Ecological site PX138X00Y140
Moist Sandy Over Loamy Upland Pine

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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, Coosawhatchie 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 Coosawhatchie 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 65o, 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 Upland Pine community (FNAI, 2010). The improved pasture community of the managed grassland state corresponds well with Forage Suitability Group G138XA231FL. (USDA, NRCS, 2013)

Ecological site concept

This site occurs on somewhat poorly drained flats and rises of uplands. The land is nearly level to gentle sloping with slopes ranging from 0 to 5 percent, and a depth to seasonal high water table of 18 to 42 inches. Soils are mostly sandy over loamy, and have an argillic horizon between 20 and 40 inches. This site often supports Upland Mixed Woodland, Upland Hardwood Forest, Coniferous Plantation, and Improved Pasture communities.

Associated sites

PX138X00Y130	**Moist Sandy Upland Pine** These soils are in a similar landscape position but have different physical properties and productivity.
PX138X00Y150	**Moist Loamy and Clayey Upland Pine** These soils are in a similar landscape position but have different physical properties and productivity.

Similar sites

PX138X00Y050	**Sandy or Sandy Over Loamy Upland Pine on Stream Terraces** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y130	**Moist Sandy Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y150	**Moist Loamy and Clayey Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y160	**Dry Sandy Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y170	**Dry Sandy Over Loamy Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y180	**Dry Loamy and Clayey Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.

PX138X00Y210	**Very Dry Loamy and Clayey Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y190	**Shallow Sandy or Loamy Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
PX138X00Y200	**Very Dry Sandy Over Loamy Upland Pine** These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.

Table 1. Dominant plant species

Tree	(1) *Pinus palustris* (2) *Pinus elliottii*
Shrub	Not specified
Herbaceous	Not specified

Legacy ID

F138XY140AL

Physiographic features

This site occurs on flats and rises of uplands that are nearly level or gently sloping with a seasonal high water table that is typically between 12 to 30 inches. Slope is typically 0 to 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Marine terrace > Rise (2) Marine terrace > Knoll (3) Marine terrace > Ridge (4) Marine terrace > Flat
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None

Elevation	20 – 60 m
Slope	0 – 10 %
Water table depth	30 – 80 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	10 – 60 m
Slope	0 – 10 %
Water table depth	30 – 90 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)	220-230 days
Freeze-free period (characteristic range)	250-260 days
Precipitation total (characteristic range)	1,320-1,370 mm
Frost-free period (actual range)	210-230 days

Freeze-free period (actual range)	240-270 days
Precipitation total (actual range)	1,320-1,370 mm
Frost-free period (average)	220 days
Freeze-free period (average)	260 days
Precipitation total (average)	1,350 mm

- (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

This site does not support wetlands.

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 Leefield, Ocilla, Ousley, and Wampee series. These soils are somewhat poorly drained, sandy over loamy, and they have an argillic horizon between 20 and 40 inches.
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Table 5. Representative soil features

Parent material	(1) Marine deposits

Surface texture	(1) Fine sand (2) Loamy fine sand (3) Loamy sand
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	5.84 – 8.64 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 10
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %

Available water capacity (0-101.6cm)	5.08 – 8.89 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	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 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.

Fire is the dominant factor in the ecology of upland pine. Frequent low-intensity ground fires during the growing season reduce hardwood competition and facilitate pine and wiregrass reproduction. The abundance of woody understory species increases with increasing time between fires. The historic fire frequency ranged from one to three years. Without relatively frequent fires water oak (Q. nigra), live oak (Q. virginiana), sweetgum (Liquidambar styraciflua), common persimmon, laurel oak, and other fire-sensitive, fast growing trees invade and shade the otherwise diverse ground layer. (FNAI, 2010)

Vast differences in vegetation composition exist between natural upland pine and pinelands that have a history of land clearing, agriculture, or heavy disturbance (often referred to as “old-field pinelands”). In the latter, longleaf pine is often replaced by loblolly pine (Pinus taeda) or shortleaf pine, and the wiregrass-dominated groundcover is replaced with old-field species such as broomsedges (Andropogon spp.), dogfennel (Eupatorium capillifolium), and blackberries (Rubus spp.). Seventeen species of herbs can be used as indicators of natural upland pine including goat’s rue, oblongleaf twinflower, hairawn muhly, bracken fern, and rice button aster. A similar suite of herbaceous species was found to be sensitive to disturbance and have low re-colonization rates in a disturbed upland pine. Absence of wiregrass is the clearest indicator that an upland pine has a disturbance history. Additionally, land-use history plays an important role in the effect fire has on community structure; natural pinelands have higher fine fuels and generally higher fire intensity, thus having a greater effect on reduction of cover of woody species than do old-field pinelands with a history of agriculture. (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

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 1.5 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 1.6 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Graminoids**			1009-13114	
	Bermudagrass	CYDA	*Cynodon dactylon*	4035-13114	–
	bahiagrass	PANO2	*Paspalum notatum*	4595-12890	–
	pearl millet	PEGL2	*Pennisetum glaucum*	8967-11220	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	4483-7566	–
	big bluestem	ANGE	*Andropogon gerardii*	1009-2018	–
Forb					
2	**Legumes**			1681-6053	
	hairy indigo	INHI	*Indigofera hirsuta*	2242-6053	–
	alyce clover	ALOV	*Alysicarpus ovalifolius*	1681-3531	–

Table 14. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

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).

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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	10/29/2026
Approved by	
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:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**