Ecological site F153AY090NC
Flooded Mineral Soil Flood Plains and Terraces

Last updated: 2/12/2025
Accessed: 05/21/2025

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 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. This concept represents locations where the soils meet hydric field criteria, meaning that some periods of soil saturation and/or inundation happen during the growing season, but some locations will also periodically dry out during the growing season. Any location where the soils do not meet hydric criteria is covered by a different ESD.

The soils on this site are 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, transport, and export 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 its dark color.

This site supports a variety of vegetation communities including bottomland hardwoods, flood plain swamps, and freshwater graminoid marsh. Table 1 very briefly lists some of the

most dominant vegetation on this site today. More detailed descriptions of community compositions are available in the State and Transition Model.

Associated sites

F153AY010NC	**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.
F153AY020NC	**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.
F153AY100NC	**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.

Similar sites

F153BY090NC	**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 younger, less dissected, and more prone to tidal impacts.

Table 1. Dominant plant species

Tree	(1) *Taxodium distichum* (2) *Nyssa aquatica*
Shrub	(1) *Fraxinus caroliniana* (2) *Cyrilla racemiflora*
Herbaceous	(1) *Polygonum punctatum* (2) *Saururus cernuus*

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 meet hydric criteria and are subject to flooding. Flood plain and riparian processes are considered the defining characteristic of this site. This site concept does not apply at locations the do not flood. Flooding processes impact saturation and inundation as well as nutrient import and export.

This site 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 its dark color.

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) Toeslope
Landforms	(1) Coastal plain > Flood plain (2) Stream terrace (3) Depression (4) Drainageway
Runoff class	Negligible
Flooding duration	Long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	8–90 m
Slope	0–2%
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	Long (7 to 30 days) to very long (more than 30 days)
Flooding frequency	None to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	8–90 m
Slope	0–2%

Ponding depth	0–30 cm
Water table depth	0–46 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

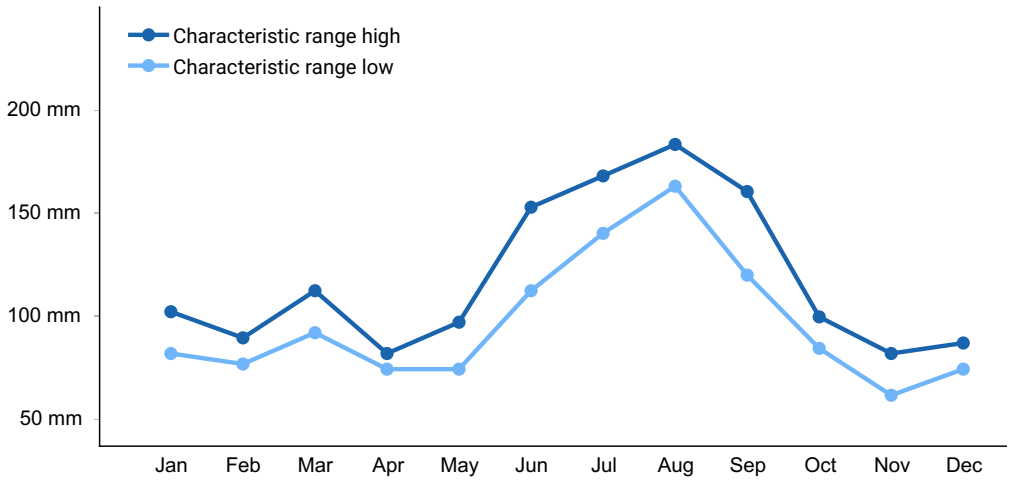


Figure 1. Monthly precipitation range

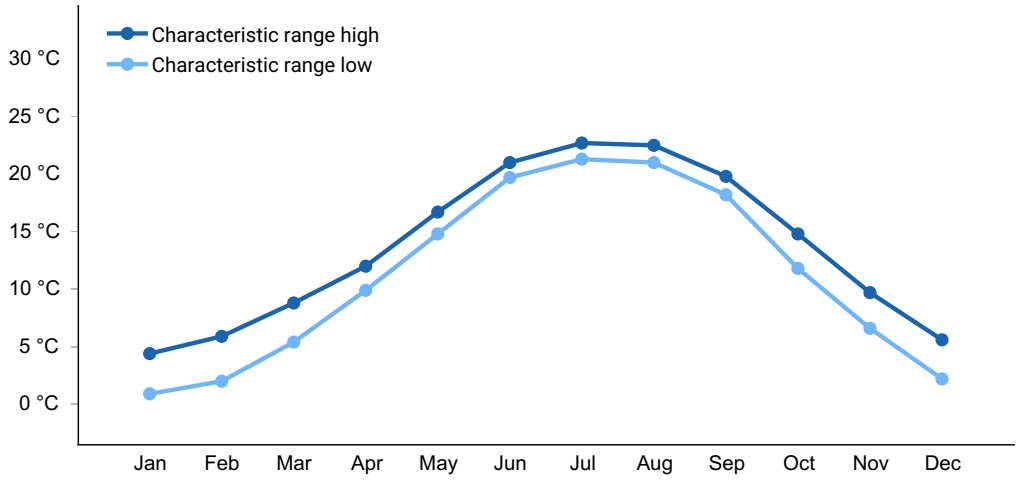


Figure 2. Monthly minimum temperature range

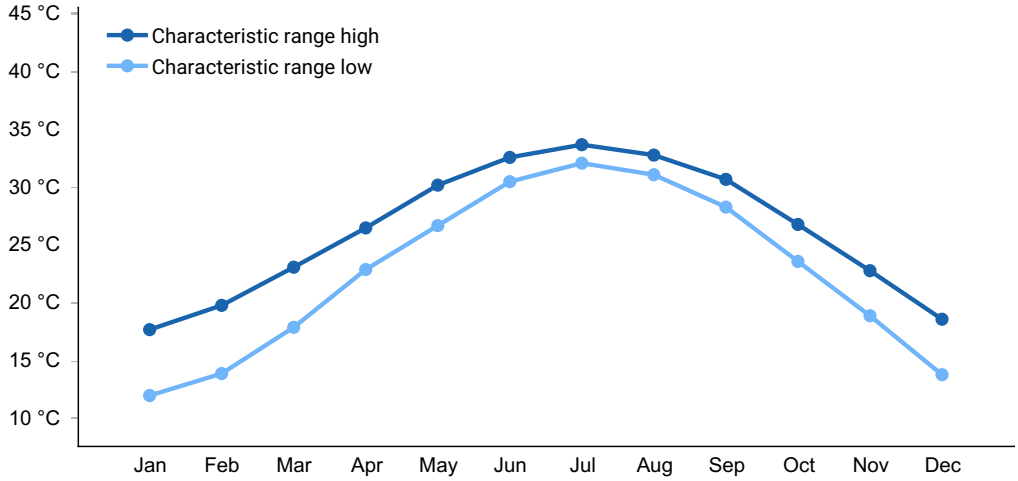


Figure 3. Monthly maximum temperature range

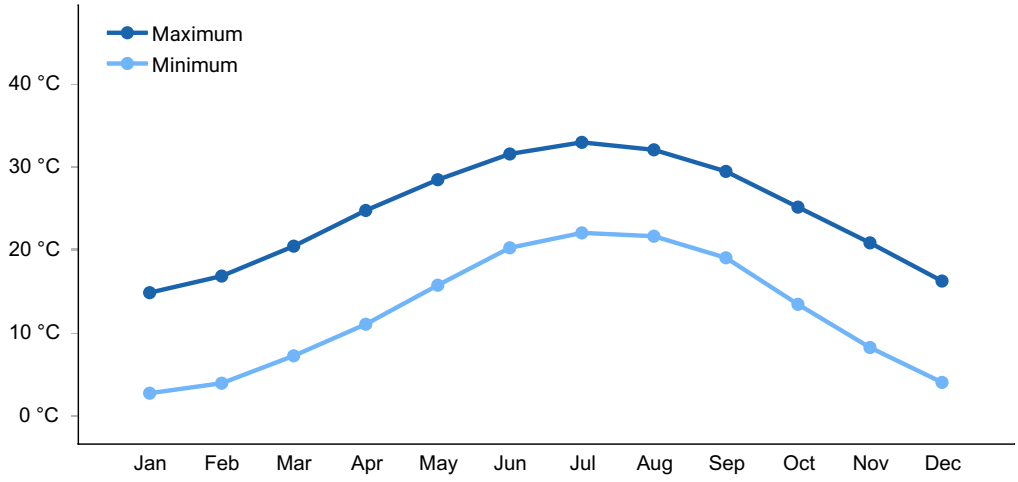


Figure 4. Monthly average minimum and maximum temperature

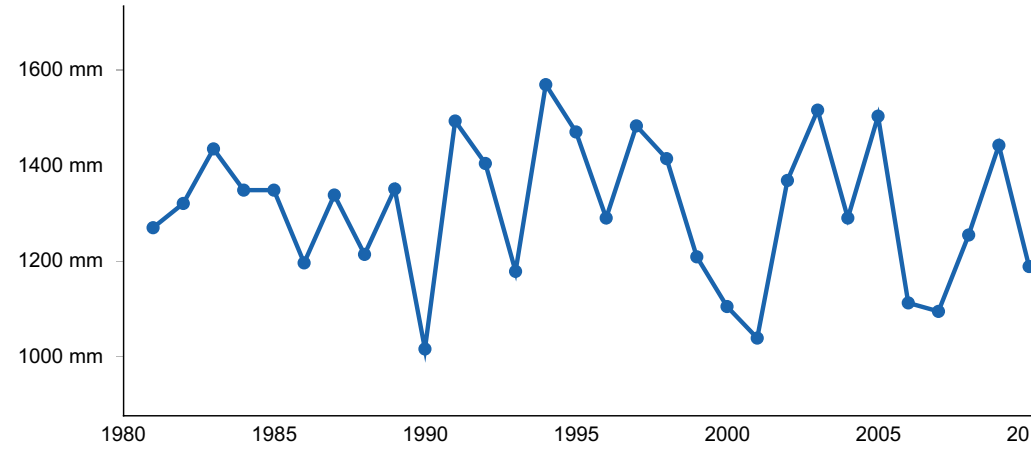


Figure 5. Annual precipitation pattern

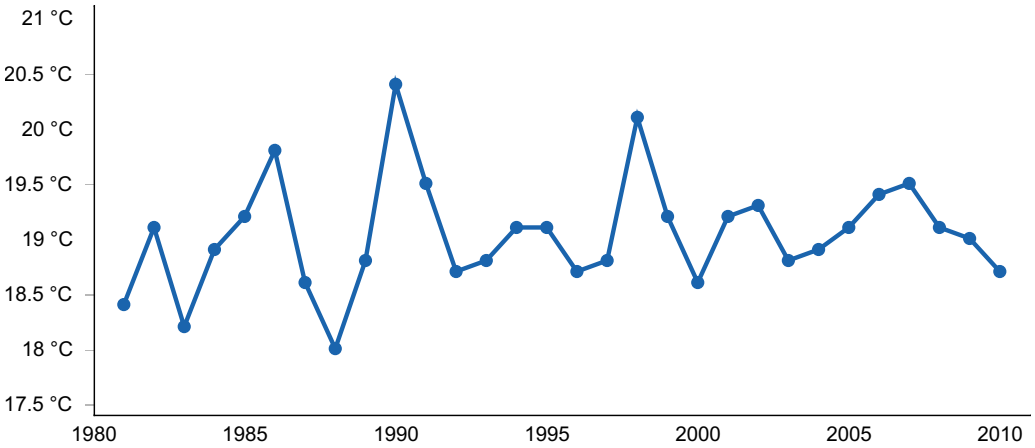


Figure 6. Annual average temperature pattern

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

On this site, flooding is a dominant process. Brownwater river and stream systems tend to move sediments through this MLRA that originate from adjacent higher landscapes with a more erosive topographic gradient. Blackwater river and stream systems tend to originate from within the MLRA, are very low gradient, and transport high levels of colored dissolved organic material.

Wetland description

Most of the soils on this site meet hydric field criteria, but, in order to classify as a wetland,

a location must meet soils, hydrology, and vegetation criteria. This site is flooded, and is not exposed to tidal influences, so any wetlands that occur on this site are riverine in nature.

Soil features

The soils of this site are varied and were formed in fluviomarine 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.

Soil series on this site include: Angelina, Arapahoe, Ballahack, Bibb, Buccaneer, Chastain, Chenneby, Chewacla, Chowan, Elloree, Grifton, Herod, Johnston, Kinston, Levy, Masontown, Meadowbrook, Meggett, Mimms, Mouzon, Muckalee, Nawney, Osier, Pickney, Riverview, Rutlege, Santee, Satilla, Scapo, Stockade, Tawcaw, Tomotley, Torhunta, Wehadkee, Wilbanks, and Yulee.

Torhunta, Johnston, and Meggett or modal.

Table 5. Representative soil features

Parent material	(1) Alluvium (2) Fluviomarine deposits
Surface texture	(1) Loam (2) Fine sandy loam (3) Sandy loam
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately slow to rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.14–17.53 cm
Soil reaction (1:1 water) (0-25.4cm)	4–6
Subsurface fragment volume <=3" (0-101.6cm)	0–3%

Subsurface fragment volume >3" (0-101.6cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to somewhat poorly drained
Permeability class	Moderately slow to rapid
Soil depth	191–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.3–22.1 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5–8.4
Subsurface fragment volume <=3" (0-101.6cm)	0–9%
Subsurface fragment volume >3" (0-101.6cm)	0%

Ecological dynamics

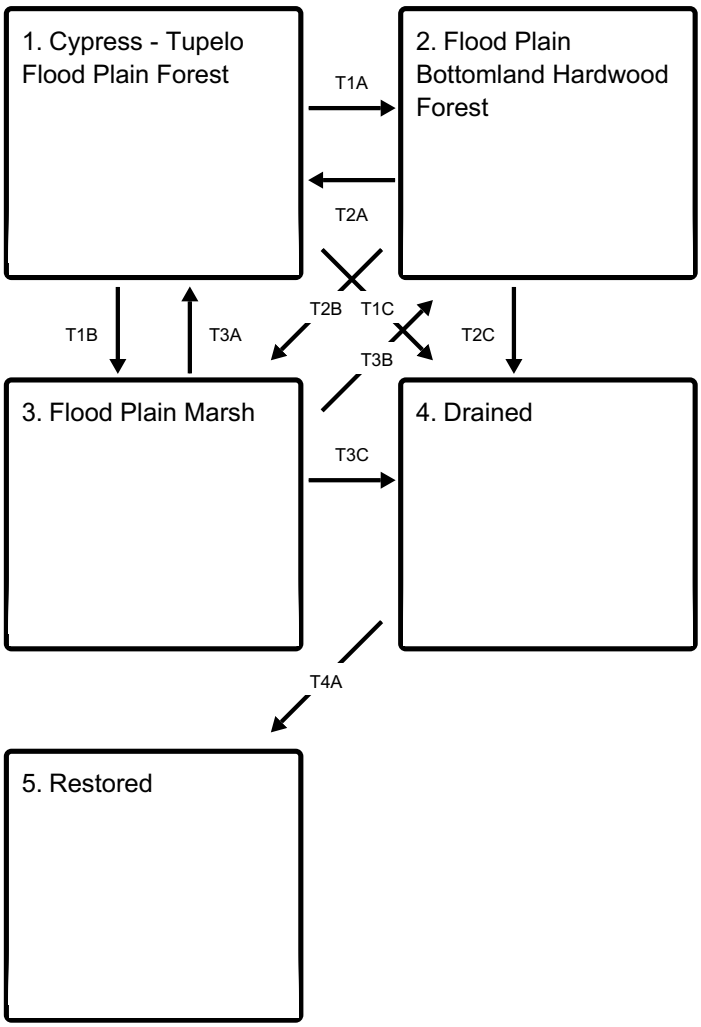
The dominant ecological driver on a flood plain site is the flooding dynamics of the adjacent waterway. Brownwater systems can redistribute nutrients by scouring and depositing sediments as well as organic detritus, whereas blackwater systems redistribute only organic detritus. Locations adjacent or 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.

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.

(FNAI, 2010; Schafale and Weakley, 1990)

State and transition model

Ecosystem states



T1A - Decreased flooding

T1B - Disturbance

T1C - Drainage

T2A - Increased flooding

T2B - Disturbance

T2C - Drainage

T3A - Undisturbed succession

T3B - Undisturbed succession

T3C - Drainage

T4A - Restoration

State 1
Cypress - Tupelo Flood Plain Forest

The cypress-tupelo flood plain community tends to occur relatively close to the main channel in areas that are more frequently flooded and for longer periods of time.

Dominant plant species

- bald cypress (*Taxodium distichum*), tree

- water tupelo (*Nyssa aquatica*), tree
- swamp tupelo (*Nyssa biflora*), tree
- red maple (*Acer rubrum*), tree
- Carolina ash (*Fraxinus caroliniana*), shrub
- planertree (*Planera aquatica*), shrub
- black willow (*Salix nigra*), shrub
- swamp titi (*Cyrilla racemiflora*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- cabbage palmetto (*Sabal palmetto*), shrub
- dotted smartweed (*Polygonum punctatum*), grass
- lizard's tail (*Saururus cernuus*), other herbaceous

State 2
Flood Plain Bottomland Hardwood Forest

The flood plain bottomland hardwood forest tends to occur at some distance from the main channel in more stagnant backwater type settings that do not flood as often.

Dominant plant species

- laurel oak (*Quercus laurifolia*), tree
- overcup oak (*Quercus lyrata*), tree
- red maple (*Acer rubrum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- American elm (*Ulmus americana*), tree
- pond cypress (*Taxodium ascendens*), tree
- Virginia sweetspire (*Itea virginica*), shrub
- Carolina ash (*Fraxinus caroliniana*), shrub
- dotted smartweed (*Polygonum punctatum*), grass
- lizard's tail (*Saururus cernuus*), other herbaceous

State 3
Flood Plain Marsh

Flood plain marsh is a community dominated by graminoids, herbs, and shrubs occurring within a river or stream flood plain. This community is disturbance dependent, or it will quickly succeed to a woody dominated community. In many locations, especially in Florida, fire may provide the necessary disturbance vector. Flood plain marsh adapted species typically sprout readily following fire.

Dominant plant species

- coastal plain willow (*Salix caroliniana*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- sand cordgrass (*Spartina bakeri*), grass
- swamp sawgrass (*Cladium mariscus*), grass

- maidencane (*Panicum hemitomon*), grass
- dotted smartweed (*Polygonum punctatum*), grass
- common rush (*Juncus effusus*), grass

State 4
Drained

This is a relatively wet site. Historically, these sites have been drained frequently to support a variety of land uses including forestry, agriculture, and development. This drained state is included in this STM because this state exists widely today across the landscape. 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).

State 5
Restored

After land on this site has been drained, it is impossible to return fully to reference conditions that existed at that location prior to drainage, especially at locations that remained under active drainage management for long periods of time. Restoration efforts might include blocking and removing drainage structures, and revegetation.

Transition T1A
State 1 to 2

Decreased flooding frequency and duration.

Transition T1B
State 1 to 3

Stand killing disturbance including scour, deposition, and/or fire.

Transition T1C
State 1 to 4

The drained state is included in this STM because this state exists widely today across the landscape. This transition is included to show how we got to where we are today. 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).

Transition T2A
State 2 to 1

Increased flooding frequency and duration.

Transition T2B
State 2 to 3

Stand killing disturbance including scour, deposition, and/or fire.

Transition T2C
State 2 to 4

The drained state is included in this STM because this state exists widely today across the landscape. This transition is included to show how we got to where we are today. 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).

Transition T3A
State 3 to 1

Undisturbed succession.

Transition T3B
State 3 to 2

Undisturbed succession.

Transition T3C
State 3 to 4

The drained state is included in this STM because this state exists widely today across the landscape. This transition is included to show how we got to where we are today. 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).

Transition T4A
State 4 to 5

Remove, plug, or otherwise restore drainage and revegetate.

Inventory data references

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

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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	05/21/2025
Approved by	Charles Stemmans
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:**
