Ecological site F153BY040NC
Moist Loamy Rises and Flats

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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): 153B–Tidewater Area

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 is within. A more complete description of the MLRA can be found in Ag Handbook 296 (USDA-NRCS, 2022). This MLRA stretches along the Atlantic coastline from northern Florida to southern Virginia. It features young marine terrace flats, broad flood plains and deltas, tidal marshes and estuaries, barrier sea islands, and a beach ridge system that spans the length of the MLRA. Its broad, shallow valleys with large rivers, tidal marshes, swamps, estuaries, drowned valleys, sea islands, and beaches, are all features of the Late Quaternary (USDA-NRCS, 2017). The Suffolk Scarp is the upper (western) limit of this MLRA and marks the extent of the ocean shoreline before it retreated during the Wisconsin period of glaciation. Fluctuating ocean levels, along with wave and wind activity, continue to rework sand deposits that comprise the ever-changing barrier sea islands and coastline in this MLRA. The marine terraces are younger to the east and are progressively older and higher inland to the west. The youngest marine terraces adjacent to the coast are very low lying and at high risk of inundation by extreme high tides, wind tides, storm surge, and extreme precipitation events. In addition to the risks of inundation, these low-lying terrestrial and freshwater systems are at high risk of salt water intrusion. The MLRA is characterized by a persistent high water table. The hydraulic gradient across this MLRA is very low. Overall, elevation ranges from sea level to less than 25 feet (0 to 8 meters). Local relief is mainly about 3 feet (1 meter) or less. Most of the surface water in this MLRA is either coming into the MLRA from the piedmont and upper coastal plain, is managed by ditching, or is ponded on the surface. Surface flow channels originating within the MLRA are extremely subtle, typically blackwater, and flow generally channelizes mostly near the shoreline where tidal processes also impact flooding processes. The dominant soil orders in this MLRA are Alfisols and Entisols. Ultisols and Histosols are important but are of lesser extent. The soils in the area are characterized by restricted drainage, a thermic temperature regime, and an aquic moisture regime. The study of subaqueous soils is of increasing importance along nearshore coastal waters. The major soil suborders of the MLRA include: 1) Endoaqualfs, which are very deep and loamy to clayey, 2) Endoaquults, which are very deep and loamy to clayey, 3) Haplosaprists, which are extensive in North Carolina and Virginia, in the Great Dismal Swamp, and in broad upland wetlands known as pocosins, 4) Hapludults, which are in the higher areas of somewhat better drainage, 5) Psamments, 6) Sulfaquents, which are extensive throughout the brackish tidal marshes protected by the barrier and sea islands, 7) Sulfiwassents (subaqueous soils), which formed in low- to moderate-energy estuarine deposits, and 8) Umbraquults, which are very deep and loamy to clayey. MLRA 153B has a lengthy north-south extent, and it runs parallel to the Atlantic coast. The MLRA extends from the northeastern corner of Florida to southern Virginia. Five states are intersected by the MLRA, including North Carolina (42 percent), Virginia (21 percent), South Carolina (20 percent), Georgia (14 percent), and Florida (3 percent). The MLRA extent makes up about 11,152 square miles (28,884 square kilometers). Because of climatic differences between the northern and southern reaches of the MLRA, vegetative communities vary with latitude. Loblolly pine, red oak, and white oak are dominant in the uplands, and blackgum, sweetgum, pond pine, laurel oak, water tupelo, and bald cypress are dominant on the bottomland. Longleaf pine and slash pine were dominant historically in the southern part of the area. Understory species common to the MLRA include switchcane, inkberry, large gallberry, greenbrier, wax myrtle, and cabbage palm. Herbaceous understory species include little bluestem, and various panicgrasses. Major wildlife species include alligator, black bear, white-tailed deer, fox, raccoon, opossum, otter, muskrat, rabbit, mink, squirrel, quail, and mourning dove. The red wolf, an endangered species, is being reintroduced in several parts of the MLRA. The nearshore estuaries of the Chesapeake Bay, the Albemarle-Pamlico estuary systems, and Atlantic Ocean provide habitat for diverse populations of terrestrial and aquatic animal species. The subaquatic vegetation in these coastal lagoon areas provides critical habitat and cover for many shellfish and juvenile finfish. The estuaries host numerous migratory waterfowl and wading birds throughout the year and are an integral part of the Atlantic Flyway. (USDA-NRCS, 2022)

LRU notes

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

Classification relationships

MLRA 153B has overlap 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 lower level (IV) concepts, of which several apply to MLRA 153B. These include: 63b) Chesapeake-Pamlico Lowlands and Tidal Marshes, 63c) Swamps and Peatlands, 63d) Virginia Barrier Islands and Coastal Islands, 63f) Delmarva Uplands), 63g) Carolinian Barrier Islands and Coastal Marshes, and 75j) Sea Islands/Coastal Marsh. (U.S. EPA, 2013) MLRA 153B overlaps a portion of the US Forest Service Outer Coastal Plain Mixed Forest province (232). The MLRA roughly corresponds to the easternmost portions of the Atlantic Coastal Flatwoods (232C) and the southeastern portion of the Northern Atlantic Coastal Flatwoods (232I) sections. In combination with MLRA 153A, 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 153B 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 particular 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 loamy soils (dominantly Ultisols) on coastal plain rises and flats of somewhat poorly drained and moderately well drained soils. 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, in this broad flat MLRA, the transition can be exceptionally subtle. 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. Although this site is on moderately high ground within the MLRA, the low lying nature of this entire MLRA dictates that this site is still at risk of inundation associated with extreme tides, storm surge, and extreme precipitation.

Associated sites

F153BY060NC	**Wet Loamy Flats and Depressions** A moist loamy 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.
F153BY065NC	**Wet Clay Flats and Depressions** A moist loamy 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 and texture.

Similar sites

F153BY045NC	**Moist Clay Rises and Flats** This site is on very similar landforms but is comprised of clayey and fine-silty soils.
F153AY040NC	**Moist Loamy Rises and Flats** This site is on very similar landforms but in an adjacent MLRA where the marine terrace surfaces are older, more dissected, and removed from tidal impacts.

Table 1. Dominant plant species

Tree	(1) *Pinus palustris* (2) *Quercus incana*

Shrub	(1) *Ilex glabra* (2) *Vaccinium tenellum*
Herbaceous	(1) *Aristida stricta* (2) *Aristida beyrichiana*

Physiographic features

This ecological site represents rises and flats of loamy mineral soils (mostly Ultisols) that are currently isolated from most flood plain processes. In general, these flat landforms developed by marine deposition, or ancient fluvial reworking and redeposition.

Table 2. Representative physiographic features

Hillslope profile	(1) Summit (2) Shoulder
Landforms	(1) Coastal plain > Marine terrace (2) Coastal plain > Flat
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	0 – 10 m
Slope	0 %
Water table depth	50 – 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 to very rare
Ponding frequency	None

Elevation	0 – 10 m
Slope	0 – 10 %
Water table depth	30 – 180 cm

Climatic features

The climate of MLRA 153B is generally warm, temperate, and humid with maritime influences along the coast. The maximum precipitation occurs in summer, and the minimum occurs in autumn. 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. Snowfall may occur in the northern end of the area. The average annual temperature is 57 to 70 degrees F (14 to 21 degrees C), increasing to the south. (USDA-NRCS, 2022)

Table 4 Representative climatic features

Frost-free period (characteristic range)	210-260 days
Freeze-free period (characteristic range)	260-340 days
Precipitation total (characteristic range)	1,140-1,220 mm
Frost-free period (actual range)	200-270 days
Freeze-free period (actual range)	240-360 days
Precipitation total (actual range)	1,140-1,250 mm
Frost-free period (average)	240 days
Freeze-free period (average)	300 days
Precipitation total (average)	1,190 mm

- (1) ELIZABETH CITY CGAS [USW00013786], Elizabeth City, NC
- (2) CHARLESTON CITY [USW00013782], Charleston, SC
- (3) BRUNSWICK 23 S [USW00063856], Saint Marys, GA

Influencing water features

This MLRA is dominated by a persistent high water table, but this site is characterized by better internal drainage. Fluctuations in water table depth are 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 is at risk of exposure to storm surge only under the most extreme conditions.

Wetland description

This site is not a wetland.

Soil features

The soils of this site are all primarily loamy in texture, and most are Ultisols formed in deep marine and fluviomarine mineral soil deposits. The soils are acidic and very deep, but some soils on this site have the potential to form root restricting layers 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. In this MLRA, these soils are at risk of inundation during extreme tidal, precipitation, or storm surge events.

Soil series on this site include: Altavista, Augusta, Bertie, Blanton, Bolling, Chapanoke, Charleston, Dragston, Edisto, Eunola, Foreston, Fork, Goldsboro, Johns, Kiawah, Lynchburg, Mattapex, Munden, Murad, Nansemond, Noboco, Onslow, Slagle, Stallings, Tetotum, Tomahawk, Winton, Woodstown, Yauhannah, Yemassee, and Yeopim.

Munden and Dragston are modal.

Table 5. Representative soil features

Parent material	(1) Marine deposits (2) Fluviomarine deposits
Surface texture	(1) Fine sandy loam (2) Loamy fine sand (3) Sandy loam
Drainage class	Somewhat poorly drained to moderately well 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)	9.14 – 17.53 cm
Soil reaction (1:1 water) (0-25.4cm)	0 – 10

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	Somewhat poorly drained to moderately well 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)	6.1 – 20.07 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, tides, 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. 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.

Across this MLRA, tidal influences and salinization also exert a primary influence on vegetation communities. This site is on relatively high ground in the context of this MLRA, but the entire MLRA is at risk of inundation associated with the most extreme tidal, precipitation, or storm surge events.

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

State and transition model

Additional community tables

Table 7. Community 3.1 plant community composition

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

Table 8. Community 3.2 plant community composition

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

Table 9. Community 3.3 plant community composition

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

Table 10. Community 3.4 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.

Other references

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Contributors

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Approval

Charles Stemmans, 4/02/2025

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	08/30/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

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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:**
