USDA Natural Resources Conservation Service

Ecological site F130BY003WV
Mesic Residuum Cool Aspect

Last updated: 9/07/2018
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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): 130B–Southern Blue Ridge

This MLRA is in North Carolina (51 percent), Tennessee (18 percent), Georgia (17 percent), Virginia (10 percent), and South Carolina (4 percent). It makes up about 16,080 square miles (41,665 square kilometers). It is locally known as the Southern Appalachians. It includes Lenoir, Morganton, Marion, Hendersonville, Waynesville, and Asheville, North Carolina; Gatlinburg, Tennessee; Damascus and Galax, Virginia; Walhalla, South Carolina; and Cleveland, Dahlonega, and Ellijay, Georgia. Interstate 40 crosses the parts of the area in Tennessee and North Carolina. Interstate 77 crosses the part in Virginia. Many national forests are in the area, including the Jefferson, Cherokee, Nantahala, Pisgah, and Chattahoochee National Forests. The Appalachian Trail begins on Springer Mountain in Georgia, near Amicalola State Park. The Great Smoky Mountains National Park is in this MLRA. The Mount Rogers National Recreation Area is in the part of the MLRA in Virginia. The Cherokee Indian Reservation is west of Waynesville, North Carolina.

Classification relationships

This ecosite is found in mountains in MLRA 130B: Southern Blue Ridge

Ecological site concept

Mesic Residuum Cool Aspect occurs below the frigid temperature regime on north-to-east-facing or shaded ridges and side slopes in the Southern Blue Ridge mountains. This site can occur across a wide range of elevations. Vegetation communities can vary but a large percent of the acreage is dominated by the Southern Appalachian Oak Forest (Comer et al. 2003). Some falls into Central and Southern Appalachian Montane Oak Forests and Southern and Central Appalachian Cove Forests. By far most of the acreage in this ecological site is forested, with only a small fraction cleared and used for pasture, ornamentals, and Christmas tree farms.

The exact history of disturbance on this site is unknown. However, to varying degrees it includes fire, logging, fire suppression and invasive exotic forest pests, pathogens and plants. The presence of American chestnut (*Castanea dentata*) sprouts are noted in the Official Series Descriptions (OSDs) for some of the series included in this PES, indicating how important the presence of American chestnut would have been on this site, prior to the chestnut blight.

Associated sites

F130BY004WV	**Mesic Residuum Warm Aspect** This PES occurs on warm aspects.

Similar sites

F130BY004WV	**Mesic Residuum Warm Aspect** There are many similarities between these sites in terms of vegetation at the PES scale. However, multiple ecological sites are likely included. Future projects should identify specific investigation needed to differentiate ecological sites. These PES projects should be considered a work plan for future refinement.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Liriodendron tulipifera*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This MLRA is mainly in the Southern Section of the Blue Ridge Province of the Appalachian Highlands. The southern tip of the MLRA and two protruding areas to the east are in the Piedmont Uplands Section of the Piedmont Province of the Appalachian Highlands. This MLRA consists of several distinct topographic areas, including the Blue Ridge Escarpment on the eastern edge of the area, the New River Plateau on the northern end, interior low and intermediate mountains throughout the MLRA, intermountain basins between the major mountains, and the high mountains making up the bulk of the MLRA. Elevation ranges from about 900 feet (275 meters) at the south and southwest boundaries of the area to more than 6,600 feet (2,010 meters) at the crest of the Great Smoky and Black Mountain ranges.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Upper Tennessee (0601), 46 percent; Kanawha (0505), 13 percent; Middle Tennessee-Hiwassee (0602), 12 percent; Edisto-Santee (0305), 9 percent; Alabama (0315), 8 percent; Ogeechee-Savannah (0306), 6 percent; Pee Dee (0304), 4 percent; Chowan-Roanoke (0301), 1 percent; and Apalachicola (0313), 1 percent. From north to south, the major rivers in this area are the New River in Virginia; the Yadkin, Catawba, French Broad, Little Tennessee, and Hiwassee Rivers in North Carolina; the Saluda, Seneca, Chattooga, and Tugaloo Rivers in South Carolina; and the Toccoa and Coosawattee Rivers in Georgia. The Tugaloo River is a headwater stream of the Savannah River, and the French Broad, Little Tennessee, Hiwassee, and Ocoee Rivers also flow into Tennessee in this area. The Hiwassee River in Tennessee and the Conasauga River in Georgia have been designated National Wild and Scenic Rivers in this area. The Chattooga River (made famous in the motion picture “Deliverance”) in South Carolina is a National Scenic River.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Mountain (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,273–5,307 ft
Slope	8–95%
Water table depth	60 in
Aspect	N, NE, E

Climatic features

The average annual precipitation in this area generally is 36 to 60 inches (915 to 1,525 millimeters), generally increasing with elevation. It is 60 to 90 inches (1,525 to 2,285 millimeters) in southwestern North Carolina and northeastern Georgia and can be as much as 119 inches (3,025 millimeters) on the higher peaks in the MLRA. Much of the precipitation occurs as snow at the higher elevations. The amount of precipitation is lowest in the fall. The average annual temperature ranges from 46 to 60 degrees F (8 to 16 degrees C), decreasing with elevation. The freeze-free period averages 185 days and ranges from 135 to 235 days. The freeze-free period is shorter at

high elevations and on valley floors because of cold air drainage. Microclimate differences resulting from aspect significantly affect the type and vigor of the plant communities in the area. South- and west-facing slopes are warmer and drier than north- and east-facing slopes and those shaded by the higher mountains.

Table 3. Representative climatic features

Frost-free period (average)	164 days
Freeze-free period (average)	186 days
Precipitation total (average)	55 in

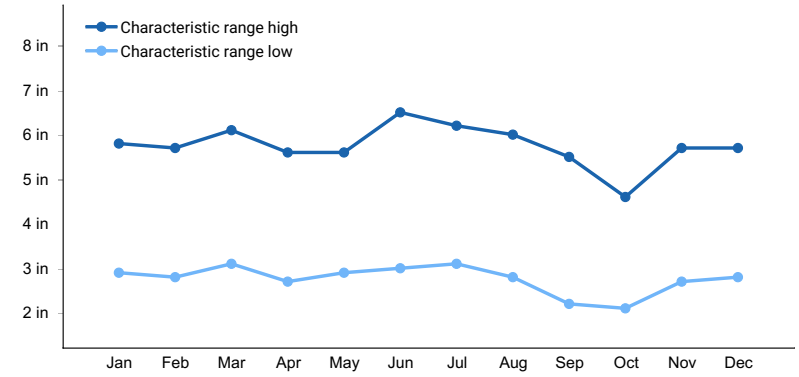


Figure 1. Monthly precipitation range

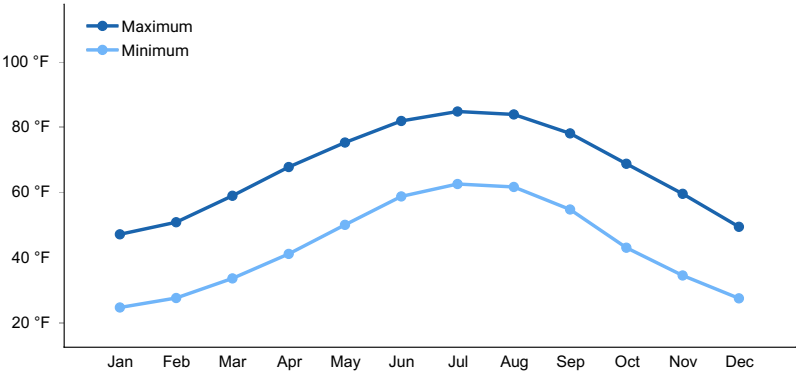


Figure 2. Monthly average minimum and maximum temperature

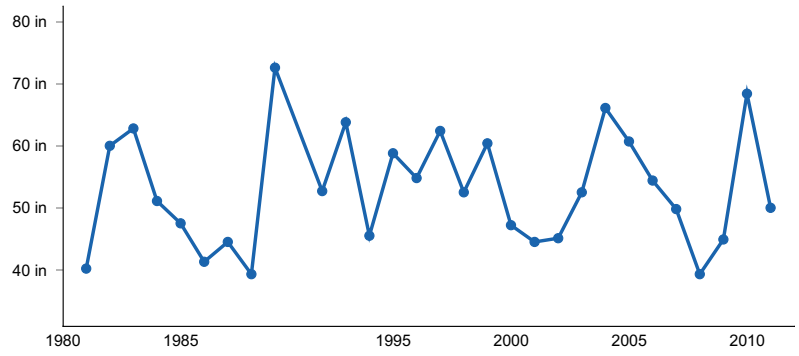


Figure 3. Annual precipitation pattern

Climate stations used

- (1) JASPER 1 NNW [USC00094648], Jasper, GA
- (2) GALAX RADIO WBRF [USC00443267], Galax, VA
- (3) BLAIRSVILLE EXP STN [USC00090969], Blairsville, GA
- (4) BOONE 1 SE [USC00310982], Boone, NC
- (5) MARION 2 NW [USC00315340], Marion, NC

- (6) MURPHY [USC00316001], Murphy, NC

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

Soil series included in this PES are Cheoah, Plott, Trimont, Jeffrey, Porters, Unaka, Soco, and Stecoah. These soils formed on cool, north to east facing ridges and side slopes and those shaded by higher mountains in the Southern Blue Ridge (MLRA 130B).

Table 4. Representative soil features

Parent material	(1) Creep deposits–arkose (2) Residuum–gneiss
Surface texture	(1) Channery fine sandy loam (2) Cobbly loam (3) Flaggy sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to rapid
Soil depth	23–59 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	2.8–8.1 in
Soil reaction (1:1 water) (0-40in)	4.3–5.3
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

A PROVISIONAL ECOLOGICAL SITE is a conceptual grouping of soil map unit components within a major land resource area (MLRA) based on the similarities in response to management. Although there may be wide variability in the productivity of the soils grouped into a provisional site, the soil vegetation interactions as expressed in the state and transition model are similar and the management actions required to achieve objectives, whether maintaining the existing ecological state or managing for an alternative state, are similar. Provisional sites are likely to be refined into more precise group during the process of meeting the APPROVED ECOLOGICAL SITE DESCRIPTION criteria.

This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the approved ecological site description standard, but it has been through a quality control and quality assurance processes to ensure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an approved ecological site description.

The vegetation groupings described in this section are based on the terrestrial ecological system classification developed by NatureServe (Comer et al. 2003). Ecological systems represent recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes, such as fire or flooding. They are intended to provide a classification unit that is readily mappable, often from remote imagery, and readily identifiable by conservation and resource managers in the field.

Provisional Ecological Sites are intended to be very broad and should be considered first approximations based on existing available data. This PES covers multiple ecological systems. The ecological system defined by NatureServe that most likely approximates the reference community of this PES across the largest acreage based on spatial analysis is Southern Appalachian Oak Forest.

This (following) information is provided by NatureServe (www.natureserve.org) and its network of natural heritage member programs, a leading source of information about rare and endangered species, and threatened ecosystems.

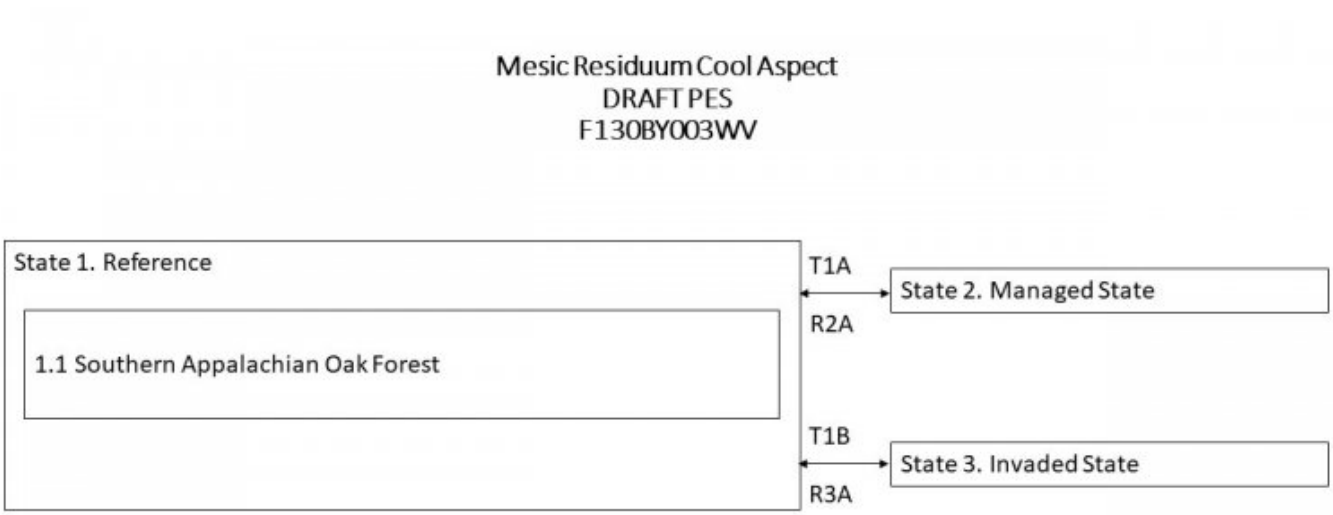
Southern Appalachian Oak Forest: “These forests are dominated by Quercus species, most typically *Quercus alba*, *Quercus coccinea*, Quercus prinus, *Quercus rubra*, and *Quercus velutina* with varying amounts of *Acer rubrum*, Carya spp., *Fraxinus americana*, *Nyssa sylvatica*, and other species. Less typical are stands dominated by other hardwood species, or by *Pinus strobus*. Historically, *Castanea dentata* was a dominant or codominant in many of these communities until its virtual elimination by the chestnut blight fungus (Cryphonectria parasitica) during the early 1900s. Subcanopies and shrub layers are usually well-developed. Some areas (usually on drier sites) now have dense evergreen heath shrub layers of *Kalmia latifolia*, with *Rhododendron maximum* on more mesic sites. Some other areas have deciduous heath-dominated layers, sometimes consisting of Vaccinium spp. or Gaylussacia spp. Herbs, forbs and ferns are usually sparse to moderate in density.

Dynamics: This system is naturally dominated by stable, uneven-aged forests. Extreme wind or ice storms occasionally create larger canopy openings. Natural old-growth forest examples have trees reproducing in small to medium-sized canopy gaps created by the death of individual or small groups of trees. Fire occurred fairly frequently in presettlement times, though there is some dispute whether most of the fires were natural or anthropogenic in origin (Abrams 1992, Delcourt and Delcourt 1997). Fires were usually low-intensity surface fires. The dominant species are fairly fire-tolerant, making most fires non-catastrophic. Fire may be important for favoring oak dominance over more mesophytic tree species within some of the topographic range of this system. Fire also can be expected to have a moderate effect on vegetation structure, producing a somewhat more open canopy and less dense understory and shrub layer than currently seen in most examples. Fire frequency or intensity may be important for determining the boundary between this system and both the more mesic and the drier systems. Virtually all examples have been strongly affected by the introduction of the chestnut blight, which killed all of the *Castanea dentata* trees, eliminating it as a canopy dominant. Past logging affected most occurrences. Regenerated forest canopies are even-aged, or have a more even-aged structure. Extreme wind or ice storms occasionally create larger canopy openings, which may provide particularly good sites for Quercus regeneration. Virtually all examples have been strongly affected by introduction of chestnut blight (Cryphonectria parasitica), which killed *Castanea dentata* trees, eliminating it as a canopy dominant. The introduction, and now widespread establishment, of gypsy moth (Lymantria dispar) that favors oaks as food has also affected these forests by causing widespread mortality of overstory trees depending on topographic position and precipitation amounts around defoliation events. Past logging, and now lack of fire, has affected most occurrences by changing canopies to an even-aged, or more even-aged, structure with an understory of shade-tolerant but fire-intolerant species such as *Pinus strobus*, *Acer rubrum*, and *Acer pensylvanicum*. The removal of *Castanea dentata* from the overstory of these forests is thought to have benefited Carya spp., and their persistence and continued recruitment in contemporary oak-hickory forests may reflect fire exclusion in recent decades. (This) occurs as a large-patch to matrix system. Contiguous areas of tens of thousands of acres once occurred. The oak forests probably make up slightly more than 50% of the landscape in all but the higher elevations of the region. Size of existing occurrences may be strongly affected by separation distances for occurrences. A few remaining occurrences over 10,000 acres are probably present.”

Description Author: M. Schafale, R. Evans, M. Pyne, R. White, S.C. Gawler Version: 29 Apr 2016

USDA-NRCS OSDs for soils included in this PES largely agree, stating that most of these soils are forested with dominant forest types consisting of northern red oak associated with black cherry, sugar maple, American beech, black oak, black birch, yellow birch, yellow-poplar, eastern hemlock, and black locust. In the drier, warmer part of the range, upland oaks, hickory, blackgum, red maple, and eastern white pine are associated. Flowering dogwood, mountain-laurel, silverbell, striped maple, serviceberry, rhododendron, red maple, blueberry, trillium, Solomons seal, and woodfern are common understory species. A small percent of this soil is cleared and used for pasture, ornamentals, and Christmas trees.

State and transition model



T1A Pasture or Christmas tree production

R2A Abandonment (~100 years until reversion to forest); control of non-native plants and pests where needed

T1B Invasion by a number of non-native forest pests and plants

R3A Management of invasive species (mechanical, chemical, biological control, etc.)

State 1
Reference State - Southern Appalachian Oak Forest

The reference state includes one major NatureServe ecological systems as described previously, Southern Appalachian Oak Forest. Oaks now dominate this site where American chestnut once would have been a major species dominant in the canopy. Invasive, non-native forest pests and pathogens such as American chestnut blight, dogwood anthracnose, and European gypsy moth (among others) are really the greatest threat to this PES. Most of it is still currently forested, although a good bit of it has been logged, burned or both in the past.

Community 1.1

State 2
Managed State

Because most of this ecological site is publicly owned, very little private management takes place. However, some acreage is in pasture and Christmas tree production. Forestry may be important on National Forests. Further investigation in the field is needed as future projects are identified to refine this PES into what will most likely become multiple ecological sites.

State 3
Invaded State

Perhaps the greatest challenge to the integrity of this ecological site is the presence of invasive, non-native pests and pathogens. The impact and response varies by species (both of the host and the invader) but often will include combinations of mechanical, biological, chemical and cultural control. Tree breeding programs for genetic resistance and germplasm conservation may be important considerations, especially in front an incoming invasion if reforestation is planned after it passes. It is always best if local genetic material can be used if restoration efforts are attempted.

Transition T1A
State 1 to 2

Conversion to pasture or Christmas tree production

Transition T1B
State 1 to 3

Invasion by any number of non-native forest pests and plants

Restoration pathway R2A
State 2 to 1

Abandonment (~100 years until reversion to forest); control of non-native plants and pests where needed.

Restoration pathway R3A
State 3 to 1

Management of invasive species (mechanical, chemical, biological control, etc.)

Additional community tables

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	
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:**

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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:

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:**