Ecological site F136XY910AL
Talladega Upland and Pine Mountain Quartzite Ridges, Dry

Last updated: 5/02/2025
Accessed: 08/20/2026

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): 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 CEGL008431 Quercus montana - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum; CEGL003708 Quercus montana - Quercus marilandica; CEGL008437 Pinus palustris - Pinus echinata / Quercus marilandica - (Quercus montana) / Vaccinium pallidum; CEGL004432 Pinus palustris - Pinus echinata / Quercus coccinea - Quercus georgiana. APPLICABLE EPA ECOREGIONS Level III: 45. Piedmont Level IV: 45d. Talladega Upland; 45h. Pine Mountain Ridges (EPA 2013). APPLICABLE USFS ECOLOGICAL UNITS Domain: Humid Temperate Division: Subtropical Ecological province: 231. Southeastern Mixed Forest Ecological sections: 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 high quartzite ridges of the Talladega Uplands and in the Pine Mountain region of Georgia and Alabama, in the thermic soil temperature regime portion of the MLRA. Due to the high weathering resistance of quartzite, these ridges generally sit at the highest elevation on the landscape. Elevation is often considerably higher than the surrounding hills underlain by fine-grained metasedimentary rock, as represented by PX136X00X900, an associated ecological site concept. This landscape setting is particularly exposed to the elements, including sun, wind, ice storms, lightning strikes, and historically fire. Soils on this ecological site are droughty, acidic, nutrient-poor, and usually rocky or gravelly. Water passes through the soil profile quickly and this water is poorly retained. Soils are typically shallow to moderately deep, well drained Ultisols. Base saturation is less than 35 percent in the subsoil. The reference state supports a partially open tree canopy dominated by dry-site oaks, or a mixture of dry-site oaks and pines, with acid-tolerant flora in the understory. Important species include chestnut oak (Quercus montana), blackjack oak (Quercus marilandica), scarlet oak (Quercus coccinea), and pine (Pinus echinata, P. palustris, P. virginiana), with sand hickory (Carya pallida) and Alabama cherry (Prunus alabamensis) being important in the understory. Dominant land uses include wildlife habitat and other land uses meant to conserve threatened plants and animals. Most of the acreage is on public land. ES CHARACTERISTICS SUMMARY • Thermic soil temperature regime • Occurs on Piedmont uplands, on high quartzite ridgetops of the Talladega Uplands and in the Pine Mountain region in Georgia and Alabama • Base saturation: 35 percent in the subsoil • Seasonal high water table: absent within 72 inches of the soil surface • Depth to bedrock is 40 inches, AND the available water storage capacity of the profile (from the soil surface to 80 inches, or to paralithic or lithic bedrock, whichever is shallower) is less than 4 inches • Parent materials: residuum derived from quartzite • Soils: shallow to moderately deep, well drained Ultisols

Associated sites

F136XY900AL	**Talladega Upland and Pine Mountain Acidic High Hills and Ridges, Dry, Metasedimentary** Sits below the central quartzite ridge system, on the surrounding hills of lower elevation underlain by fine-grained metasedimentary rock. Longleaf pine (Pinus palustris) usually makes a larger contribution to the canopy under reference conditions.
F136XY850AL	**Acidic High Hills and Isolated Ridges, Dry-moist** Where associated, it sits below the central quartzite ridge system, on the surrounding hills of lower elevation underlain by fine-grained metasedimentary rock. Longleaf pine (Pinus palustris) usually makes a larger contribution to the canopy under reference conditions. Soils are deeper to bedrock (usually ? 40 inches), with a higher available water storage capacity (? 4 inches). Primary productivity is presumably higher.
F136XY840GA	**Acidic Upland Colluvial Forest** Found in lower landscape positions, in sheltered colluvial areas that receive water from upslope. Moisture-loving plant species, such as American beech (Fagus grandifolia), northern red oak (Quercus rubra), and tuliptree (Liriodendron tulipifera) are dominant in the canopy.

Similar sites

F136XY900AL	**Talladega Upland and Pine Mountain Acidic High Hills and Ridges, Dry, Metasedimentary** Sits below the central quartzite ridge system, on the surrounding hills of lower elevation underlain by fine-grained metasedimentary rock. Longleaf pine (Pinus palustris) usually makes a larger contribution to the canopy under reference conditions.

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.

Figure 4. An approximation of the native range of montane longleaf pine in Alabama and Georgia, symbolized in dark grey (Varner et al. 2003).

Table 5. Dominant plant species

Tree	(1) *Quercus montana* (2) *Carya pallida*
Shrub	(1) *Vaccinium pallidum* (2) *Vaccinium arboreum*
Herbaceous	(1) *Piptochaetium avenaceum* (2) *Solidago odora*

Physiographic features

This ecological site includes high quartzite ridges of the Talladega Uplands and in the Pine Mountain region of Georgia and Alabama (EPA ecoregions 45d and 45h respectively). These steep-sided curvilinear ridges trend northeast-southeast and rise above the surrounding Piedmont plateau. This ecological site includes the backslope, shoulder and summit positions. Due to the high weathering-resistance of quartzite, these ridges generally sit at the highest elevation on the landscape. Elevation ranges from approximately 1000 feet to over 2000 feet at the summit of Cheaha Mountain. Representative locations are gently sloping on ridgetops, to steeply sloping on backslopes, with a representative slope of 15 to 55 percent and a maximum slope of 60 percent.

The geologic substrate is derived from quartzite, an extremely hard, coarse-grained, acidic rock composed of almost pure silica. It formed through sedimentary and metamorphic processes, where sandy sediments were laid down by ocean currents and later altered by the heat and pressure of tectonic uplift.

Note: Along the southwestern boundary of the Piedmont rise the Talladega, Cheaha, and Rebecca Mountains, together constituting a range of low mountains some 50 miles long, adhering to the same southwest-northeast orientation as the Appalachian Highlands. Over the years, there has been some debate as to which physiographic province the Talladega Uplands belong to, be it the Piedmont or the Blue Ridge. Like the Blue Ridge, these mountain outliers straddle the boundary between the Ridge and Valley to the northwest and the Piedmont plateau to the southeast, suggesting a similar geologic origin. Nonetheless, most modern physiographic classification systems place this region within the Piedmont province, in part because of its modest elevation, and in part because of its location many miles removed from the Blue Ridge proper. From an ecological standpoint however, it has much in common with the Blue Ridge, though with ample influence from warmer regions further south (Mohr 1901; Fenneman and Johnson 1946; Craul et al. 2005; Cleland et al. 2007; Wills and Davenport 2016).

Figure 1. A landscape typical of Cheaha soils in the Talladega uplands of Alabama.

Table 6. Representative physiographic features

Hillslope profile	(1) Backslope (2) Shoulder (3) Summit
Landforms	(1) Piedmont > Ridge
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	300 – 580 m

Slope	20 – 60 %
Water table depth	180 – 2,540 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 7. Representative physiographic features (actual ranges)

Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	260 – 670 m
Slope	10 – 60 %
Water table depth	180 – 2,540 cm

Climatic features

On this ecological site, the average mean annual precipitation is 53 inches. On average, the rainiest months occur from February through March, as well as in July. The driest months occur in September and October, as well as in May in some years.

Table 8 Representative climatic features

Frost-free period (characteristic range)	170-200 days
Freeze-free period (characteristic range)	210-240 days
Precipitation total (characteristic range)	1,270-1,420 mm
Frost-free period (actual range)	170-200 days
Freeze-free period (actual range)	200-240 days
Precipitation total (actual range)	1,250-1,470 mm
Frost-free period (average)	180 days

Freeze-free period (average)	220 days
Precipitation total (average)	1,350 mm

- (1) HEFLIN [USC00013775], Heflin, AL
- (2) SYLACAUGA 4 NE [USC00017999], Sylacauga, AL
- (3) WEST POINT [USC00099291], Lanett, GA
- (4) ASHLAND 3 ENE [USC00010369], Ashland, AL

Influencing water features

This ecological site is not influenced by surface or ground water features.

Soil features

Soils on this ecological site are typically shallow to moderately deep, well drained Ultisols. Areas of exposed rock are often present at the surface, as well as areas containing deeper soil pockets. Fragment content, including cobbles, stones, and gravel, is high. Unweathered or partially weathered bedrock is typically found within 40 inches of the surface. Parent materials are typically residuum derived from quartzite.

The Hollis and Cheaha quartzites, from which soils on this ecological site formed, are composed of almost pure silica. Soils that formed in quartzite are notoriously droughty and nutrient-poor. Water passes through very quickly and this water is poorly retained. Representative particle size families include fine-loamy and loamy-skeletal families. The available water storage capacity of the profile is typically 4 inches or less. Reaction is typically strongly acid to very strongly acid (pH 4.5 to 5.5) throughout. Base saturation is less than 35 percent in the subsoil.

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 taxa include: Typic Hapludults, Lithic Hapludults
Modal soil series include: Cheaha, Meansville
Other soils attributed to this ecological site include Thomaston

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

Table 9. Representative soil features

Parent material	(1) Residuum – quartzite
Surface texture	(1) Gravelly, very cobbly sandy loam
Family particle size	(1) Fine-loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid

Depth to restrictive layer	50 – 80 cm
Soil depth	50 – 80 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-203.2cm)	5.08 – 10.16 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 5.5
Subsurface fragment volume <=3" (0-203.2cm)	10 – 30 %
Subsurface fragment volume >3" (0-203.2cm)	0 – 10 %

Table 10. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	40 – 90 cm
Soil depth	40 – 90 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-203.2cm)	2.54 – 12.7 cm

Soil reaction (1:1 water) (0-101.6cm)	4.5 – 10
Subsurface fragment volume <=3" (0-203.2cm)	0 – 30 %
Subsurface fragment volume >3" (0-203.2cm)	0 – 40 %

Ecological dynamics

U.S. National Vegetation Classification (USNVC) associations that are consistent with reference conditions on this ecological site include CEGL008431 Quercus montana - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum, which is typical of ridgetops. Typical of steep, south and west-facing slopes, is CEGL003708 Quercus montana - Quercus marilandica, though in the past, a sparse emergent layer of longleaf and shortleaf pines was common on these warmer and drier exposures, as represented by CEGL008437 Pinus palustris - Pinus echinata / Quercus marilandica - (Quercus montana) / Vaccinium pallidum, or CEGL004432 Pinus palustris - Pinus echinata / Quercus coccinea - Quercus georgiana. Montane longleaf pine communities are still found on these slopes, but most examples are in a somewhat degraded state after decades of fire suppression and other anthropogenic impacts.

The reference community on this ecological site overlaps that of Carter and Floyd (2013) 'Quercus georgiana - Carya pallida / Dichanthelium commutatum' and 'Quercus montana / Cornus florida / Galactia volubilis,' which were found on ridgetops and shoulders, along with 'Pinus palustris / Asimina parviflora / Clitoria mariana,' found on steep backslopes.

MATURE FORESTS
The reference state typically supports a partially open tree canopy that is dominated by dry-site oaks, or a mixture of dry-site oaks and pines, with acid-tolerant flora in the understory. Canopy elements and their proportions vary with aspect, elevation, and landscape position, as well as the history of fire. As noted in several accounts of early reconnaissance (Mohr 1901; Harper 1903, 1905; Howell 1921) the flora associated with the steeper slopes of this region often support species with either Blue Ridge or Coastal Plain affinities, as well as species more typical of the Piedmont. Understory species diversity can be surprisingly high at the macroscale, due at least in part to the regional intersection of the native ranges of many Appalachian and Coastal Plain species here. This can produce a unique complex of vegetation assemblages, with sheltered, north-facing slopes harboring plants aligned with the Blue Ridge, and exposed, south-facing slopes harboring species more common to the Coastal Plain.

On gently sloping ridgetops and north-facing slopes, the canopy is usually strongly dominated by chestnut oak (Quercus montana). Several other oaks are often present, including scarlet oak (Quercus coccinea) and black oak (Quercus velutina), along with scattered pines (Pinus virginiana, P. echinata, P. palustris). In fire suppressed examples, loblolly pine (Pinus taeda) can be abundant, in both the canopy and in the ground layer as seedlings. On the narrower ridges, soils tend to be shallower and trees conspicuously stunted. Broad, flat-topped ridges on the other hand tend to have deeper soils and typically support larger trees.

On the highest ridgetops of the Talladega Uplands, the canopy is dominated by a mixture of chestnut oak (Q. montana) and Virginia pine (P. virginiana), with few other species in the canopy. Wind and ice storms often sculpt the vegetation here. The climate is generally too harsh on these summits for longleaf pine (P. palustris), and it is usually absent. Virginia pine is generally favored instead, though individuals often appear stunted and windswept.

On the steeper slopes, especially those that face south or west and especially those situated at lower elevations, longleaf pine (Pinus palustris) becomes increasingly important in the canopy. Widely-spaced emergent pines often cover these slopes, with shortleaf pine (Pinus echinata) appearing alongside longleaf pine, and with stunted oaks appearing underneath. On dry south and west-facing exposures, oaks often take on a shrub-like appearance and can form dense thickets, with or without a pine overstory. Here, the oak component usually contains a greater proportion of blackjack oak (Quercus marilandica), though on Pine Mountain, these oak thickets are often dominated by Georgia Oak (Quercus georgiana). In the past, longleaf pine was more important on these slopes, but populations have been drastically reduced over the past two centuries through selective logging, tar and turpentine production, and fire exclusion.

In the subcanopy layer, characteristic species include sand hickory (Carya pallida) and Alabama cherry (Prunus alabamensis), which are diagnostic and often abundant. Other common species include blackgum (Nyssa sylvatica), sourwood (Oxydendrum arboreum), Georgia oak (Quercus georgiana), and red maple (Acer rubrum), along with saplings of canopy species.

The shrub layer is dominated by members of the heath family, of which Blue Ridge blueberry (Vaccinium pallidum), farkleberry

(Vaccinium arboreum), and deerberry (Vaccinium stamineum) are most common. In most contemporary examples, the shrub layer is patchy, varying from open, savannah-like areas where shrubs are virtually absent, to a dense, nearly impenetrable undergrowth of shrubs and small trees. On north-facing slopes, the subcanopy and shrub layers can include species such as oakleaf hydrangea (Hydrangea quercifolia), mountain laurel (Kalmia latifolia), common serviceberry (Amelanchier arborea), northern red oak (Quercus rubra), and several species of rhododendron (Rhododendron spp.).

In contemporary examples, the herb layer tends to be sparse. It is often highly suppressed, as a result of canopy closure and leaf litter accumulation due to fire exclusion. Outcrops of rock, which commonly hug the shoulders of the ridges, can support a higher cover of herbaceous plants.

This ecological site is within the historic range of the American chestnut (Castanea dentata), which was reportedly present on ridgetops of the Talladega Uplands, and to a lesser extent on Pine Mountain, prior to the early 1900's. In the years that followed, blight infestation decimated American chestnut populations across the eastern United States. On high quartzite ridgetops of the Talladega Uplands, American chestnut was among the dominant canopy species, along with chestnut oak and Virginia pine. In its place, chestnut oak has come to fill the vacuum, presumably assuming a more dominant role than it had in the past. Occasionally, surviving sprouts of the American chestnut are still observed in these areas, although functionally, the species has been extirpated over the extent of the MLRA.

DYNAMICS OF NATURAL SUCCESSION AND FIRE ECOLOGY
The exposure of this ecological site to the elements makes it particularly susceptible to lightning and wind, as well as occasional ice storms. It is also subject to the uphill spread of fire, which produces burns of increased speed and intensity.

Historically, oak and oak-pine forests of the Southeast were maintained through recurring fire, either naturally-occurring or introduced by humans. Beginning in the early 20th century, a widespread fire suppression campaign resulted in a dramatic decrease in the frequency of fires across the Southeast. These changes gradually altered the vegetation structure and species composition of ecosystems that were dependent on fire for seedling recruitment, reproduction, and maintenance.

In most contemporary examples associated with this ecological site, a thick layer of leaf litter and duff has accumulated on the forest floor, suppressing the growth of understory grasses and forbs. Shrubs, vines, and small trees have often grown up in the understory, further constraining herb growth. Over years of fire exclusion, these characteristics have often progressed to such a degree that conditions are no longer conducive to the spread of fire, a phenomenon known as mesophication. In this scenario, when fire is removed for long periods of time, positive feedbacks result in succession toward forest systems that are less apt to burn.

In the past, the routine use of fire by Native Americans, coupled with periodic lightning-induced fires, constrained the growth of understory shrubs and fire-intolerant trees. These fires maintained a more open canopy and promoted a dense, and often diverse, herbaceous layer that could efficiently carry fire in future burns. While the historic fire return interval is thought to be relatively similar across most of the Southern Piedmont uplands, drier sites were more prone to fire and hence burned more completely and at higher intensities than moister sites.

Vegetation structure was historically more open throughout the Southern Piedmont uplands, but particularly on drier or more exposed sites. Given the more frequent fire regime of the past, canopy cover was likely more open and more heterogeneous than it is presently, and herb cover higher overall, as per historical accounts and witness tree records.

With a dense grassy herb layer, burning would have been more complete and fire more intense than in the current hardwood litter. Under a more regular fire regime, pyrophytic oaks, pines, and other fire-dependent plant species are more competitive, and fire-sensitive species less competitive. Under these conditions, tree species such as red maple (Acer rubrum), which can be abundant in the understory on this ecological site, would have presumably been supplanted by more fire-tolerant tree species. Moreover, tree replacement would have presumably been less dependent on canopy gaps and more on fire than under current, fire-suppressed conditions.

A combination of prescribed burns and selective removals can open up the understory and constrain the growth of fire-intolerant opportunistic species, thereby restoring the health and vigor of forests that evolved under a more regular fire regime (Mohr 1901; Jones Jr. 1974; Wharton 1978; Cowell 1998; Maceina et al. 2000; Govus 2002; Varner and Kush 2003;Craul et al. 2005; Spira 2011; Guyette et al. 2012; Carter and Floyd 2013; Edwards 2013; Vander Yacht et al. 2020; Greenberg et al. 2021; Spooner et al. 2021).

SPECIES LIST
Canopy layer: Quercus montana, Quercus marilandica, Quercus coccinea, Quercus velutina, Quercus stellata, Quercus alba, Pinus echinata, Pinus palustris, Pinus taeda, Pinus virginiana,

Subcanopy layer: Carya pallida, Prunus alabamensis, Nyssa sylvatica, Oxydendrum arboreum, Quercus georgiana, Acer rubrum, Quercus marilandica, Cornus florida, Diospyros virginiana, Prunus umbellata, Carya tomentosa, Robinia hispida, Robinia viscosa, Robinia pseudoacacia, Castanea pumila, Quercus rubra

Vines/lianas: Vitis rotundifolia, Gelsemium sempervirens, Smilax glauca, Smilax rotundifolia, Vitis aestivalis,

Shrub layer: Vaccinium pallidum, Vaccinium arboreum, Vaccinium stamineum, Gaylussacia dumosa, Quercus georgiana, Hypericum hypericoides, Sassafras albidum, Viburnum acerifolium, Asimina parviflora, Kalmia latifolia, Rhododendron canescens, Rhododendron periclymenoides, Rhododendron minus, Hydrangea quercifolia, Symplocos tinctoria, Quercus laevis, Toxicodendron pubescens, Yucca filamentosa, Prunus umbellata, Rhus copallinum, Prunus americana, Rhus glabra, Rubus argutus, Morella cerifera, Amelanchier arborea, Hamamelis virginiana, Rhododendron alabamense, Ribes curvatum, Rhododendron catawbiense, Castanea dentata (stump sprouts)

Herb layer - forbs: Solidago odora, Pityopsis graminifolia, Tephrosia virginiana, Coreopsis major, Clitoria mariana, Lespedeza spp., Baptisia bracteata, Pteridium aquilinum, Viola pedata, Agalinis tenuifolia, Sericocarpus linifolius, Desmodium spp., Aureolaria pectinata, Ionactis linariifolius, Chimaphila maculata, Antennaria plantaginifolia, Galactia volubilis, Chrysopsis mariana, Hypoxis hirsuta, Epigaea repens, Hieracium venosum, Liatris pilosa, Iris verna, Euphorbia pubentissima, Scutellaria elliptica, Stylosanthes biflora, Rhynchosia tomentosa, Trichostema dichotomum, Parthenium integrifolium, Pleopeltis polypodioides, Aristolochia serpentaria, Aureolaria virginica, Pityopsis aspera, Chamaecrista nictitans, Helianthus divaricatus, Helianthus laevigatus, Solidago caesia, Hieracium venosum, Silphium compositum, Amianthium muscitoxicum, Asplenium platyneuron, Cunila origanoides, Pycnanthemum loomisii, Ipomoea pandurata, Aletris farinosa, Phlox amoena, Pycnanthemum incanum var. puberulum, Campanula divaricata, Doellingeria infirma, Brickellia eupatorioides, Silene virginica, Arnoglossum atriplicifolium, Aureolaria flava, Hypopitys monotropa, Eupatorium album, Solidago hispida, Solidago nemoralis, Solidago curtisii, Sericocarpus caespitosus, Manfreda virginica, Angelica venenosa, Lathyrus latifolius, Houstonia longifolia, Polygala incarnata, Lechea racemulosa, Amorpha schwerinii, Orbexilum pedunculatum, Wahlenbergia marginata, Arabis canadensis, Vernonia flaccidifolia, Lysimachia tonsa,

Herb layer - graminoids: Piptochaetium avenaceum, Schizachyrium scoparium, Dichanthelium commutatum, Danthonia sericea, Danthonia spicata, Carex nigromarginata, Andropogon virginicus, Andropogon ternarius, Gymnopogon ambiguus, Gymnopogon brevifolius, Andropogon gerardi, Dichanthelium boscii, Sporobolus clandestinus, Sporobolus junceus, Aristida purpurascens, Scleria triglomerata, Carex pensylvanica

State and transition model

Additional community tables

Table 11. Community 1.1 plant community composition

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

Table 12. Community 1.2 plant community composition

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

Table 13. Community 2.1 plant community composition

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

Table 14. Community 2.2 plant community composition

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

Table 15. 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.

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Approval

Charles Stemmans, 5/02/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	08/20/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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:**