Ecological site F153AY045NC
Moist Clay Rises and Flats

Last updated: 2/12/2025
Accessed: 05/13/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 153A–Atlantic Coast Flatwoods

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

This MLRA is found on the lower coastal plain and is known as the Atlantic Coast Flatwoods. This flat terrain is formed from marine terraces and fluviomarine sediments of Tertiary and Quaternary age. These marine terraces are younger to the east and are progressively older and higher inland to the west. Post formation these terraces have been crossed by widely meandering river and stream channels producing broad shallow valleys with many high order interfluves. All these factors combine to produce relatively flat landscapes that favor high water tables.

Many rivers and streams that flow through this area have headwaters that originate to the west in the upper coastal plain (MLRA 133A, Southern Coastal Plain) and piedmont (MLRA 136, Southern Piedmont) regions. Large river valleys are extremely flat and of great extent. Most surface water that originates from within the MLRA starts as blackwater in very low energy and subtle low-order channels. Most surface water emerges first as broad, very low energy, very low velocity sheet flow before accumulating in these very subtle channels. Local relief is generally less than 35 feet (10 meters), although some short, steep slopes border the stream valleys.

The dominant soil orders in MLRA 153A are Ultisols and Spodosols. The soils in this MLRA have a thermic temperature regime, an aquic or udic moisture regime, and generally have siliceous mineralogy. They are generally very deep, well drained to very poorly drained, and loamy or clayey. The major soil suborders of the MLRA include: 1) Alaquods, which formed in marine sediments on flats and terraces and in depressions, 2) Albaquults, which formed in mixed alluvium and marine sediments on flats and terraces, 3) Haplosaprists, which formed in organic deposits over mixed marine and fluvial deposits, 4) Paleaquults, which formed in marine sediments on flats and in depressions, and 5) Paleudults, which formed in marine sediments on uplands.

MLRA 153A has a lengthy north-south extent. It runs parallel to the Atlantic coast and has a width of approximately 10 to 30 miles. The MLRA extends from the northeastern corner of Florida to southern Virginia. Five states are intersected by the MLRA, including Georgia (30 percent), South Carolina (28 percent), North Carolina (28 percent), Florida (10 percent), and Virginia (4 percent). The MLRA extent makes up about 30,319 square miles (78,527 square kilometers).

Because of climatic differences between the northern and southern reaches of the MLRA, vegetative communities vary with latitude. Overall, the MLRA is dominated by pine-oak forest vegetation. Loblolly pine, longleaf pine, slash pine, sweetgum, red maple, red oak, and white oak are dominant in the uplands. Water tupelo, pond pine, swamp blackgum, laurel oak, swamp chestnut oak, bald cypress, and red maple are dominant on the bottomland. Herbaceous understory species common to the MLRA include cutover muhly, toothache grass, little bluestem, and various panicums.

Major wildlife species of the MLRA include alligator, white-tailed deer, black bear, gray fox, red fox, bobcat, raccoon, skunk, opossum, otter, rabbit, squirrel, turkey, and bobwhite quail. The threatened and endangered gopher tortoise inhabits the southern portion of this MLRA. This area provides crucial habitat for neotropical migrants, migratory waterfowl, and wading birds along the Atlantic Flyway.

(USDA-NRCS, 2022)

LRU notes

Currently, Ecological Site Descriptions (ESDs) for MLRA 153A cover the full north-south range of the MLRA. However, climate variation across the north-south extent warrants the future development of Land Resource Unit (LRU) classifications to support more precise Ecological Site Descriptions.

Classification relationships

MLRA 153A overlaps with two level III EPA ecoregion concepts: 63) the Middle Atlantic Coastal Plain and 75) the Southern Coastal Plain. Under ecoregions 63 and 75 are a number of level IV concepts, of which several apply to MLRA 153A. These include: 63c) Swamps and Peatlands, 63e) Mid-Atlantic Flatwoods, 63h) Carolina Flatwoods, 63n) Mid-Atlantic Floodplains and Low Terraces, 75e) Okefenokee Plains, 75f) Sea Island Flatwoods, 75g) Okefenokee Swamp, and 75i) Floodplains and Low Terraces. (U.S. EPA, 2013)

MLRA 153A overlaps portions of the US Forest Service Outer Coastal Plain Mixed Forest province (232). The MLRA 153A concept roughly corresponds to the western portion of the Atlantic Coastal Flatwoods (232C) and the southcentral portion of the Northern Atlantic Coastal Flatwoods (232I) sections. In combination with MLRA 153B, these two MLRAs correspond very closely to the full extent of sections 232C and 232I. (Cleland et al., 2007)

Based on the USGS physiographic classification system, most of MLRA 153A is in the Sea Island section of the Coastal Plain province, in the Atlantic Plain division. The northern quarter is in the Embayed section of the same province and division. The embayed barrier islands extend from the eastern shore of the Chesapeake Bay in Virginia to north of Charleston, South Carolina (Fenneman et al., 1946). The portion in North Carolina is referred to as the Outer Banks. Large bodies of brackish water, such as Pamlico and Albemarle Sounds, are on the inland side of the barrier islands. The Sea Islands extend from north of Charleston, South Carolina, to Jacksonville, Florida.

The reference community for this particularly site is approximately aligned with Mesic Pine Flatwoods (Schafale and Weakely, 1990) and Mesic Flatwoods (FNAI, 2010).

Ecological site concept

This site is characterized by somewhat poorly drained and moderately well drained, clayey and fine silty soils (dominantly Ultisols) on coastal plain rises and flats. This ecological site is correlated to soils that do not meet the hydric criteria. However, this site is spatially associated with ecological sites describing hydric soils, and on the flat landscape of MLRA 153A this transition can be exceptionally subtle with large and subtle ecotonal areas. Variability in water table depth is mostly driven by variability in subsurface drainage patterns, which can be difficult to identify on the surface, so this site can be difficult to distinguish from wet flats and depressions.

This site has the potential to support a variety of vegetation communities including flatwoods, and mixed hardwood forests, but most of this site has been converted to alternative states. Historically, the vegetation communities on this site have been maintained by frequent low-intensity surface fires. Table 1 very briefly lists some of the most dominant vegetation on the reference community for this site. More detailed descriptions of community compositions are available in the State and Transition Model.

Associated sites

F153AY060NC	**Wet Loamy Flats and Depressions** A moist clayey flat is often associated with and difficult to distinguish from a wet loamy flat. Much of the difference between moist and wet sites is driven by variations in subsurface drainage patterns, which are difficult to see at the surface, but these sites can be distinguished by soil moisture and texture.

F153AY065NC	**Wet Clay Flats and Depressions** A moist clayey flat is often associated with and difficult to distinguish from a wet clayey flat. Much of the difference between moist and wet sites is driven by variations in subsurface drainage patterns, which are difficult to see at the surface, but these sites can be distinguished by soil moisture.

Similar sites

F153AY040NC	**Moist Loamy Rises and Flats** This site is on very similar landforms but is comprised of loamy soils. Differences are expressed in productivity.
F153BY045NC	**Moist Clay Rises and Flats** This site is on very similar landforms but in an adjacent MLRA where the marine terrace surfaces are younger, less dissected, and more prone to tidal impacts.

Table 1. Dominant plant species

Tree	(1) *Pinus palustris* (2) *Fagus grandifolia*
Shrub	(1) *Kalmia latifolia* (2) *Vaccinium arboreum*
Herbaceous	(1) *Aristida stricta* (2) *Aristida beyrichiana*

Physiographic features

This ecological site represents rises and flats of clayey and fine-silty mineral soils (mostly Ultisols) that are currently isolated from most flood plain processes. In general, these landforms developed by marine deposition, or ancient fluvial reworking and redeposition. In comparison to it's surroundings, topographic relief is relatively high on this site, with slopes ranging up to 8 percent.

Table 2 summarizes physiography of the modal soil concepts. Table 3 summarizes physiography of all soils included in this description.

Table 2. Representative physiographic features

Hillslope profile	(1) Shoulder (2) Summit
Landforms	(1) Coastal plain > Marine terrace (2) Flat
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	8–90 m
Slope	0–2%
Water table depth	30–76 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	8–90 m

Slope	0–8%
Water table depth	15–107 cm

Climatic features

The climate across MLRA 153A is generally warm, temperate, and humid with some maritime influences near the coast. The maximum precipitation occurs during summer. Rainfall is usually of moderate intensity. Occasionally, extreme weather events (e.g., northeasters, tropical storms, and hurricanes) produce large amounts of precipitation and destructive winds. On rare occasions snowfall occurs in the northern third of the area. The average annual temperature is 59 to 70 degrees F (15 to 21 degrees C), increasing to the south. (USDA-NRCS, 2022)

Table 4. Representative climatic features

Frost-free period (characteristic range)	222-237 days
Freeze-free period (characteristic range)	257-306 days
Precipitation total (characteristic range)	1,245-1,321 mm
Frost-free period (actual range)	211-241 days
Freeze-free period (actual range)	250-350 days
Precipitation total (actual range)	1,168-1,346 mm
Frost-free period (average)	229 days
Freeze-free period (average)	286 days
Precipitation total (average)	1,270 mm

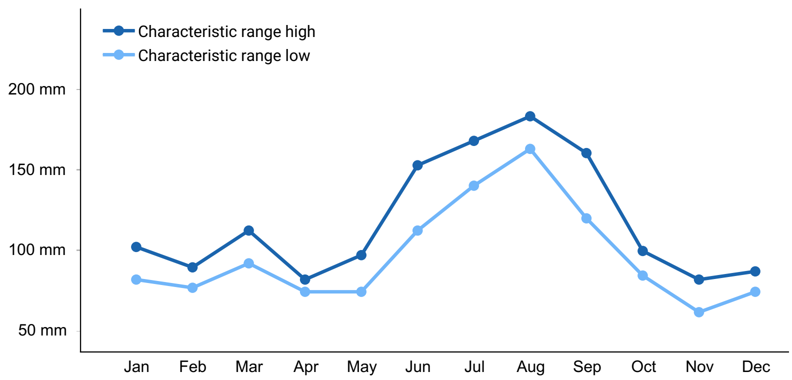


Figure 1. Monthly precipitation range

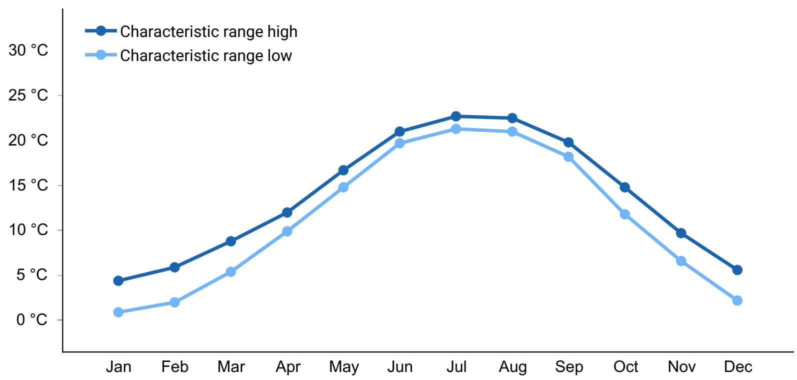


Figure 2. Monthly minimum temperature range

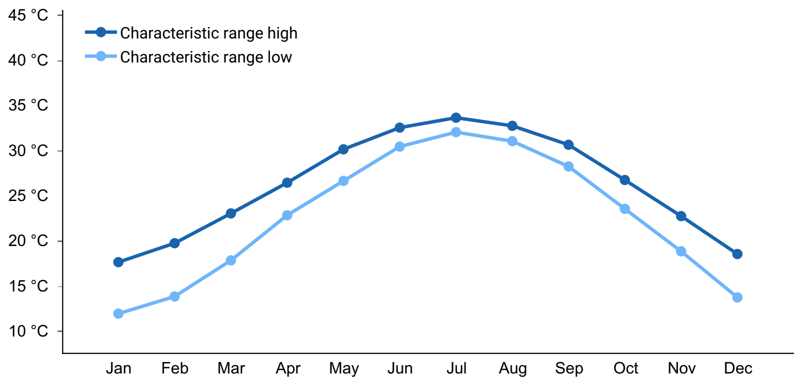


Figure 3. Monthly maximum temperature range

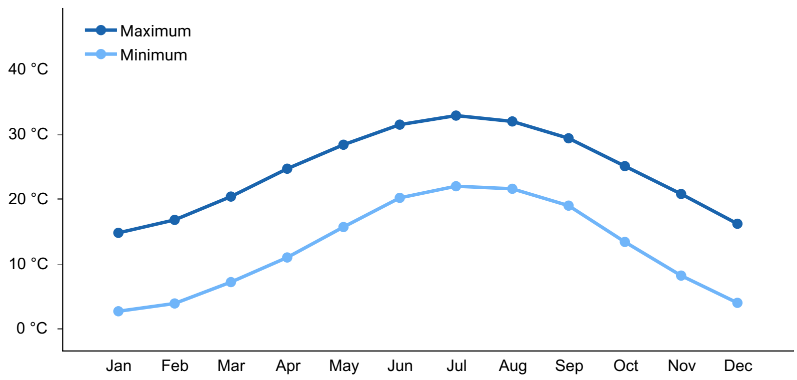


Figure 4. Monthly average minimum and maximum temperature

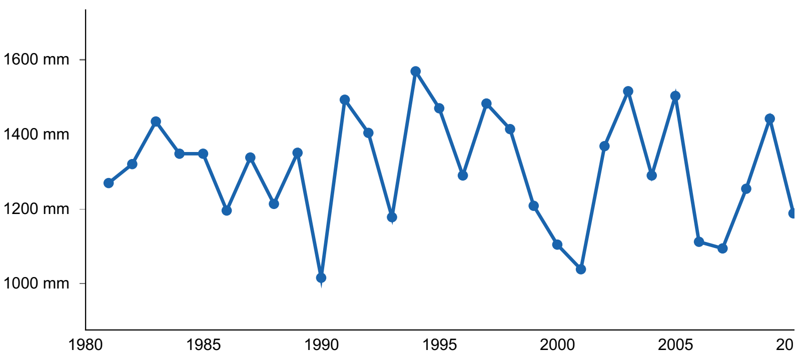


Figure 5. Annual precipitation pattern

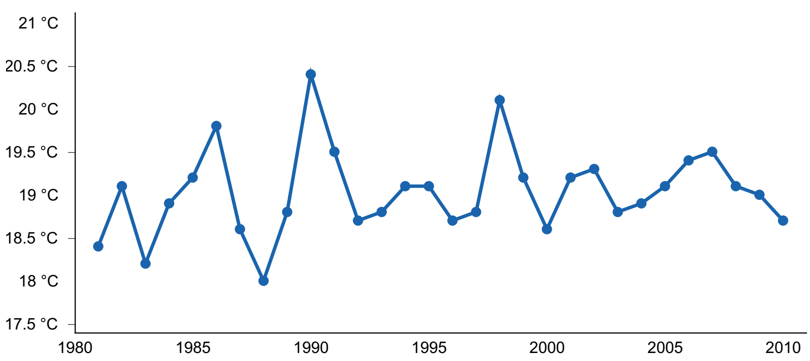


Figure 6. Annual average temperature pattern

Climate stations used

- (1) NEWPORT NEWS INTL AP [USW00093741], Newport News, VA
- (2) NEW BERN CRAVEN CO AP [USW00093719], New Bern, NC
- (3) CHARLESTON INTL AP [USW00013880], Charleston AFB, SC

- (4) FT STEWART [USC00093538], Fort Stewart, GA
- (5) JACKSONVILLE CECIL FLD NAS [USW00093832], Jacksonville, FL

Influencing water features

This MLRA is dominated by a persistent high water table, but this site is characterized by better internal drainage than associated wetter sites. Variability in water table depth is mostly driven by variability in subsurface drainage patterns, which can be difficult to identify on the surface, so this site can be difficult to distinguish from wet flats and depressions.

Wetland description

This site is not a wetland.

Soil features

The soils of this site are all primarily clayey or fine-silty in texture, and most are Ultisols formed in deep marine and fluviomarine mineral soil deposits. The soils are acidic and very deep. Some soils on this site have the potential to form a root restricting layer due to repeated wetting and drying cycles. This site represents those locations where soils do not meet hydric criteria, but this site is often associated with wet sites that do meet hydric criteria, and the transition can be exceptionally subtle. The soils on this site are primarily somewhat poorly drained and moderately well drained.

Soil series on this site include: Ackwater, Angie, Craven, Dogue, Dorian, Dunbar, Duplin, Eulonia, Fairhope, Gilead, Gritney, Invershiel, Lenoir, Mantachie, Nemours, Nevarc, Newflat, Okeetee, Peawick, Persanti, Sawyer, and Wahee.

Craven, Lenoir, and Wahee are modal.

Table 5. Representative soil features

Parent material	(1) Marine deposits
Surface texture	(1) Fine sandy loam (2) Loam
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	185–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.91–17.02 cm
Soil reaction (1:1 water) (0-25.4cm)	3.6–6
Subsurface fragment volume <=3" (0-101.6cm)	0–4%
Subsurface fragment volume >3" (0-101.6cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	76–203 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	8.89–18.8 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5–6.5
Subsurface fragment volume <=3" (0-101.6cm)	0–10%
Subsurface fragment volume >3" (0-101.6cm)	0%

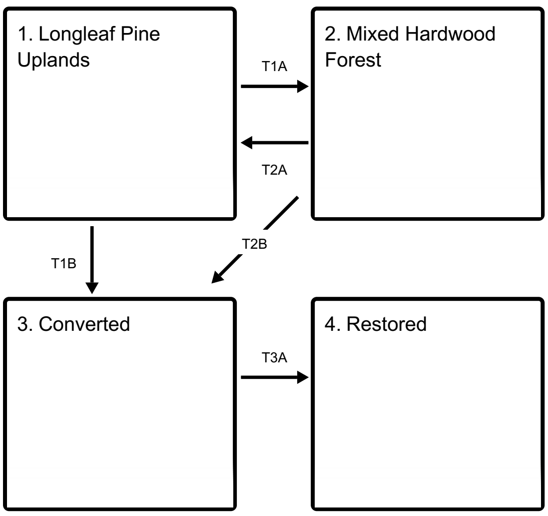
Ecological dynamics

The most dominant ecological drivers on this site are fire, soil moisture dynamics, and landuse conversion. This site is relatively fertile and nearly all of these locations have been converted to agriculture and other development. This site tends to occur in locations that are somewhat sheltered from fire, but frequent low intensity fire on a return interval of roughly 2 to 10 years is thought to be necessary to maintain the reference community. This site likely experiences seasonal saturation and seasonal dryness. The vegetation composition is very similar to drier sites (F153AY035NC), but this site is likely more productive. On this ecological site, longleaf pine uplands is the reference community, because it represents the dominant precolonial forest community. It is probable that longleaf pine uplands were a cultural state maintained by indigenous civilizations but, in most locations today, they no longer dominate the landscape. Historically, the use of fire by indigenous civilizations may have been extensive. Some limited wildfire and prescribed fire occur today, but fire suppression has been the norm since the 20th century.

(Peat and Allard, 1993; Schafale and Weakley, 1990)

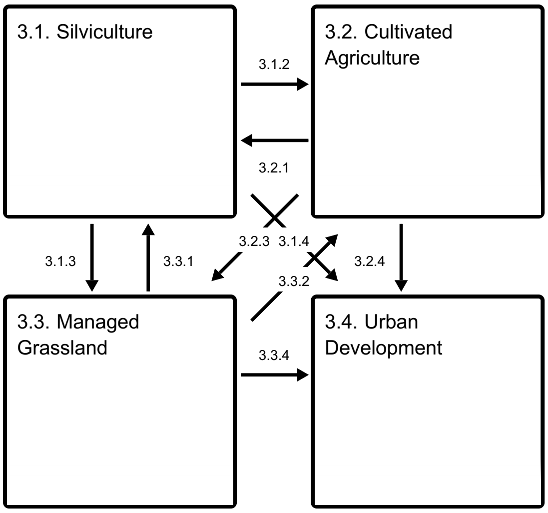
State and transition model

Ecosystem states



T1A - Lack of fire
T1B - Land use conversion
T2A - Reintroduction of fire
T2B - Land use conversion
T3A - Restoration

State 3 submodel, plant communities



3.1.2 - Establishment of cultivated agriculture
3.1.3 - Establishment of managed grassland
3.1.4 - Urban development
3.2.1 - Establishment of trees for silviculture
3.2.3 - Establishment of managed grassland
3.2.4 - Urban development
3.3.1 - Establishment of trees for silviculture
3.3.2 - Establishment of cultivated agriculture
3.3.4 - Urban development

State 1
Longleaf Pine Uplands

On this site, this vegetation community ranges from an open overstory to a nearly closed canopy. This longleaf pine type on clay soils is characterized by a dense shrub layer and a sparce to absent herbaceous layer. Fire helps to establish and maintain a more open canopy, but, on this moist site, some locations with a frequent fire return interval maintain a nearly closed canopy. This vegetation community on this site is exceptionally rare today, due mostly to landuse conversion to agriculture. (Peat and Allard, 1993; Schafale and Weakley, 1990)

Dominant plant species

- longleaf pine (*Pinus palustris*), tree
- mountain laurel (*Kalmia latifolia*), shrub
- farkleberry (*Vaccinium arboreum*), shrub
- creeping blueberry (*Vaccinium crassifolium*), shrub
- Beyrich threeawn (*Aristida beyrichiana*), grass
- pineland threeawn (*Aristida stricta*), grass
- little bluestem (*Schizachyrium scoparium*), grass
- western brackenfern (*Pteridium aquilinum*), other herbaceous

State 2
Mixed Hardwood Forest

Mixed hardwood forests are closed canopy forests dominated by deciduous hardwoods. These forests tend to occur at locations protected from fire. These forests are typically uneven aged with regeneration establishing in canopy gaps. Pines and shade tolerant hardwoods tend to occur in areas that have experienced disturbance. (FNAI, 2010; Peat and Allard, 1993; Schafale and Weakley, 1990)

Dominant plant species

- American beech (*Fagus grandifolia*), tree

- white oak (*Quercus alba*), tree
- sweetgum (*Liquidambar styraciflua*), tree
- southern sugar maple (*Acer floridanum*), tree
- pignut hickory (*Carya glabra*), tree
- swamp chestnut oak (*Quercus michauxii*), tree
- loblolly pine (*Pinus taeda*), tree
- American holly (*Ilex opaca*), shrub
- American hornbeam (*Carpinus caroliniana*), shrub
- hophornbeam (*Ostrya virginiana*), shrub
- flowering dogwood (*Cornus florida*), shrub
- common sweetleaf (*Symplocos tinctoria*), shrub
- sedge (*Carex*), grass
- bursting-heart (*Euonymus americanus*), other herbaceous
- partridgeberry (*Mitchella repens*), other herbaceous

State 3
Converted

Community 3.1
Silviculture

Native forests are typically converted to silvicultural systems in order to facilitate timber production. The application of artificial regeneration is common. The timber industry in the Southeast has artificially expanded the ecological footprint of Loblolly pine in particular.

Dominant plant species

- loblolly pine (*Pinus taeda*), tree

Community 3.2
Cultivated Agriculture

Much of this site has been converted to cultivated agriculture.

Community 3.3
Managed Grassland

Lands converted in order to support pasture and/or hayland management.

Community 3.4
Urban Development

Lands developed to urban land use conditions.

Pathway 3.1.2
Community 3.1 to 3.2

Establishment of cultivated agriculture

Pathway 3.1.3
Community 3.1 to 3.3

Establishment of managed grassland

Pathway 3.1.4
Community 3.1 to 3.4

Urban development

Pathway 3.2.1
Community 3.2 to 3.1

Establishment of trees for silviculture

Pathway 3.2.3
Community 3.2 to 3.3

Establishment of managed grassland

Pathway 3.2.4
Community 3.2 to 3.4

Urban development

Pathway 3.3.1
Community 3.3 to 3.1

Establishment of trees for silviculture

Pathway 3.3.2
Community 3.3 to 3.2

Establishment of cultivated agriculture

Pathway 3.3.4
Community 3.3 to 3.4

Urban development

State 4
Restored

Restoration efforts might include revegetation and reintroduction of periodic fire. There is increased interest in restoration of longleaf pine and it's associated vegetation communities including the application of prescribed and controlled fire. However, it is unclear whether or not the full historical range of fire behavior and fire seasonality can be restored on the modern landscape, and the limited scope of modern fire application may impact full restoration to historical conditions.

Transition T1A
State 1 to 2

Lack of fire, or a fire return interval that exceeds 10 years on a consistent basis for a long period of time.

Transition T1B
State 1 to 3

Land use conversion

Transition T2A
State 2 to 1

Reintroduction of fire on a 2 to 10 year return interval.

Transition T2B
State 2 to 3

Land use conversion

Transition T3A
State 3 to 4

Restoration of vegetation community and application of managed fire.

Additional community tables

Inventory data references

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

Other references

Ash, A., E. McDonald, E. Kane, and C. Pories. 1983. Natural and modified pocosins: Literature synthesis and management options. U.S. Fish and Wildlife Services, Dept. Biol., Tech. Rep. FWS/OBS-83/04. U.S. Fish and Wildlife Services, Washington, D.C.

Caldwell, P., M. Vepraskas, J.D. Gregory, R.W. Skaggs, and R.L. Huffman. 2011. Linking Plant Ecology and Long-Term Hydrology to Improve Wetland Restoration Success. Transactions of the ASABE. 54: 2129-2137. DOI: 10.13031/2013.40662

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C.A. Carpenter, W.H. McNab. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. General Technical Report WO-76D. U.S. Department of Agriculture, Forest Service. Washington, D.C.

Dimick, B. P., J. Stucky, W. Wall, M. Vepraskas, T. Wentworth, and C. Arellana. 2010. Plant-soil- hydrology relationships in three Carolina bays in Bladen County, North Carolina, USA. Castanaea 75(4): 407-420

Fenneman, N.M., and D.W. Johnson. 1946. Physical divisions of the United States. U.S. Geological Survey, Physiographic Committee. Scale 1:700,000.

Florida Chapter, Soil and Water Conservation Society. 1989. 26 Ecological Communities of Florida. 147 pp.

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

McNab, W.H.; D.T. Cleland, J.A Freeouf, J.E. Keys Jr., G.J. Nowacki, C.A. Carpenter, 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 pp.

Moritz, C. 2021. Evaluating mitigation sites in Carolina bay wetlands that were previously converted to agriculture. Institutional Repository at North Carolina State University, North Carolina State University, Raleigh, NC, 1–323.

Moritz C., M. Vepraskas, and M. Ricker. 2022. Hydrology and Vegetation Relationships in a Carolina Bay Wetland 15 Years after Restoration. Wetlands. 42. DOI: 10.1007/s13157-022-01530-0.

Nelson, J.B. 1986. The Natural Communities of South Carolina Initial Classification and Description, South Carolina Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries.

Peet, R.K., and D.J. Allard. 1993. Longleaf Pine Vegetation of the Southern Atlantic and Eastern Gulf Coast Regions: A Preliminary Classification. In Proceedings of the Tall Timbers Fire Ecology Conference, No. 18, The Longleaf Pine Ecosystem: ecology, restoration and management, edited by Sharon M. Hermann, Tall Timbers Research Station, Tallahassee, FL, 1993.

Ross, T.E. 2003. Pocosins and Carolina Bays Compared, The North Carolina Geographer, Volume 11: 22-32

Schafale, M.P., and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina Third Approximation. North Carolina Natural Heritage Program. 321 pp.

Sharitz R.R., and J.W. Gibbons. 1982. The ecology of southeastern shrub bogs (pocosins) and Carolina bays: a community profile. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-82/04. 93 pp.

Soil Survey Staff. 2023. Web Soil Survey. USDA Natural Resources Conservation Service. http://websoilsurvey.sc.egov.usda.gov/ (accessed 16 February 2023).

U.S. Department of Agriculture, Natural Resources Conservation Service. 2017. Geomorphic Description System, Version 5.0. Schoeneberger, P.J., and D.A. (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

Matthew D. Duvall

Approval

Charles Stemmans, 2/12/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Charles Stemmans
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

---

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**