

Ecological site F130BY013WV

Frigid Mountain Bog

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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.

Ecological site concept

This PES is very poorly drained. The depth to the seasonal high water table ranges from 0.5 foot above the surface to 0.5 foot below the surface throughout most of the year. Permeability is moderate to moderately rapid in the organic material and moderately slow to moderately rapid in the mineral horizons. Surface runoff is very slow or ponded. Very little agricultural or commercial use is made of these soils because of the high water table and organic deposits. Most of the areas are in natural vegetation. Overstory vegetation is sparse with Carolina hemlock, red maple and red spruce comprising the major species. Ground cover is commonly consists of sphagnum moss, haircap moss, bulrush, spike-rush, sedges, grays lily, cinnamon fern, violet, meadow sweet, tag alder, silky willow, Carolina geranium, sundew, cranberry, and rhododendron. The hemlock woolly adelgid may impact this site but further investigation is needed.

Associated sites

F130BY001WV	Frigid Residuum
F130BY002WV	Frigid Colluvium

Table 1. Dominant plant species

Tree	Not specified
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 Coosawatee 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 RiverThis 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.

Table 2. Representative physiographic features

Landforms	(1) Bog (2) Cove (3) Drainageway
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	1,220 – 1,490 m
Slope	0 %
Ponding depth	0 – 20 cm

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)	160 days
Freeze-free period (average)	190 days
Precipitation total (average)	1,400 mm

- (1) JASPER 1 NNW [USC00094648], Jasper, GA
- (2) MURPHY [USC00316001], Murphy, NC
- (3) TRYON [USC00318744], Tryon, NC
- (4) GALAX RADIO WBRF [USC00443267], Galax, VA
- (5) GRANDFATHER MTN [USC00313565], Collettsville, NC
- (6) ASHEVILLE [USW00013872], Asheville, NC

Influencing water features

This PES is very poorly drained. The depth to the seasonal high water table ranges from 0.5 foot above the surface to 0.5 foot below the surface throughout most of the year. Permeability is moderate to moderately rapid in the organic material and moderately slow to moderately rapid in the mineral horizons. Surface runoff is very slow or ponded. This site has a Peraquic moisture regime - seasonal high water table at or near the surface throughout the year. Water is supplied mainly by seeps and excessive rainfall.

Soil features

The soil series associated with this site is Longhope. The Longhope series consists of very deep, very poorly drained soils formed in organic material 16 to 30 inches thick overlying loamy mineral deposits. These soils are in broad upland drainageways at high elevations in the Southern Blue Ridge (MLRA 130B). Permeability is moderate to moderately rapid in the organic layers and moderately slow to moderately rapid in the mineral horizons. Slope ranges from 0 to 6 percent. Mean annual precipitation is about 75 inches and mean annual temperature is about 45 degrees F. near the type location.

Depth to the mineral horizons range from 16 to 30 inches. Depth to lithic contact with hard, unweathered bedrock (R) is more than 60 inches. Rock fragments, mostly pebbles or cobbles range from 0 to 50 percent by volume in individual horizons in the mineral layers, generally increasing with depth. Content of mica flakes and dark minerals ranges from few to many in the organic layers and are many in the mineral horizons. The organic layers are extremely acid to strongly acid and the mineral horizons are very strongly acid to slightly acid.

Table 4. Representative soil features

Family particle size	(1) Sandy
Drainage class	Very poorly drained
Permeability class	Moderate to moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	35.31 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 5.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Very little agricultural or commercial use is made of these soils because of the high water table and organic deposits. Most of the areas are in natural vegetation. The official series description characterizes vegetation as follows: "Overstory vegetation is sparse with Carolina hemlock, red maple and red spruce comprising the major species. Ground cover commonly consists of sphagnum moss, haircap moss, bulrush, spike-rush, sedges, grays lily, cinnamon fern, violet, meadow sweet, tag alder, silky willow, Carolina geranium, sundew, cranberry, and rhododendron." A 1994 study of three high elevation southern Appalachian bogs by J. Dan Pittillo confirms this vegetation and describes a bog that occurring in close proximity to this site, so it is likely the same system. Of the three bogs he sampled, this site contained more northern taxa, such as bog bean (*Menyanthes trifoliata*), American honeysuckle (*Lonicera canadensis*), and Cranberry (*Vaccinium macrocarpon*) and so, from a vegetation perspective, can be viewed as different. He also describes occasional red spruce and eastern hemlock (which is probably Carolina hemlock). Additionally, he describes extensive patches of cranberry and scattered maleberry (*Lyonia ligustrina*) overtopping the Spagnum and cinnamon fern (*Osmunda cinnamomea*) herb layer. These are currently seen as stable communities that are largely in native vegetation. They are quite rare and should be protected. Because the reference state largely encompasses this entire site, the State and Transition Diagram reflects that (see below). It is unknown whether or not invasive exotic forest pests, diseases or plants are adversely affecting this site but that should be investigated in future projects. Additionally, it is unknown how much of it may have been converted to other land uses such as hay or pasture. That also requires further field investigation.

State and transition model

Additional community tables

Other references

Comer PJ, Faber-Langendoen D, Evans R, Gawler SC, Josse C, Kittel G, Menard S, Pyne M, Reid M, Schulz K, Snow K, and Teague J. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

Fleming, G. P., P. P. Coulling, K. D. Patterson, and K. Taverna. 2005. The natural communities of Virginia: Classification of ecological community groups. Second approximation. Version 2.1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. [<http://www.dcr.virginia.gov/dnh/ncintro.htm>]

Jenkins, M.A. 2007. Vegetation Communities of the Great Smoky Mountains National Park. *Southeastern Naturalist* 1:35-56.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: April 10, 2018).

Patillo, J.D. 1994. Vegetation of three high elevation southern Appalachian bogs and implications of their vegetational history. *Water, Air and Soil Pollution* 77: 333-348.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296 digital maps and attributes. Available online. Accessed [6/13/2018].

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Available online. Accessed [6/12/2018].

US Geological Survey, Gap Analysis Program (GAP). August 2011. National Land Cover, Version 2.

White, R.D., K.D. Patterson, A. Weakley, E.J. Ulrey, and J. Drake. 2003. Vegetation classification of Great Smoky Mountains National Park. Report submitted to BRD-NPS Vegetation Mapping Program. NatureServe, Durham, NC. 376 pp.

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Approval

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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	09/20/2026
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:
