Ecological site F128XY516WV
Mesic Limestone With Interbedded Sedimentary Uplands

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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): 128X–Southern Appalachian Ridges and Valleys

MLRA 128, partially shown as the gray shaded area on the accompanying figure, falls into the East and Central Farming and Forest Region. This MLRA is in Tennessee (36 percent), Alabama (27 percent), Virginia (25 percent), and Georgia (12 percent). It makes up about 21,095 square miles (54,660 square kilometers).

Most of this MLRA is in the Tennessee Section of the Valley and Ridge Province of the Appalachian Highlands. The thin stringers in the western part of the area are mostly in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands. A separate area of the MLRA in northern Alabama is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. The western side of the area is dominantly hilly to very steep and is rougher and much steeper than the eastern side, much of which is rolling and hilly. Elevation ranges from 660 feet (200 meters) near the southern end of the area to more than 2,400 feet (730 meters) in the part of the area in the western tip of Virginia. Some isolated linear mountain ridges rise to nearly 4,920 feet (1,500 meters) above sea level.

The MLRA is highly diversified. It has many parallel ridges, narrow intervening valleys, and large areas of low, irregular hills. The bedrock in this area consists of alternating beds of limestone, dolomite, shale, and sandstone of early Paleozoic age. Ridgetops are capped with more resistant carbonate and sandstone layers, and valleys have been eroded into the less resistant shale beds. These folded and faulted layers are at the southernmost extent of the Appalachian Mountains. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand, and gravel.

Ecological site concept

This PES occurs primarily on uplands and formed in materials weathered from limestone and interbedded sedimentary rocks in the mesic temperature regime of the southern ridge and valley, MLRA 128.

Virginia Department of Conservation and Recreation (VDCR) classifies this PES under two vegetation descriptions: Montane Mixed Oak / Oak - Hickory Forest and Rich Cove / Slope Forest.

Table 1. Dominant plant species

Tree	(1) *Quercus montana* (2) *Quercus rubra*
Shrub	(1) *Vaccinium*
Herbaceous	Not specified

Physiographic features

This PES occurs primarily on uplands and formed in materials weathered from limestone and interbedded sedimentary rocks in the mesic temperature regime of the southern ridge and valley, MLRA 128.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Ridge (3) Interfluve
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Frequent
Elevation	499–4,116 ft
Slope	2–55%
Water table depth	24–48 in
Aspect	N, S

Climatic features

The average annual precipitation in most of this area is 41 to 55 inches (1,040 to 1,395 millimeters). It increases to the south and is as much as 66 inches (1,675 millimeters) at the highest elevations in east Tennessee and the northwest corner of Georgia. The maximum precipitation occurs in midwinter and midsummer, and the minimum occurs in autumn. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall may occur in winter. The average annual temperature is 52 to 63 degrees F (11 to 17 degrees C), increasing to the south. The freeze-free period averages 205 days and ranges from 165 to 245 days. It is longest in the southern part of the area and shortest at high elevations and at the northern end.

Table 3. Representative climatic features

Frost-free period (average)	149 days
Freeze-free period (average)	176 days
Precipitation total (average)	44 in

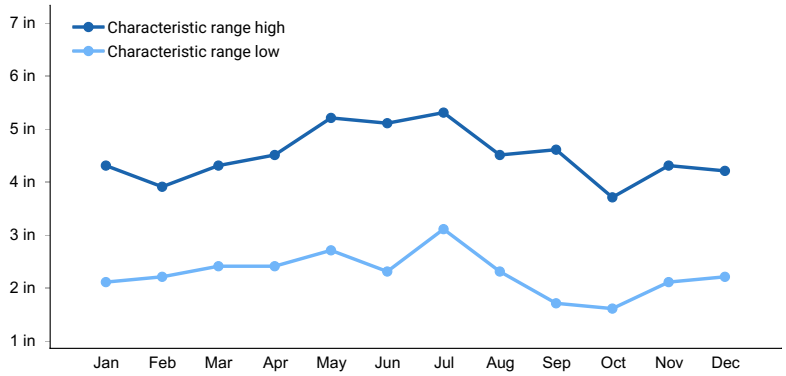


Figure 1. Monthly precipitation range

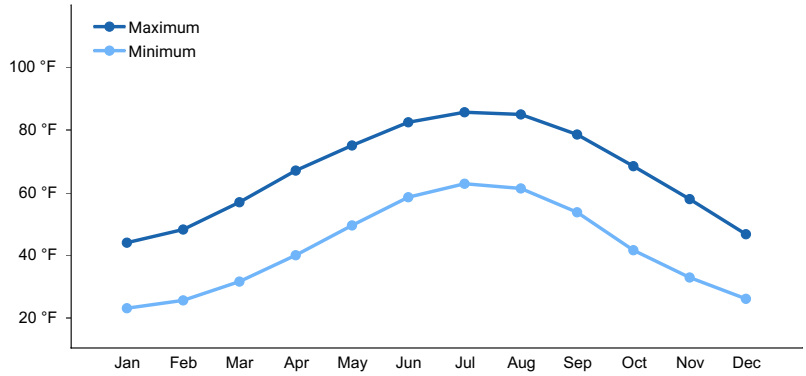


Figure 2. Monthly average minimum and maximum temperature

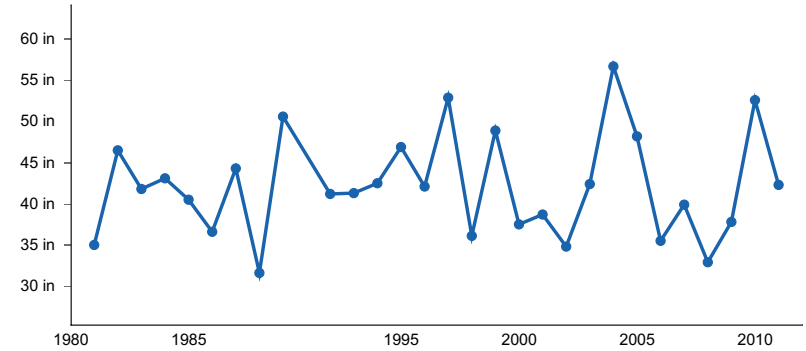


Figure 3. Annual precipitation pattern

Climate stations used

- (1) LEBANON [USC00444777], Lebanon, VA
- (2) TAZEWELL [USC00408868], Tazewell, TN
- (3) RADFORD 3 N [USC00446999], Blacksburg, VA
- (4) BUCHANAN [USC00441121], Buchanan, VA
- (5) WYTHEVILLE 1 S [USC00449301], Wytheville, VA
- (6) ROANOKE RGNL AP [USW00013741], Roanoke, VA

Influencing water features

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

Soil features

These soils formed dominantly on uplands and formed in materials weathered from limestone and interbedded sedimentary rocks. The slopes range from 0 to 80 percent. They are deep and very deep (40 to more than 60 inches) to bedrock, and are moderately well and well drained. The available water capacity of these soils is low to high. The depth to a seasonal high water table ranges from 1.5 to more than 6 feet. Flooding frequency ranges from none to occasional, and they are not subject to ponding. The soil reaction ranges from extremely acid to slightly alkaline (pH from 3.5 to 7.3).

The soil series associated with this site are: Austinville, Bledsoe, Bolton, Duffield, Groseclose, Lodi, Lowell, Marbie, McClung, Pisgah, Poplimento, Slabtown, Timberville, Tumbling, Westmoreland, Wyrick

Parent Material Kind: residuum, alluvium, colluvium

Parent Material Origin: dolomite (dolostone); limestone and dolomite; limestone and sandstone; limestone and shale; limestone, sandstone and shale; limestone, unspecified; metasedimentary, unspecified; quartzite; sandstone and shale; shale and siltstone; shale, unspecified; siltstone, unspecified

Table 4. Representative soil features

Parent material	(1) Residuum–dolomite (2) Alluvium–limestone and sandstone (3) Colluvium–limestone and shale
Surface texture	(1) Cobbly fine sandy loam (2) Gravelly loam (3) Sandy loam
Drainage class	Moderately well drained to well drained
Permeability class	Slow to rapid
Soil depth	18–80 in
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0–3%
Available water capacity (0-40in)	4–8.2 in
Soil reaction (1:1 water) (0-40in)	4.6–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–27%
Subsurface fragment volume >3" (Depth not specified)	0–80%

Ecological dynamics

Virginia Department of Conservation and Recreation (VDCR) classifies this PES under two vegetation descriptions: Montane Mixed Oak / Oak - Hickory Forest and Rich Cove / Slope Forest.

Rich Cove/Slope Forests are characterized by the VDCR as follows:

Characteristic trees include sugar maple (*Acer saccharum*), basswoods (*Tilia americana* var. americana and var. heterophylla), white ash (*Fraxinus americana*), tulip-tree (*Liriodendron tulipifera*), and yellow buckeye (*Aesculus flava*; chiefly south of the James River). Herbaceous growth is lush with spring ephemerals and leafy, shade-tolerant forbs such as blue cohosh (*Caulophyllum thalictroides*), yellow jewelweed (*Impatiens pallida*), large-flowered trillium (*Trillium grandiflorum*), wood-nettle (*Laportea canadensis*), common black cohosh (*Actaea racemosa*), sweet cicely (*Osmorhiza claytonii*), Virginia waterleaf (*Hydrophyllum virginianum*), large-leaf waterleaf (*Hydrophyllum macrophyllum*), large-flowered bellwort (*Uvularia grandiflora*), red trillium (*Trillium erectum*), yellow violets (*Viola pubescens* and Viola pensylvanica), white baneberry (*Actaea pachypoda*), two-leaved miterwort (*Mitella diphylla*), goat's-beard (*Aruncus dioicus* var. dioicus), yellow mandarin (*Prosartes lanuginosa*, = Disporum lanuginosum), showy skullcap (*Scutellaria serrata*), eastern blue-eyed-mary (*Collinsia verna*), Guyandotte beauty (*Synandra hispidula*), glade fern (Homalosorus pycnocarpos), and many others. Compositional variation related to substrate and elevation is complex but partitions convincingly into several major community types. The principal threats to rich cove forests are logging and invasion by shade-tolerant, non-native weeds, especially garlic-mustard (*Alliaria petiolata*).

References: Coulling and Rawinski (1999), Fleming (1999), Fleming and Coulling (2001), Fleming and Moorhead (1996), Fleming and Moorhead (2000), Johnson and Ware (1982), Olson and Hupp (1986), Rawinski et al. (1994), Rawinski et al. (1996), Rheinhardt and Ware (1984).

Full description: http://www.dcr.virginia.gov/natural_heritage/natural_communities/ncTIIa.shtml

Montane Mixed Oak / Oak - Hickory Forests are characterized by the VDCR as follows:

Overstory composition contains mixtures of chestnut oak (Quercus montana), northern red oak (*Quercus rubra*), and white oak (*Quercus alba*). Overstory associates vary with geography and site conditions, but often include sweet birch (*Betula lenta* var. lenta), magnolias (*Magnolia acuminata* and *Magnolia fraseri*), sourwood

(*Oxydendrum arboreum*), hickories (Carya spp.), red maple (*Acer rubrum*), tulip-tree (*Liriodendron tulipifera*), and white pine (*Pinus strobus*). The understories of mixed oak communities usually contain a substantial component of heaths, but also contain many non-ericaceous species such as witch hazel (*Hamamelis virginiana* var. virginiana), striped maple (*Acer pensylvanicum*), maple-leaved viburnum (*Viburnum acerifolium*), mountain holly (*Ilex montana*), buffalo-nut (*Pyrularia pubera*), and hazelnuts (*Corylus cornuta* var. cornuta and *Corylus americana*). The herbaceous component is relatively diverse, but often patchy and composed of both acidophiles and species characteristic of moderately fertile soils, including New York fern (Parathelypteris noveboracensis), galax (*Galax urceolata*), Curtis' goldenrod (*Solidago curtisii*), white wood aster (*Eurybia divaricata*), indian cucumber-root (*Medeola virginiana*), squawroot (*Conopholis americana*), halberd-leaved yellow violet (*Viola hastata*), speckled wood lily (*Clintonia umbellulata*), devil's-bit (*Chamaelirium luteum*), mountain golden-alexanders (*Zizia trifoliata*), and American lily-of-the-valley (Convallaria pseudomajalis).

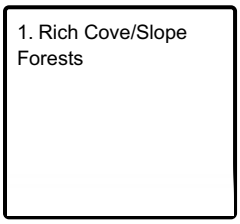
References: Adams and Stephenson (1983), Coulling and Rawinski (1999), Fleming (2007), Fleming and Coulling (2001), Fleming and Moorhead (2000), Johnson and Ware (1982), McCormick and Platt (1980), Rawinski et al . (1994), Rawinski et al . (1996), Stephenson (1982a), Stephenson (1982b), Stephenson and Adams (1991).

Full description: http://www.dcr.virginia.gov/natural_heritage/natural_communities/ncTIIId.shtml

Differences in plant community may be due to rockiness, with the mixed oak-hickory occurring in areas that are drier (more rocky).

State and transition model

Ecosystem states



State 1
Rich Cove/Slope Forests

Other references

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Martin, William H. 1989. Forest patterns in the Great Valley of Tennessee. Journal of the Tennessee Academy of Science 64(3): 137 – 143.

Thornthwaite, Charles W. 1948. An approach toward a rational classification of climate. Geographical Review 38(1): 55-94.

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Contributors

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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):**

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:**