asheville, NC: US Department of Agriculture Forest Service, Southern Research Station, 7-40.

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

Greenberg, C. H., & Simons, R. W. 1999. Age, composition, and stand structure of old-growth oak sites in the Florida high pine landscape: implications for ecosystem management and restoration. *Natural Areas Journal*. 19 (1): 30-40.

Grelen, H. E. 1962. Plant succession on cleared sandhills in northwest Florida. *American Midland Naturalist*, 36-44.

Haag, K. H., Lee, T. M., & Water, T. B. 2010. Hydrology and ecology of freshwater wetlands in central Florida: a primer. Reston, VA, USA: US Geological Survey.

Inventory, F. N. A. 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL.

Kellison, R. C., & Young, M. J. 1997. The bottomland hardwood forest of the southern United States. *Forest Ecology and Management*, 90(2-3), 101-115.

Landers, J. L., & Boyer, W. D. 1999. An old-growth definition for upland longleaf and south Florida slash pine forests, woodlands, and savannas (Vol. 29). US Department of Agriculture, Forest Service, Southern Research Station.

LaPierre, G. D. J., Irizarry, N. M., & Andreu, M. G. 2022. Florida Soil Series and Natural Community Associations: FOR384/FR455, 5/2022. EDIS, 2022(3).

Light, H. M. 1993. Hydrology, vegetation, and soils of four North Florida river flood plains with an evaluation of state and federal wetland determinations (Vol. 93, No. 4033). US Department of the Interior, US Geological Survey.

Martin, T. A., & Jokela, E. J. 2004. Stand development and production dynamics of loblolly pine under a range of cultural treatments in north-central Florida USA. *Forest Ecology and Management*, 192(1), 39-58.

Martin, T. A., Adams, D. C., Cohen, M. J., Crandall, R. M., Gonzalez-Benecke, C. A., Smith, J. A., & Vogel, J. G. 2017. Managing Florida's plantation forests in a changing climate. *Florida's Climate: Changes, Variations, & Impacts*.

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

Monk, C. D. 1968. Successional and environmental relationships of the forest vegetation of north central Florida. *American Midland Naturalist*, 441-457.

NatureServe. 2018. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 28 August 2018.

Schoeneberger, P.J., and Wysocki, D.A. 2017. Geomorphic Description System, Version 5.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

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

Tamang, B., Hedman, C., Haines, F., Stone, D., & Andreu, M. 2023. Upland forest community composition and structure by ecoregion in 73 Florida state parks—Insights for ongoing management. *Forest Ecology and Management*, 545, 121237.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013. Forage Suitability Groups, MLRA 138XA. Retrieved from <https://efotg.sc.egov.usda.gov/#/state/FL/documents/section=2&folder=52895>.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013a. Forage Suitability Group G138XA111, Sandy Soils on Ridges and Dunes of Xeric Uplands. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA111FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA111FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013b. Forage

Suitability Group G138XA113, Sandy Soils on Strongly Sloping to Steep Side Slopes of Xeric Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA113FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA113FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013c. Forage Suitability Group G138XA114, Sandy Xeric Soils on Stream Terraces or Flood Plains. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA114FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA114FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013d. Forage Suitability Group G138XA121, Sandy Soils on Rises, Knolls, and Ridges of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA121FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA121FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013e. Forage Suitability Group G138XA123, Sandy Soils on Strongly Sloping to Steep Side Slopes of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA123FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA123FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013f. Forage Suitability Group G138XA124, Very Deep, Sandy Soils on Terraces and Floodplains. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA124FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA124FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013g. Forage Suitability Group G138XA131, Sandy Soils on Rises and Knolls of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA131FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA131FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013h. Forage Suitability Group G138XA134, Sandy or Sandy Over Loamy Soils on Stream Terraces or Flood Plains. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA134FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA134FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013i. Forage Suitability Group G138XA141, Sandy Soils, on Flats on Mesic and Hydric Lowlands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA141FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA141FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013j. Forage Suitability Group G138XA145, Sandy Soils on Stream Terraces, Flood Plains, or in Depressions. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA145FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA145FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013j'. Forage

Suitability Group G138XA211, Sandy Over Loamy Soils on Knolls and Ridges of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA211FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA211FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013k. Forage Suitability Group G138XA221, Sandy Over Loamy Soils on Rises, Knolls, and Ridges of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA221FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA221FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013l. Forage Suitability Group G138XA231, Sandy Over Loamy Soils on Flats and Rises of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA231FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA231FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013m. Forage Suitability Group G138XA241, Sandy Over Loamy Soils on Flats of Hydric or Mesic Lowlands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA241FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA241FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013n. Forage Suitability Group G138XA245, Sandy Over Loamy Soils on Stream Terraces, Flood Plains or in Depressions. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA245FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA245FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013o. Forage Suitability Group G138XA311, Loamy and Clayey Soils on Knolls and Ridges of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA311FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA311FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013p. Forage Suitability Group G138XA312, Loamy and Clayey Soils on Ridges and Side Slopes of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA312FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA312FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013p'. Forage Suitability Group G138XA321, Loamy and Clayey Soils on Rises and Knolls of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA321FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA321FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013p''. Forage Suitability Group G138XA322, Loamy and Clayey Sols on Rises, Knolls, and Ridges of Mesic Uplands. Retrieved from

[https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA322FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA322FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013q. Forage

Suitability Group G138XA331, Loamy and Clayey Soils on Flats and Rises of Mesic Uplands. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA331FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA331FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013r. Forage Suitability Group G138XA334, Loamy and Clayey Soils on Stream Terraces and Flood Plains. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA334FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA334FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013s. Forage Suitability Group G138XA341, Loamy and Clayey Soils on Flats of Hydric or Mesic Lowlands. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA341FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA341FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013t. Forage Suitability Group G138XA345, Loamy and Clayey Soils on Stream Terraces, Flood Plains or in Depressions. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA345FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA345FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2013u. Forage Suitability Group G138XA521, Shallow or Moderately Deep, Sandy or Loamy Soils on Rises and Ridges of Mesic Uplands. Retrieved from [https://efotg.sc.egov.usda.gov/references/public/FL/FSG\\_MLRA\\_138XA521FL.pdf](https://efotg.sc.egov.usda.gov/references/public/FL/FSG_MLRA_138XA521FL.pdf)

U.S. Department of Agriculture, Natural Resources Conservation Service. 2017. Geomorphic Description System, Version 5.0. Schoeneberger, P.J., and D.A. Wysocki (eds). USDA-NRCS, National Soil Survey Center, Lincoln, NE.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. Agriculture Handbook 296.

U.S. Environmental Protection Agency. 2013. Level III and IV ecoregions of the continental United States: Corvallis, Oregon, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1:3,000,000, <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>.

## **Contributors**

Ferrara, Jack  
Figueroa, Martin  
Duvall, Matthew

## **Acknowledgments**

Sincere appreciation goes to the MLRA 138X ecological sites technical team, especially NRCS Florida State Soil Scientist, Isabelle Giuliani, and NRCS Florida State Forester, Conrad Wysocki, for their persistent collaboration in the development of these Provisional ESDs.

## 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	03/18/2026
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:**

---