Ecological site F154XA003FL
Dry Yellow Sands Pine Woodland

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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): 154X–South-Central Florida Ridge

This MLRA makes up about 7,209 square miles (18,672 square kilometers) and is entirely in Florida. MLRA 154 contains a series of parallel, prominent sandy ridges of Pleistocene marine origin, including the Brooksville and Mount Dora Ridges. These north to south oriented parallel ridges are interspersed with more low lying physiographic provinces, including: upland hills, plains, valleys and gaps (Puri and Vernon 1964). Many of the soils in this sub-unit are Pleistocene or Holocene sands that are underlain with older, loamy Pliocene marine sediments (Cypresshead formation) or the clayey Miocene marine sediments (Hawthorne formation). A combination of marine depositional events and the dissolution of underlying limestone (karst geology) is responsible for surficial topography throughout Peninsular Florida.

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; 75c Central Florida Ridges and Uplands (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013) -Florida Natural Area Inventory, 2010 Edition: Sandhill (State 1) and Xeric Hammock (State 2)(FNAI, 2010)

Ecological site concept

Dry Yellow Sand Pine Woodlands occur in deep infertile excessively drained sands. These Entisols are yellowish in color and are generally acidic. The site occurs on ridges and shallow slopes (8% but can range up to 40%). Distinguishing features of these yellow sands include very deep-water tables, lack of soil profile development, and coarse soil texture. Map unit components are numerous, and predominantly restricted to the Central Florida Ridges and Uplands physiographic provinces, including the Brooksville Ridge, Cotton Plant Ridge, Mount Dora Ridge, Lake Wales Ridge, Ocala Hills, Marion Uplands, and Sumter Uplands units. This site concept is distinct because of its native condition (i.e., reference site vegetation), component soils, successional patterns, and wildlife habitat. Natural woodland vegetation is adapted to edaphic conditions of deep, droughty, yellow sands with a deep seasonal high water table. Pine woodlands and “sandhills” are dominated by widely spaced longleaf pine (Pinus palustris) and continuous swaths of herbaceous ground cover vegetation consisting of dominant bunch grasses and numerous herbaceous and low woody species.

Associated sites

R154XX001FL	**Yellow Sands Xeric Uplands** These sites are excessively drained communities that occur in similar to slightly higher, drier, more xeric landscape positions
F154XX002FL	**Xeric Bicolor Sandy Uplands** These sites are excessively drained communities that occur in similar to slightly higher, drier, more xeric landscape positions

F154XA004FL	**Moist Sandy Pine-Hardwood Woodlands** These sites are somewhat poorly to well drained communities that occur in lower, wetter landscape positions
F154XA006FL	**Dry White Sand Scrubs** These sites are excessively drained communities that occur in similar to slightly higher, drier, more xeric landscape positions
F154XA008FL	**Moist Sandy Scrubby Flatwoods** These sites are moderately well to well drained communities that occur in slightly lower, slightly wetter, more mesic landscape positions
F154XA009FL	**Moist Basic Pine Uplands** These sites are moderately well to well drained communities that occur in slightly lower, slightly wetter, more mesic landscape positions
F154XA010FL	**Moist Lithic Flatwoods And Hammocks** These sites are somewhat poorly to well drained communities that occur in lower, wetter landscape positions

Similar sites

R154XX001FL	**Yellow Sands Xeric Uplands** These sites will have a deeper depth to a seasonal high-water table (>80 inches) and greater than 80 inches of yellow sand. These will often have more xeric reference plant communities and different management strategies.
F154XX002FL	**Xeric Bicolor Sandy Uplands** These sites will have a deeper depth to a seasonal high-water table (>80 inches) and greater than 80 inches of sand with two contrasting colors. These will often have more xeric reference plant communities and different management strategies.
F154XA006FL	**Dry White Sand Scrubs** These sites will have a similar depth to a seasonal high-water table (80 inches) and greater than 80 inches of white, bleached sand rather than yellow sand. These infertile soils will often have more xeric reference plant communities and different management strategies.

Table 1. Dominant plant species

Tree	(1) *Pinus palustris* (2) *Quercus laevis*
Shrub	(1) *Quercus laevis* (2) *Quercus geminata*

Herbaceous	(1) *Aristida stricta* (2) *Pityopsis graminifolia*

Physiographic features

The Central Florida Peninsula features rolling topography of ridges, hills, and dunes interspersed with low-lying valleys, depressions, and drainage ways. The entire area is located in within the Floridian Section of the Coastal Plain Province of the Atlantic Plain. Elevation ranges from sea level to 260 feet (0 to79 m).

This site occurs on sandy, excessively drained uplands in central and west-central Florida. Slopes are nearly level to strongly sloping (0 to 40%). The site occurs on elevated hills of eolian or marine deposition. The soils are sandy to more than 80 inches.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope (2) Summit (3) Shoulder
Landforms	(1) Marine terrace > Hill
Runoff class	Very low to high
Flooding frequency	None
Ponding frequency	None
Elevation	10 – 40 m
Slope	0 – 10 %
Water table depth	150 – 200 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	0 – 80 m

Slope	0 – 40 %
Water table depth	110 – 200 cm

Climatic features

The climate is characterized as humid subtropical with long hot summers and mild winters. In the winter months, Canadian air masses move across Peninsular Florida and produce cool, cloudy, and rainy weather. Freezing temperatures are occasional in the northern part of MLRA 154, with typically < 30 days of the year with temperatures dropping below freezing.

Precipitation is distributed fairly evenly throughout the year. Average annual precipitation ranges from 50 to 55 inches. Highest monthly precipitation falls from June through October, with June through August being the wettest period. Winter rainfall is associated with cold fronts.

Hurricanes and tropical storms affect much of the MLRA 154 region. Catastrophic hurricanes make landfall along the Atlantic coast of Peninsular Florida on the order of two to four times per century. Strong winds and heavy rainfall affect the interior peninsula; rainfall from hurricanes and tropical systems vary widely but can exceed 20 inches from one storm. Hurricanes are most likely to occur between June and November and are most common in August and September.

Table 4 Representative climatic features

Frost-free period (characteristic range)	230-370 days
Freeze-free period (characteristic range)	370 days
Precipitation total (characteristic range)	1,300-1,350 mm
Frost-free period (actual range)	210-370 days
Freeze-free period (actual range)	310-370 days
Precipitation total (actual range)	1,270-1,370 mm
Frost-free period (average)	300 days
Freeze-free period (average)	360 days
Precipitation total (average)	1,320 mm

- (1) CLERMONT 9 S [USC00081641], Clermont, FL
- (2) INVERNESS 3 SE [USC00084289], Inverness, FL
- (3) LISBON [USC00085076], Leesburg, FL
- (4) MTN LAKE [USC00085973], Lake Wales, FL
- (5) LAKELAND [USW00012883], Lakeland, FL
- (6) BARTOW [USC00080478], Bartow, FL
- (7) GAINESVILLE 11 WNW [USC00083322], Gainesville, FL
- (8) BROOKSVILLE CHIN HILL [USC00081046], Brooksville, FL

- (9) ORANGE SPRINGS 2SSW [USC00086618], Fort Mc Coy, FL
- (10) SAINT LEO [USC00087851], San Antonio, FL
- (11) TARPON SPGS SEWAGE PL [USC00088824], Tarpon Springs, FL

Influencing water features

This site occurs in extensive areas of hills surrounded by wetter environments. The site is situated on soils that have very deep seasonal high water tables (predominantly > 80 inches). Subsurface water flow is dependent on the presence or absence of an aquitard (loamy or clayey layer). The presence, depth, and orientation of this restrictive layer may affect subsurface water movement.

Given significant hydrologic differences of surrounding communities, this site can have a very abrupt ecotones with dramatic shifts in species composition. Some deep-rooted species are able to tap into the deep or very deep seasonal high water table.

Hydrogeomorphically, these uplands receive water from local precipitation. Slope gradient, rapid infiltration, and saturated hydraulic conductivity results in negligible to low surface runoff. The combination of infertile sand, low available water, and rapid or very rapid saturated hydraulic conductivity influences natural plant vegetation.

Soil features

Soils are excessively drained, uncoated or coated, Typic Quartzipsamments (Gainesville, Kershaw, Lake, Ortega), and Lamellic Quartzipsamments (Alpin, Candler, Penney). Soils of minor extent classify as Humic Psammentic Dystrudepts (Orlando) or Entic Grossarenic Alorthods (Centenary). These soils formed mainly from eolian or sandy marine sediments. Slopes generally range from 0 to 8% but can be as steep as 40%. The small amounts of silt and clay (generally 10%) and infertile sands are largely responsible for low pH and low base saturation.

These very deep, porous sands will not restrict rooting depth, and some deep-rooted species may be able to access the water table. Without sufficient, periodic precipitation, shallower rooted species can develop moisture stress during the hot summers.

Figure 7. Representative Soil Series

Table 5. Representative soil features

Parent material	(1) Marine deposits (2) Eolian deposits
Surface texture	(1) Fine sand (2) Sand (3) Loamy sand (4) Loamy fine sand (5) Clay
Drainage class	Well drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	4.32 – 9.91 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.7 – 5.1
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Slow to very rapid
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	3.3 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	3.5 – 7.3
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

The natural community associated with the Dry Yellow Sands Pine Woodlands is “Longleaf Pine Sandhill” (hereafter “Sandhills”; FNAI, 2010). Fire regimes are the primary driver of community distribution and ecological dynamics in sandhills. The fine fuels of herbaceous ground cover vegetation enable frequent fire ignition and spread. Ground fires affect sandhill ecological dynamics in many ways: preparation of seedbed for germination of longleaf pine and other native sandhill species; stimulation of seed production in many species of grasses and forbs; maintenance of open stand conditions needed for sun-loving plant species; and reduced growth of hardwoods and non-native species (Abrahamson, 1984; Walker and Peet, 1983; Wade and Lundsford, 1990; Waldrop et al., 1992; Outcalt et al., 2002; Glitzenstein et al., 2003; Rienhard and Menges, 2004). Once established in sandhill communities, mature pines and oaks are resistant to injury from frequent ground fires (Glitzenstein et al., 1995).

Sandhills burned frequently and with some regularity on the order of once per 1 to 5 years (Robbins and Myers, 1992; Gilliam and Platt, 1999; Rodgers and Provencher, 1999; Provencher et al., 2001; Glitzenstein et al., 2003).

Changes in fire regimes trigger radical shifts in species composition and abundance in Central Florida sandhills. Where fire is infrequent (fire return intervals > 10 years), woody abundance increases, and fire intolerant sand pines and hardwoods increase in abundance. This in turn changes the physiognomy and ecological dynamics of the community (Glitzenstein et al., 1995; Platt, 1999; Provencher et al., 2000; VanLear et al., 2005).

The diversity and abundance of sandhill groundcover herbaceous species decreases with infrequent or absent fire, as thick growths of woody plants compete with herbaceous vegetation for light and other resources. Typical ground cover of burned yellow sands sandhills contains 20 to 30 species /m², many of these interspersed among a matrix of bunchgrass (Aristida beyrichiana, Schizachyrium scoparium, Sorghastrum secundum, Andropogon spp.) (Rodgers and Provencher, 1999; Carr et al., 2010; Peet, 2006). Following period of fire suppression of > 10 years, ground cover richness drops to 5 species /m² (Provencher et al., 2001; Varner et al., 2005), and herbaceous species cover is similarly diminished. Concurrently, fire intolerant hardwood species gradually replace longleaf pine and fire tolerant oaks of the over- and mid-stories (i.e., turkey and bluejack oaks).

Following long term fire suppression (> 80 years), Central Florida sandhills will eventually be replaced by oak dominated closed canopy forests (Givens et al., 1984; Myers, 1985; Peroni and Abrahamson, 1986; Myers and White, 1987; Abrahamson and Abrahamson, 1996). In most cases, this is a xeric hammock with sand live oak (Q. geminata) canopy and understory of low growing clonal oaks and other hardwood seedlings (FNAI 2010).

When fire suppressed sandhills do burn, excess woody fuel loads and ground litter encourage hotter and more intense fires which may cause excessive pine mortality (Varner et al., 2005). Smoldering fires in litter accumulations can kill underground plant part and hinder post-fire recovery. For the purposes of ecological restoration of fire suppressed sandhills, the manner and timing of fire reintroduction is very much dependent on the amount of fuel buildup (Varner et al., 2005).

Wind damage associated with hurricanes and strong storms infrequently affect ecological dynamics of Central Florida sandhills. Strong winds can cause local or widespread pine mortality. Although hurricanes usually dissipate before reaching the interior of the peninsula, large storms do affect the region on the order of 2 to 3 per century.

Other natural disturbances that affect Central Florida sandhills include pine and hardwood mortality caused by insects and pathogen. Southern pine beetle (Dendroctonus frontalis; SPB) is a species of bark beetle native to the Southeastern Coastal Plain. Periodically SPB populations increase to epidemic levels and healthy pines are killed as infestations expand. Most susceptible to SPB mortality are densely planted even-aged loblolly and longleaf pine stands, which is common in community timber plantations (Schowalter et al., 1981). Widely space longleaf pines in natural stands are less susceptible to SPB related mortality.

State and transition model

Figure 8. Dry sandy pine woodlands

Figure 9. Dry Yellow Sands Pine Woodland

Additional community tables

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Contributors

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Approval

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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	02/23/2024
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:

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:**