Ecological site R153BY120NC
Wet Dune Slack

Last updated: 4/02/2025
Accessed: 09/24/2026

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 Maritime Wet Grassland (Schafale and Weakely, 1990) and Coastal Interdune Swale (FNAI, 2010).

Ecological site concept

This site represents poorly drained hydric soils on swales within coastal strand dune swale complex landforms. The soils are dominantly sandy and have a surface horizon of muck 1 cm (0.5 inch) or more thick. Subsurface mineral soil horizons are low chroma, and this site typically meets hydric soil indicator s12, which applies specifically in the swale portion of dune-and- swale complexes of barrier islands. S12 indicates a layer of muck 1 cm (0.5 inch) or more thick with a Munsell color value of 3 or less and chroma of 2 or less and starting at a depth ?15 cm (6 inches) from the soil surface. This site predominantly supports a wet dune grasses vegetation community.

Associated sites

R153BY110NC	**Coastal Strand, Beaches, and Dunes** Wet dune slack is a component of the coastal strand landscape and can be distinguished by soil moisture.
R153BY130NC	**Tidal Marsh on Mineral Soil** Tidal marsh is typically associated with and lower on the landscape than the coastal strand and beach landscapes.
R153BY140NC	**Tidal Marsh on Organic Soil** Tidal marsh is typically associated with and lower on the landscape than the coastal strand and beach landscapes.

Similar sites

R153BY110NC	**Coastal Strand, Beaches, and Dunes** Wet dune slack is a component of the coastal strand landscape and can be distinguished by soil moisture.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Morella cerifera*
Herbaceous	(1) *Spartina patens* (2) *Juncus roemerianus*

Physiographic features

This site represents swales within coastal strand dune swale complex landforms.

Table 2. Representative physiographic features

Landforms	(1) Dune field > Depression (2) Swale (3) Interdune
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None to rare
Elevation	0 – 10 m
Slope	0 %
Water table depth	0 – 20 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to very low
Flooding duration	Long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding frequency	None to rare
Elevation	0 – 10 m
Slope	0 %

Water table depth	0 – 30 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)

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. Hurricanes and other storms that combine strong winds with extreme precipitation can topple trees and place this entire MLRA at risk of inundation. Furthermore, sea-level rise puts these low-lying terrestrial and freshwater systems at high risk of salt water intrusion and the damaging impacts of salinization.

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 site is typically adjacent to Atlantic Ocean shoreline and is prone to tidal and storm surge inundation.

Wetland description

This site typically meets hydric soil indicator s12. These soils may be hydric, but, in order to classify as a wetland, a location must meet soils, hydrology, and vegetation criteria. Some of these sites are sufficiently inland and are not exposed to tidal influences, so any

wetlands that occur on this site would be palustrine in nature. Those wetland locations exposed to tidal influences classify as estuarine.

Soil features

The soils of this site are all primarily sandy, and most are Entisols. This site represents wet poorly drained depressions and swales within sandy shoreline features. This site can typically be found as a depression within three unique positions: 1) coastal strand, 2) coastal dunes, and 3) beaches. They have a surface horizon of muck 1 cm (0.5 inch) or more thick. Subsurface mineral soil horizons are low chroma, and this site typically meets hydric soil indicator s12. These soils are at risk of saltwater inundation during extreme tidal or storm surge events.

This site represents poorly drained hydric soils on swales within coastal strand dune swale complex landforms.

Soil series on this site include: Camocca, Duckston, and Osier.

Duckston is modal.

Table 5. Representative soil features

Parent material	(1) Eolian deposits (2) Marine deposits (3) Eolian sands (4) Beach sand
Surface texture	(1) Fine sand (2) Sand (3) Loamy fine sand
Drainage class	Poorly drained
Permeability class	Rapid to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	2.03 – 7.87 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Poorly drained
Permeability class	Rapid to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	2.03 – 9.91 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	0 %

Ecological dynamics

The primary ecological drivers on this site including wind driven sand, salt spray, and storm driven inundation. Wind driven sand can both bury plants and expose plant roots. Dune migration can bury entire vegetation communities. Salt spray limits the development of woody vegetation. In comparison to other ecological sites on infertile sandy soils, salt spray increases plant diversity by providing a continuous input of nutrients. While fire does occur on this ecological site, it is relatively rare. Proximity and adjacency to the shoreline limits compass directions from which a fire can encroach on this site.

On this wet dune slack rangeland ecological site, salt spray and saltwater over wash appear to be sufficient to mostly prevent ecological succession to more woody dominated communities.

(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

Matthew D. Duvall

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	09/24/2026
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:**

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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:**
