

Ecological site F153BY090NC

Flooded Mineral Soil Flood Plains and Terraces

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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) Endoaqualts, 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) Psammments, 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) Umbraqualts, 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 Cypress--Gum Swamp (Schafale and Weakely, 1990) and Cypress - Tupelo Floodplain Swamp (FNAI, 2010).

Ecological site concept

This site is characterized by mineral soils (dominantly Entisols and Inceptisols) on coastal plain flood plains and drainageways. The soils on this site are hydric and subject to flooding. Flood plain and riparian processes are considered the defining characteristic of this site, and it includes a variety of textural and drainage classes. These classes may warrant further refinement into multiple site concepts in the future. Flood plain and riparian sites in this MLRA include both small blackwater and large brownwater river systems. Brownwater river systems import and transport sediments derived from Piedmont, Sandhills, and Upper Coast Plain landscapes above this MLRA. Small blackwater drainages originate from within the MLRA and carry waters very low in sediments but high in colored dissolved organic materials which give the water it's dark color. All river systems in this MLRA are subject to tidal influences, and the riparian zones are also at risk of saltwater intrusion and salinization. This site supports a variety of vegetation communities including bottomland hardwoods, and flood plain swamps.

Associated sites

R153BY130NC	Tidal Marsh on Mineral Soil Flooded flood plain sites are often associated with tidal marsh where the riverine system is frequently impacted by tidal influences and transitions to an estuarine system.
F153BY010NC	Dry Sands Dry sands often comprise an eolian deposit associated with and higher on the landscape than large expansive flood plain systems in this MLRA.
F153BY020NC	Moist Sands Moist sands often comprise an eolian deposit associated with and higher on the landscape than large expansive flood plain systems in this MLRA.
F153BY100NC	Flooded Organic Soil Flood Plains and Terraces This site occupies similar landforms and is very poorly drained, but is comprised of Histosols (deep organic soils). The flooded mineral soil flood plains and terraces includes soils with histic epipedons, mineral soils with an organic surface horizon that is significant but not deep enough to classify as a Histosol.
R153BY140NC	Tidal Marsh on Organic Soil Flooded flood plain sites are often associated with tidal marsh where the riverine system is frequently impacted by tidal influences and transitions to an estuarine system.

Similar sites

F153AY090NC	Flooded Mineral Soil Flood Plains and Terraces 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.
F153BY100NC	Flooded Organic Soil Flood Plains and Terraces This site occupies similar landforms and is very poorly drained, but is comprised of Histosols (deep organic soils). The flooded mineral soil flood plains and terraces includes soils with histic epipedons, mineral soils with an organic surface horizon that is significant but not deep enough to classify as a Histosol.

Table 1. Dominant plant species

Tree	(1) <i>Taxodium distichum</i> (2) <i>Nyssa aquatica</i>
Shrub	(1) <i>Fraxinus caroliniana</i> (2) <i>Cyrilla racemiflora</i>
Herbaceous	(1) <i>Polygonum punctatum</i> (2) <i>Saururus cernuus</i>

Physiographic features

This site is characterized by mineral soils (dominantly Entisols and Inceptisols) on coastal plain flood plains and drainageways. The soils on this site are hydric and subject to flooding. Flood plain and riparian processes are considered the defining characteristic of this site, and it includes a variety of textural and drainage classes. These classes may warrant further refinement into multiple site concepts in the future.

Flood plain and riparian sites in this MLRA include both small blackwater and large brownwater river systems. Brownwater river systems import into and transport through this Lower Coastal Plain MLRA sediments derived from Piedmont, Sandhills, and Upper Coast Plain landscapes above this MLRA. Small blackwater drainages originate from within the MLRA and carry waters very low in sediments but high in colored dissolved organic materials which give the water it's dark color.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain (2) Depression (3) Drainageway
Runoff class	Negligible to very low
Flooding duration	Extremely brief (0.1 to 4 hours) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding duration	Not specified

Ponding frequency	None
Elevation	0 – 10 m
Slope	0 %
Ponding depth	0 cm
Water table depth	0 – 30 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding duration	Extremely brief (0.1 to 4 hours) to very long (more than 30 days)
Flooding frequency	Rare to very frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	0 – 10 m
Slope	0 %
Ponding depth	0 – 30 cm
Water table depth	0 – 50 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

On this site, flooding is a dominant process. This site is potentially exposed to both riverine and tidal flooding processes.

Wetland description

These soils are hydric, but, in order to classify as a wetland, a location must meet soils, hydrology, and vegetation criteria. This site is flooded. Some of these sites are sufficiently inland and are not exposed to tidal influences, so they would be riverine in nature. Those locations exposed to tidal influences classify as estuarine. Most locations associated with frequent tidal influences are likely best described by a different ESD, R153BY130NC, tidal marsh on mineral soil, or R153BY140NC, tidal marsh on organic soil.

Soil features

The soils of this site are varied and were formed in fluvio-marine mineral soil deposits. They are generally deep. Surface water flooding is a dominant process on this site. Most soils on this site are Entisols or Inceptisols, but this site also includes several Alfisols and a few Mollisols. The soils are hydric meaning that they are saturated near the surface during a portion of the growing season for a period sufficiently long to produce anaerobic conditions. This site represents those locations where soils meet hydric criteria, but this site is often associated with moist sites that do not meet hydric criteria, and the transition can be exceptionally subtle. The soils on this site are poorly and very poorly drained. This site includes soils with a shallow organic surface horizon (i.e., histic epipedons). In this MLRA, these soils are at risk of salt water intrusion.

Soil series on this site include: Bibb, Chowan, Engelhard, Grifton, Johnston, Kinston, Levy, Masontown, Meggett, Mouzon, Muckalee, Nawney, Pickney, Polawana, Roanoke, Rutlege, Santee, Satilla, Stockade, Torhunta, and Wysocking.

Roanoke and Rutlege are modal.

Table 5. Representative soil features

Parent material	(1) Fluviomarine deposits (2) Alluvium
Surface texture	(1) Silt (2) Loam (3) Sand
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately slow to rapid
Soil depth	180 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	8.64 – 19.3 cm
Soil reaction (1:1 water) (0-25.4cm)	3.6 – 5.5
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	Very poorly drained to poorly drained
Permeability class	Moderately slow to rapid
Soil depth	180 – 200 cm

Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	4.32 – 24.38 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 7.8
Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	0 %

Ecological dynamics

The dominant ecological drivers on a flood plain site are tides as well as the flooding dynamics of the adjacent waterway. Brownwater systems can redistribute nutrients by scouring and depositing sediments as well as organic detritus, whereas blackwater systems redistribute only organic detritus. Locations adjacent or proximate to the primary waterway tend to be exposed to aerobic floodwaters, whereas locations distant from the primary waterway tend to be flooded by stagnant backwaters. Flooding dynamics can cause the location of the waterway channel to shift, which will cause changes to hydrology at the effected locations. Flooding dynamics at any individual location will be impacted by the type and size of the river or stream system as well as the relative distance from the main channel. Beaver activity may also alter local flooding dynamics.

In this MLRA, intrusion of salt water into the soil profile can have significant impacts on vegetation. Low lying riparian areas are at particularly high risk of salinization, especially near their outlet. In forested areas, this phenomenon is sufficiently common that ghost forests are increasingly recognized as a widespread example of the impacts of sea level rise and salinization. Extensive ditching across this MLRA increases exposure of the landscape to salinization. As sea level rises, a dense salt-water wedge moves further inland up these ditches exposing more of the landscape to these processes.

Flood plain forests tend to be relatively stable. Flood plain forests along brownwater systems appear to be more diverse than those along blackwater systems. Historical logging practices may have artificially reduced the prevalence of cypress (*Taxodium* sp.) and increased the relative dominance of tupelo (*Nyssa* sp.) and other flood adapted hardwoods.

If following the soil survey has brought you to this ESD, but you find yourself in a graminoid marsh community, please refer to the ESD titled Tidal Marsh on Mineral Soil, R153BY130NC. Some of the same soils mapped on this ecological site are also mapped on marsh locations, but the complexity of salinity and tidal dynamics make it necessary to describe the marsh systems in a separate ESD.

(FNAI, 2010; Schafale and Weakley, 1990)

State and transition model

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

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Contributors

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Approval

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	09/17/2026
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:
