Ecological site F136XY800VA
Acidic Upland Depressions and Heads of Drains, Wet

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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): 136X–Southern Piedmont

This MLRA is on a large piedmont underlain by metamorphic and igneous bedrock. It stretches from north-central Virginia to east-central Alabama, running parallel to the Appalachian highlands to the northwest and the Atlantic coast to the southeast. MLRA 136 has only subtle climatic differences with MLRA 148 (Northern Piedmont), with which it shares a common geologic origin. This adjacent MLRA sits to the north. Along the fall line, it shares a boundary with MLRA 133A (Southern Coastal Plain), MLRA 137 (Carolina and Georgia Sand Hills), and 133C (Gulf Coastal Plain). Here, unconsolidated Coastal Plain sediments intersect the much older Piedmont bedrock. Along it's northwestern boundary, it sits adjacent to MLRAs 130B (Southern Blue Ridge), 130A (Northern Blue Ridge), and 128 (Southern Appalachian Ridges and Valleys). These MLRAs are distinguished from the Southern Piedmont by topographic and elevational differences, as well as differences in the age, origin, and degree of metamorphism of the underlying bedrock. Five states are intersected by the MLRA, including North Carolina (29 percent), Georgia (27 percent), Virginia (20 percent), South Carolina (17 percent), and Alabama (7 percent). The MLRA extent makes up about 63,720 square miles (165,034 square kilometers). MLRA PHYSIOGRAPHY The landscape is generally rolling to hilly, with a well-defined drainage pattern. Streams have dissected the original Piedmont plateau, forming narrow ridgetops, somewhat broad interfluves, and short, steep side slopes adjacent to the streams and drainageways. With some exceptions, the valley floors are generally narrow and make up about 10 percent or less of the land area. The associated stream terraces are generally small and of minor extent. The landscape is moderately dissected overall, with isolated erosional remnants (monadnocks) and other areas of high topographic relief interspersed. Over most of the MLRA, elevation ranges from approximately 325 to 1,315 feet (100 to 400 meters), with elevations generally increasing toward the Appalachian Highlands, in the upper Piedmont, and decreasing toward the Coastal Plain, in the lower Piedmont. The major rivers that cross this area en route to the ocean include, from north to south, the James, Roanoke, Cape Fear, Savannah, Altamaha, Chattahoochee, and Alabama Rivers. These rivers typically originate within the Piedmont or in the Blue Ridge. They flow east and south across the Coastal Plain and empty into the Atlantic Ocean or the Gulf of America. MLRA GEOLOGY Precambrian and Paleozoic metamorphic and igneous rocks underlie almost all of this MLRA. The dominant metamorphic rock types include gneiss, schist, slate, argillite, and phyllite, among others. Dominant igneous rock types include granite and other related felsic crystalline rocks. Mafic intrusive rocks, including gabbro, diabase, amphibolite, and other dark colored rocks, underlie a minority of the upland landscape. These mafic intrusions crop out in the form of dikes and sills, and often weather to produce soils high in base cations. The Carolina Slate Belt runs lengthwise through the east-central part of the MLRA, in southern Virginia, North Carolina, South Carolina, and the eastern-most part of the Georgia Piedmont. This region is underlain by fine-grained metasedimentary and metavolcanic rock, which generally weathers to produce soils high in silt. From Virginia to North Carolina, and in a single county in South Carolina, fault-bounded Triassic Basins are scattered amongst the igneous and metamorphic uplands. These basins are underlain by Triassic and Jurassic siltstone, shale, sandstone, and mudstone, which were laid down in response to continental rifting and subsequent erosion during the Mesozoic era. MLRA SOILS The dominant soil orders of the MLRA are Ultisols, Inceptisols, and Alfisols. Ultisols and Alfisols are typically found on more stable landforms, such as interfluves, gentle hillslopes, broad ridgetops, and stream terraces, while Inceptisols are typically found on less stable landforms, including flood plains, steep hillslopes, and narrow ridgetops. Soils of the region predominantly have a thermic temperature regime, a udic moisture regime, and generally have kaolinitic or mixed mineralogy. In the upper Piedmont of Virginia and North Carolina however, soils have a mesic soil temperature regime, as depicted in figure 2. The mesic soil temperature regime portion of the MLRA is oriented from northeast to southwest and occupies approximately 18 percent of the MLRA extent, or 11,729 square miles (30,377 square kilometers). Broadly speaking, soils of the Southern Piedmont uplands are shallow to very deep, well drained, and loamy or clayey. Soils of the river valleys are generally very deep, well to poorly drained, and loamy. Soils tend to be finer-textured than in Coastal Plain regions. MLRA CLIMATE In general, precipitation is evenly distributed throughout the year in this MLRA, with occasional drought-like conditions extending from late summer into autumn. During the growing season, most of the rainfall comes from high-intensity, convective thunderstorms. Significant moisture also comes from the movement of warm and cold fronts across the MLRA from November to April. High amounts of rain can also occur during hurricanes, usually during the months of August through October. Over most of the MLRA, snowfall is typically light, though overall, the mesic soil temperature regime portion of the MLRA features colder temperatures, more snowfall, and a shorter growing season than in the thermic portion. The cooler climate in this region supports an increase in species with northern or Blue Ridge affinities. Both the mean annual temperature and the length of the freeze-free period increase from north to south and with decreasing elevation from the upper to the lower Piedmont. MLRA LAND USE AND RESOURCES Once largely cultivated, much of this region is now planted to loblolly pine or has reverted to successional pine and hardwood forests. The more productive lands support small to medium-size family farms that produce crops and livestock, while the less productive lands have been in forest for some time. Most of the open areas are used for grazing beef cattle, though in years past, dairy cattle were also important to the local economy. The principal crops of the region include corn, soybeans, and small grains. Burley tobacco remains a crop of local importance. Cotton is grown in the thermic soil temperature regime portion of the MLRA. Several major land cover transformations have occurred in the Southern Piedmont over the past several centuries; from open woodlands sculpted by fire, to farmland, to closed forests and planted pine, past land uses have played an outsized role in shaping present-day soils and vegetation patterns in the region. Land-use intensity peaked with the arrival of the industrial revolution, which gradually increased demand for textiles. Cotton became the dominant crop over much of the region. In spite of early successes, two centuries of poor management practices accelerated soil erosion, stripping away the fertility and moisture-supplying capacity of soils. In addition to soil losses in the uplands, legacy sediments derived from the eroded land rapidly accumulated in the river valleys below, often leading to changes in hydrology and flooding frequency. After being stripped of it's loamy topsoil, many areas of the Piedmont had been so badly eroded as to render the land unsuitable or economically impractical for agriculture. The effects of erosion were widespread, with cumulative soil loss estimates ranging from 5 to 10 inches on average. The steeper slopes, which had often been cleared and farmed at the height of the Cotton era, generally suffered greater losses. By the 1930's, crop production was in rapid decline in the Southern Piedmont. The loss of soil productivity due to erosion, losses to the cotton boll weevil, development of synthetic fibers, and the onset of the Great Depression all contributed to rapid abandonment of cropland. By 1960, cropland acres had decreased by more than 50 percent in nearly every county in the Southern Piedmont. While crop production is still important today on the more productive lands, those of lower productivity, or those that were subject to severe erosion, were often abandoned some time ago. Typically, they have either reverted to forest, or have been converted to other uses. Although the productivity of soils was greatly reduced through erosion, less intensive land uses such as grazing and forestry were still feasible. These land uses gained popularity as patterns of urban migration, low commodity prices, and other factors gradually made crop production less economical on the marginal lands. In recent years, large-scale adoption of soil conservation practices have led to better outcomes with respect to erosion in much of MLRA, increasing the economic viability and long-term sustainability of Piedmont farms. Despite some success, water erosion remains one of the most important soil resource concerns in the MLRA. Other major resource concerns include increasing conversion of prime farmland and farmland of statewide importance to urban uses. Throughout the MLRA, metropolitan areas are expanding into lands that have historically been used for timber or agriculture. This change in land use is occurring rapidly in the corridor called the Piedmont Crescent, which extends from Atlanta, Georgia, to Raleigh, North Carolina. HISTORIC VEGETATION COVER Over most of the Southern Piedmont uplands, the historic oak-hickory, or oak-hickory-pine forest, once covered large portions of the landscape. It was dominated by upland oaks, such as white oak (Quercus alba), northern red oak (Quercus rubra), and southern red oak (Quercus falcata), with a smaller contribution from hickories (Carya spp.) and pines. The principal pine species are shortleaf pine (Pinus echinata), loblolly pine (Pinus taeda), and to the north and west, Virginia pine (Pinus virginiana). In the southernmost and easternmost portions of the MLRA, the historic montane longleaf pine forest, dominated by longleaf pine (Pinus palustris), shortleaf pine (P. echinata), and dry-site oaks, was found on ridgetops and steep south or west-facing slopes. According to historic accounts, forests and woodlands of the past were generally more open and park-like, having been exposed to a more frequent fire regime. Piedmont prairies, likely maintained by Native Americans, were also reportedly common across the landscape, as were fire-maintained canebrakes along the streams (Trimble 1974; Daniels 1987; Griffith et al. 2002; Van Lear et al. 2004; Dearman and James 2019; Schomberg et al. 2020; USDA-NRCS 2022).

LRU notes

MLRA 136 is one of the largest MLRAs in the United States. It has a broad north-south and east-west extent and covers a wide range of elevations. The MLRA is partitioned by the mesic-thermic line, which divides the MLRA into mesic and thermic soil temperature regimes (figure 2.). The mesic soil temperature regime was delineated based on estimates of the native range of loblolly pine, which was historically absent in this part of the MLRA. In addition, this region is said to represent the northern and western limits of cotton production, an important crop to the south and east. ESDs developed for this MLRA were split geographically into mesic and thermic ecological site concepts. Climate variation across the MLRA extent warrants the development of Land Resource Unit (LRU) classifications, to further subdivide the MLRA and support more precise Ecological Site Descriptions.

Classification relationships

APPLICABLE USNVC ASSOCIATIONS CEGL007403 Quercus phellos/ Carex (albolutescens, intumescens, joorii) / Climacium americanum APPLICABLE EPA ECOREGIONS Level III: 45. Piedmont Level IV: 45a. Southern Inner Piedmont; 45b. Southern Outer Piedmont; 45c. Carolina Slate Belt; 45f. Northern Outer Piedmont; 45i. Kings Mountain (EPA 2013). APPLICABLE USFS ECOLOGICAL UNITS Domain: Humid Temperate Division: Subtropical Ecological province: 231. Southeastern Mixed Forest Ecological sections: 231I.Central Appalachian Piedmont; 231A. Southern Appalachian Piedmont (Cleland et al. 2007). Based on the USGS physiographic classification system (Fenneman and Johnson 1946), most of MLRA 136 is in the Piedmont Upland section of the Piedmont province, in the Appalachian Highlands division.

Ecological site concept

This ecological site includes isolated wet areas on uplands, which are confined to shallow depressions, flats, and at the heads of drainageways, in the thermic soil temperature regime portion of the MLRA. These sites are saturated during the cooler months but generally dry out by summer. Wetness is not usually great enough to prevent a closed tree canopy from developing, and any areas of seepage or standing water are typically drawn down through evapotranspiration early in the growing season. Overbank flooding does not occur. Soils on this ecological site are typically moderately deep to very deep, poorly drained Ultisols. They typically have dense clay subsoils or other subsurface materials that impede drainage. Parent materials are typically residuum overlain by a mantle of slope alluvium washed from higher areas, which can be of variable thickness, or slope alluvium or residuum alone. These materials are typically derived from acidic igneous or metamorphic rocks. The reference state supports a closed canopy forest dominated by bottomland oaks. Species diversity is typically very low in these forests. Typically, willow oak (Quercus phellos) is strongly dominant. Other species that may be present include red maple (Acer rubrum), blackgum (Nyssa sylvatica), and sweetgum (Liquidambar styraciflua). Dominant land uses include pastureland and wildlife habitat. Soils are poorly-suited to most building applications or septic system installations due to seasonal wetness. ES CHARACTERISTICS SUMMARY • Thermic soil temperature regime • Occurs on Piedmont uplands, on upland flats, upland depressions, and at the heads of drainageways • Base saturation: 35 percent in the subsoil • Seasonal high water table: 0 - 12 inches from the soil surface • Soils: moderately deep to very deep, poorly drained Ultisols

Associated sites

F136XY810SC	**Acidic Upland Forest, Seasonally Wet** Found in slightly higher landscape positions. The seasonal high water table is deeper (12-40 inches for the soil surface), supporting a decrease in obligate or facultative wetland indicator species.
F136XY820GA	**Acidic Upland Forest, Moist** Widespread on the surrounding well drained uplands. Found in higher and drier landscape positions. The seasonal high water table is much deeper (? 40 inches from the soil surface, usually deeper), supporting a marked decrease in obligate or facultative wetland indicator species.

Similar sites

F136XY300VA	**Mesic Temperature Regime, Acidic Upland Depressions and Heads of Drains, Wet** The soil temperature regime is mesic, occurring outside of the native range of loblolly pine (Pinus taeda).
F136XY700NC	**Basic Upland Flats and Depressions, Expansive Clay, Seasonally Wet and Dry** The geomorphic setting is similar, but soils weathered from mafic intrusive rock. The subsoil is dominated by shrink-swell clay minerals and has a base saturation greater than or equal to 35 percent. Seasonal extremes in plant available water are more pronounced. Dry-site species usually occupy some portion of the canopy, of which post oak (Quercus stellata) is most notable. Species diversity is usually considerably higher. Basic indicator species are more abundant in the understory.

Figure 1. EPA level IV ecoregions of the Southern Piedmont (45).

Figure 2. Spatial illustration of soil temperature regimes of the Southern Piedmont.

Figure 3. Spatial extent of this ecological site representing the major areas where this site is important on the landscape.

Table 4. Dominant plant species

Tree	(1) *Quercus phellos* (2) *Acer rubrum*
Shrub	(1) *Smilax rotundifolia* (2) *Vaccinium fuscatum*

Herbaceous	(1) *Carex* (2) *Sphagnum*

Physiographic features

This ecological site includes isolated wet areas on uplands, which are confined to shallow depressions, flats, and at the heads of drainageways. Occasionally it can be found at the base of slopes. Representative locations are nearly level to gently sloping, with a representative slope of 0 to 6 percent and a maximum slope of 10 percent at the base of slopes.

The geologic substrate is is typically acidic igneous or metamorphic rock, or slope alluvium derived from these rocks, or both. These materials are typically derived from acidic igneous or metamorphic rocks, such as granite, gneiss, or schist.

Figure 1. Typical soil-landscape relationships of the Southern Piedmont Felsic Crystalline Soil System. Worsham soils are associated with this ecological site, depicted here around the heads of drainageways.

Table 5. Representative physiographic features

Hillslope profile	(1) Toeslope (2) Footslope (3) Summit
Landforms	(1) Piedmont > Depression (2) Piedmont > Drainageway (3) Piedmont > Flat
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	100 – 260 m
Slope	0 – 10 %
Water table depth	20 – 30 cm
Aspect	Aspect is not a significant factor

Table 6. Representative physiographic features (actual ranges)

Runoff class	Low to very high

Flooding frequency	None to frequent
Ponding frequency	None
Elevation	60 – 350 m
Slope	0 – 10 %
Water table depth	0 – 30 cm

Climatic features

On this ecological site, the average mean annual precipitation is 45 inches. On average, the rainiest months occur from July through August, as well as in March. The driest months occur from October through December, along with April.

Table 7 Representative climatic features

Frost-free period (characteristic range)	160-180 days
Freeze-free period (characteristic range)	190-220 days
Precipitation total (characteristic range)	1,120-1,190 mm
Frost-free period (actual range)	150-190 days
Freeze-free period (actual range)	180-230 days
Precipitation total (actual range)	1,090-1,220 mm
Frost-free period (average)	170 days
Freeze-free period (average)	200 days
Precipitation total (average)	1,140 mm

- (1) LAWRENCEVILLE 3 E [USC00444768], Freeman, VA
- (2) CLARKSVILLE [USC00441746], Clarksville, VA
- (3) CHASE CITY [USC00441606], Chase City, VA
- (4) GREENBAY 3 NE [USC00443565], Burkeville, VA
- (5) CHARLOTTE COURT HOUSE [USC00441585], Keysville, VA
- (6) CAMP PICKETT [USC00441322], Blackstone, VA
- (7) AMELIA COURTHOUSE 1 [USC00440187], Amelia Court House, VA

- (8) AMELIA 8 NE [USC00440188], Amelia Court House, VA
- (9) CROZIER [USC00442142], Maidens, VA
- (10) SOUTH BOSTON [USC00447925], South Boston, VA
- (11) HAW RIVER 1E [USC00313919], Graham, NC
- (12) RALEIGH DURHAM INTL AP [USW00013722], Raleigh, NC
- (13) RALEIGH 4 SW [USC00317074], Raleigh, NC
- (14) CLAYTON WTP [USC00311820], Clayton, NC
- (15) LOUISBURG [USC00315123], Louisburg, NC
- (16) ARCOLA [USC00310241], Macon, NC
- (17) EXPERIMENT [USC00093271], Griffin, GA
- (18) LA GRANGE 1N [USC00094949], LaGrange, GA
- (19) LAURENS [USC00385017], Laurens, SC
- (20) WINNSBORO [USC00389327], Winnsboro, SC
- (21) MONROE 2 SE [USC00315771], Monroe, NC
- (22) KERSHAW 1SW [USC00384690], Kershaw, SC
- (23) SANTUCK [USC00387722], Union, SC
- (24) JOHN H KERR DAM [USC00444414], Boydton, VA
- (25) FARMVILLE 2 N [USC00442941], Farmville, VA

Influencing water features

Soils associated with this ecological site are saturated during the cooler months but generally dry out by summer. Over the cooler months, during periods of lower evapotranspiration, a rising water table contributes to soil wetness. Unless artificial drainage is introduced, a seasonal high water table is apparent at depths between 0 to 12 inches for some time during the months of November to April. Although seepage and runoff from adjacent higher areas may result in local discharge or flash flooding, flooding from streams does not occur.

Wetland description

In the reference state, wetlands on this ecological site typically classify as follows according to the Cowardin system (Cowardin 1979).

System: Palustrine
Class: Forested
Subclass: Broad-leaved deciduous

Lower-level Modifiers
Water Regime: Saturated
Water Chemistry: Fresh, acid
Soil: Mineral

Soil features

Soils on this ecological site are typically moderately deep to very deep, poorly drained Ultisols. They typically have dense clay subsoils or other subsurface materials that impede drainage. The material does not usually have a high shrink-swell potential. Redoximorphic features (iron and/or manganese depletions) are found at depths between 0 to 12 inches and below. Soils are typically deep to very deep, though in some pedons, unweathered or partially weathered bedrock may be found at depths less than 40 inches.

Parent materials are typically residuum overlain by a mantle of slope alluvium washed from higher areas, which can be of variable thickness, or slope alluvium or residuum alone. These materials are usually derived from felsic crystalline rocks, but they can be derived from any type of igneous or metamorphic rock, as long as it is high in silica and low in ferromagnesian minerals.

Reaction in the subsoil is typically strongly acid to very strongly acid (pH 4.5 to 5.5). In the surface layers, reaction varies with land use and management. Under low input or forested conditions, it generally falls somewhere between pH 4.5 and 6.0. Base saturation is less than 35 percent in the subsoil. These soils are usually of mixed minerology and are in a fine particle size family.

Soils on this ecological site have a thermic soil temperature regime, which is characterized by a mean annual soil temperature of 15°C to 22°C and a winter to summer temperature differential of 6°C or more in the subsoil.

Modal soil taxa include: Typic Endoaquults
Modal soil series include: Worsham
Other soils attributed to this ecological site include Pouncey and Forestdale

Figure 8. An illustration of a soil profile belonging to the Worsham series, a representative soil series associated with this ecological site.

Table 8. Representative soil features

Parent material	(1) Slope alluvium – igneous and metamorphic rock (2) Residuum – igneous and metamorphic rock
Surface texture	(1) Sandy loam (2) Fine sandy loam (3) Loam (4) Silt loam
Family particle size	(1) Fine
Drainage class	Poorly drained
Permeability class	Very slow
Depth to restrictive layer	200 – 2,540 cm
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-203.2cm)	20.32 – 27.94 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5 – 10
Subsurface fragment volume <=3" (0-203.2cm)	0 – 10 %
Subsurface fragment volume >3" (0-203.2cm)	Not specified

Table 9. Representative soil features (actual values)

Drainage class	Poorly drained
Permeability class	Slow to very slow
Depth to restrictive layer	130 – 2,540 cm
Soil depth	130 – 200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-203.2cm)	7.62 – 33.02 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5 – 10
Subsurface fragment volume <=3" (0-203.2cm)	0 – 10 %
Subsurface fragment volume >3" (0-203.2cm)	0 %

Ecological dynamics

U.S. National Vegetation Classification (USNVC) associations that are consistent with reference conditions on this ecological site include CEGL007403 Quercus phellos/ Carex (albolutescens, intumescens, joorii) / Climacium americanum. This concept is closely related to the reference community, though it is likely broader than the scope of this ecological site, as it covers both acidic and basic examples (USNVC 2022).

MATURE FORESTS
The reference state supports a closed canopy forest dominated by bottomland oaks. Species diversity is typically very low in these forests. Typically, willow oak (Quercus phellos) is strongly dominant. Other oaks are often present in smaller numbers, including water oak (Quercus nigra), which can appear in slightly drier examples, and overcup oak (Quercus lyrata), which is generally limited to wetter examples. Upland oaks may also be present, usually as scattered individuals, but will generally be more important along the margins of the site. Other species of some consistency include red maple (Acer rubrum), blackgum (Nyssa sylvatica), and sweetgum (Liquidambar styraciflua). Outside of disturbed examples, these species are seldom abundant in the canopy.

In representative examples, the subcanopy and shrub layers tend to be poorly-developed. Vines/lianas are usually important in most examples, and they tend to occupy the lower strata, in lieu of other woody plants. Roundleaf greenbrier (Smilax rotundifolia) is most constant and is usually dominant. Shrub species that may appear occasionally in the understory include several highbush blueberries (Vaccinium fuscatum, V. formosum), possumhaw viburnum (Viburnum nudum), and common buttonbush (Cephalanthus occidentalis), among others.

The herb layer is typically sparse. It is usually dominated by sedges (Carex spp.) and other water-tolerant herbs. Sphagnum and tree mosses are often present, the most common being Lescur's sphagnum (Sphagnum lescurii) and American climacium (Climacium americanum) respectively. The presence of Sphagnum is a good indicator of acidic conditions and lower base saturation, both of which are diagnostic of this ecological site.

DYNAMICS OF NATURAL SUCCESSION AND FIRE ECOLOGY
On this ecological site, successional dynamics are primarily gap driven, with trees regenerating in canopy gaps caused by windthrow, disease and other small-scale natural disturbances that result in individual tree death. Given the small size of most forest patches on this ecological site, as well as its higher susceptibility to windthrow when soils are saturated, it is conceivable that much of the canopy could be lost to a single storm event on rare occasions.

Though fire historically played an important role in the dynamics of natural succession in the past throughout the Piedmont uplands, fire likely played a minor role on this ecological site. Although it undoubtedly burned on occasion, its sheltered landscape position and higher soil moisture content would have insulated it from most fires as they spread through the surrounding uplands. During periods of drought, fire likely crept into the more sheltered low-lying areas, though in all likelihood these fires were less intense and the burning was less complete than in higher and drier areas.

YOUNG SECONDARY FORESTS
In areas that were disturbed in the recent past, through timber harvest or other means, sweetgum (L. styraciflua), red maple (A. rubrum), and other pioneers tend to dominate, along with willow oak (Q. phellos), water oak (Q. nigra), and other bottomland oaks. Disturbed examples are generally accommodated by the USNVC association CEGL007388 Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum, or other similar associations (Nelson 1986; Seymour et al. 2011; Schafale and Weakley 1990; Schafale 2012a, 2012b; Flemming et al. 2021).

SPECIES LIST
Canopy layer: Quercus phellos, Acer rubrum, Nyssa sylvatica, Liquidambar styraciflua, Pinus taeda, Quercus lyrata,

Subcanopy layer: Nyssa sylvatica, Acer rubrum, Liquidambar styraciflua, Diospyros virginiana,

Vines/lianas: Smilax rotundifolia, Campsis radicans,

Shrub layer: Vaccinium fuscatum, Viburnum nudum, Cephalanthus occidentalis, Vaccinium formosum, Eubotrys racemosus

Herb layer - forbs: Climacium americanum, Sphagnum lescurii, Woodwardia areolata, Polytrichum spp., Thuidium spp., Leucobryum spp., Marchantiophyta spp., Mitchella repens, Bidens spp.,

Herb layer - graminoids: Carex spp. (joorii, normalis, albolutescens, lupulina, flaccosperma, typhina, pigra, styloflexa), Chasmanthium laxum, Juncus coriaceus, Juncus tenuis, Juncus spp., Glyceria striata, Rhynchospora spp., Scirpus cyperinus,

State and transition model

Additional community tables

Table 10. Community 2.1 plant community composition

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

Table 11. Community 2.2 plant community composition

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

Table 12. Community 2.3 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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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	08/19/2026
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:**