

Ecological site PX138X00Y070

Sandy Depression Basin and Dome Swamps

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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 calcinbicarbonate 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 Dome or Basin Swamp communities within the Cypress - Tupelo Freshwater Forested Wetland systems (FNAI, 2010). The improved pasture community of the managed grassland state corresponds well with Forage Suitability Group G138XA145FL. The improved drained pasture community corresponds well with Forage Suitability Group G138XA141FL. (USDA, NRCS, 2013)

Ecological site concept

This site is on very poorly to poorly drained soils in closed depressions where the dominant hydrology is occasional to frequent ponding. The land is flat with slopes mostly from 0 to 2 percent. Soils are mostly sandy, have a spodic horizon within 30 inches, an argillic horizon below 40 inches, or both. Some soils may have a mollic or umbric horizon. Some soils may lack a diagnostic horizon. This site often supports Dome Swamp, Mixed Scrub-Shrub Wetland, Coniferous Plantation, and Improved Pasture communities.

Associated sites

PX138X00Y080	Sandy Over Loamy Depression Basin and Dome Swamps These soils are in a similar landscape position but have different physical properties and productivity.
PX138X00Y090	Loamy and Clayey Depression Bottomland Forests These soils are in a similar landscape position but have different physical properties and productivity.

Similar sites

PX138X00Y080	Sandy Over Loamy Depression Basin and Dome Swamps These sites support similar native vegetation communities, but production is somewhat different, especially regarding grazing forage production.
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Table 1. Dominant plant species

Tree	(1) <i>Taxodium ascendens</i> (2) <i>Nyssa biflora</i>
Shrub	Not specified
Herbaceous	Not specified

Legacy ID

F138XY070AL

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 in closed depressions. Dominant hydrology on this site is typically ponding. Slope is typically 0 to 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Marine terrace > Depression (2) Marine terrace > Flat
Runoff class	Negligible

Flooding duration	Not specified
Flooding frequency	None
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	10 – 60 m
Slope	0 %
Ponding depth	0 – 60 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible
Flooding duration	Very long (more than 30 days)
Flooding frequency	None to occasional
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	10 – 60 m
Slope	0 %
Ponding depth	0 – 60 cm
Water table depth	0 – 30 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

Dominant hydrology on this site is ponding. This site is very poorly to 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 Leon, Wesconnett, Plummer, and Meadowbrook series. These soils are very poorly to poorly drained, sandy, and they have a spodic horizon within 30 inches, an argillic horizon below 40 inches, or both. Some soils may have a mollic or umbric horizon. Some soils may lack a diagnostic horizon.

Table 5. Representative soil features

Parent material	(1) Marine deposits
Surface texture	(1) Mucky fine sand (2) Fine sand (3) Sand
Drainage class	Very poorly drained
Permeability class	Moderately rapid to rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	3.3 – 20 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 5.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified

Subsurface fragment volume >3" (Depth not specified)	Not specified
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Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately rapid to rapid
Soil depth	200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	3.05 – 20 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 %
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.

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).

Dome swamps are often formed when poor surface drainage causes water to move downward and dissolve the limestone bedrock. These depressions then fill in with peat or marl. Dome swamps derive much of their water through surficial runoff from surrounding uplands. Water levels in dome swamps naturally fluctuate with seasonal rainfall changes. They may also be connected directly to the

aquifer, where groundwater influences the hydrological regime, especially during periods of drought. Dome swamps can function as reservoirs that recharge the aquifer. The normal hydroperiod for dome swamps is 180 to 270 days per year, with water being deepest, and remaining longest, near the center of the dome creating a larger buildup of peat there. The most likely reason for the domed profile, where trees grow faster in the center of the dome swamp is due to deeper peat and lower competition from other species. Dome swamps experience a wide range of water level variation. Prolonged dry periods as well as prolonged wet periods can have a significant effect on cypress regeneration. Although adult cypress trees are tolerant of extended inundation, their seeds cannot germinate under water and cypress seedlings may not survive if submerged. Fire is essential for maintaining the structure and the species composition of a dome swamp community. Fire frequency is generally greatest at the periphery of the dome and least in the interior, where long hydroperiods and deeper peat, and/ or water, maintain high moisture levels. The normal fire cycle might be as short as three to five years along the outer edge and as long as 100 to 150 years towards the center. The domed profile of these swamps may be partly attributable to this frequent, peripheral fire regime. Fire in a long-unburned dome swamp may result in higher cypress mortality in the center of the dome where fire burns through a deeper layer of accumulated peat and kills the cypress roots. Emergent marshes can develop in the center of such dome swamps. (FNAI, 2010)

The primary source of water in basin swamps is local rainfall, with additional input from runoff and seepage from the surrounding uplands. A clay lens or other impervious layer often causes a perched water table. Basin swamps hold standing water for most of the year. Basin swamps are generally still water swamps but can flow during periods of high water. These swamps may contain streams and sloughs that drain the swamp, especially during periods of high rainfall. Fire intervals are variable and depend on such factors as dominant vegetation, fire exposure, and drought. The interior of basin swamps may go without fire for decades or even centuries while the exposed outer edges can be more susceptible to frequent fire. Basin swamps that are situated within the matrix of a pyrogenic community, such as mesic flatwoods, will likely burn more frequently than basin swamps positioned within a matrix of mesic or hydric hammock. (FNAI, 2010)

In both dome and basin swamps, without fire, bays and hardwoods increase in density and peat accumulates more rapidly. Cypress and pines are tolerant of light surface fires, but muck fires burning into the peat can kill the trees, lower the ground surface, and transform a swamp into a pond, lake, marsh, or shrub bog. Cypress have fairly thick, fire-resistant bark and are tolerant of light surface fires, but catastrophic fires burning into the peat can kill cypress trees, especially when fire has long been absent. Topographic microsites can be important areas for tree, shrub, and herbaceous seedling recruitment in basin swamps. Raised mats of root fiber and peat form hummocks at the bases of trees and shrubs, on old tree stumps, or among cypress knees, and often create microsites for mesic species to establish above the water surface. (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 (%)
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Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 1.5 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Graminoids			2354-14571	
	limpograss	HEAL5	<i>Hemarthria altissima</i>	8967-14571	–
	maidencane	PAHE2	<i>Panicum hemitomom</i>	5604-7510	–
	Japanese millet	ECES	<i>Echinochloa esculenta</i>	4483-6725	–
	blue maidencane	AMPU6	<i>Amphicarpum purshii</i>	2354-2802	–
Forb					
2	Legumes			2242-3363	
	shyleaf	AEAM	<i>Aeschynomene americana</i>	2242-3363	–

Table 13. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Graminoids			3363-15692	
	Bermudagrass	CYDA	<i>Cynodon dactylon</i>	11208-15692	–
	limpograss	HEAL5	<i>Hemarthria altissima</i>	8967-14571	–
	pearl millet	PEGL2	<i>Pennisetum glaucum</i>	6725-13450	–
	bahiagrass	PANO2	<i>Paspalum notatum</i>	3363-6725	–
Forb					
2	Legumes			2242-3363	
	shyleaf	AEAM	<i>Aeschynomene americana</i>	2242-3363	–
	hairy indigo	INHI	<i>Indigofera hirsuta</i>	2242-3363	–

Table 14. Community 2.3 plant community composition

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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>.

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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	10/07/2026
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:

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:
