Ecological site F128XY514WV
Mesic Interbedded Sedimentary Uplands

Accessed: 05/19/2024

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 dominantly in residuum on uplands underlain by interbedded sedimentary rocks, with a few areas formed in colluvium over residuum in the southern ridge and valley, MLRA 128.

This site is generally associated with the Rich Cove and Slope Forest classification by NatureServe. However, there may be a dry forest component to this site that is important.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Quercus alba*
Shrub	(1) *Lindera benzoin*
Herbaceous	Not specified

Physiographic features

This PES occurs dominantly in residuum on uplands underlain by interbedded sedimentary rocks, with a few areas

formed in colluvium over residuum in the southern ridge and valley, MLRA 128.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Interfluve (3) Ridge
Flooding duration	Extremely brief (0.1 to 4 hours)
Elevation	91–1,184 m
Slope	7–80%
Water table depth	69 cm
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)	151 days
Freeze-free period (average)	180 days
Precipitation total (average)	1,118 mm

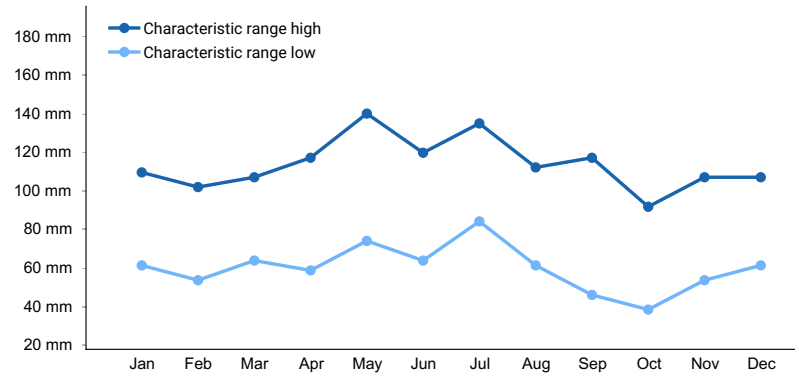


Figure 1. Monthly precipitation range

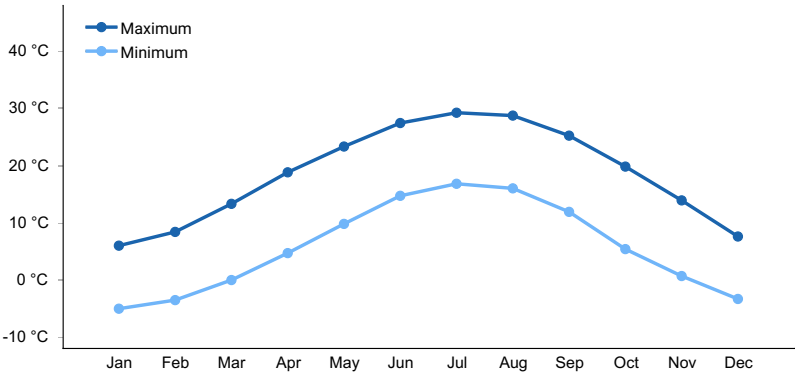


Figure 2. Monthly average minimum and maximum temperature

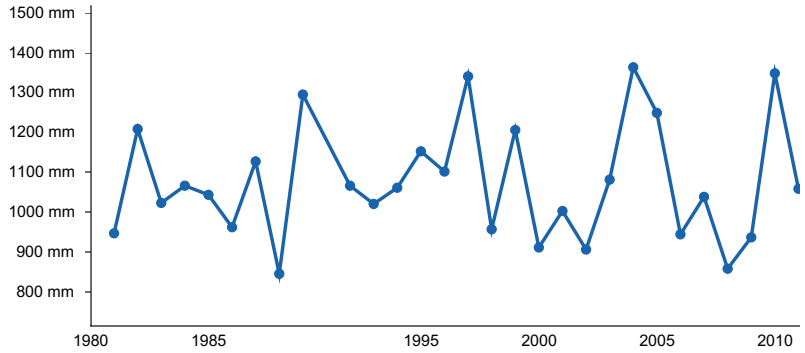


Figure 3. Annual precipitation pattern

Climate stations used

- (1) RADFORD 3 N [USC00446999], Blacksburg, VA
- (2) ROANOKE RGNL AP [USW00013741], Roanoke, VA
- (3) BURKES GARDEN [USC00441209], Tazewell, VA
- (4) ABINGDON 3S [USC00440021], Abingdon, VA
- (5) COVINGTON FLTR PLT [USC00442044], Covington, VA
- (6) ROGERSVILLE 1 NE [USC00407884], Rogersville, TN

Influencing water features

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

Soil features

These soils formed dominantly in residuum on uplands underlain by interbedded sedimentary rocks, with a few areas formed in colluvium over residuum. The slopes range from 2 to 100 percent. They are shallow to very deep (10 to more than 60 inches) to bedrock, and are moderately well to excessively drained. The available water capacity of these soils is very low to moderate. The depth to a seasonal high water table is 3 to more than 6 feet. They are not subject to flooding or ponding. The soil reaction ranges from extremely acid to neutral (pH from 3.5 to 7.3).

The soil series associated with this site are: Armuchee, Berks, Calvin, Chiswell, Clymer, Culleoka, Elliber, Flatwoods, Gilpin, Klinesville, Leck Kill, Lehew, Litz, Montevallo, Newbern, Rayne, Sequoia, Sylvatus, Sylco, Weikert, Wharton, Wurno

Parent Material Kind: Residuum, Colluvium
Parent Material Origin: shale (acid), shale, sandstone and shale, limestone (cherty), schist, sandstone and siltstone, shale and siltstone, sandstone, sandstone and shale, limestone and shale, siltstone, phyllite, slate

Table 4. Representative soil features

Parent material	(1) Residuum–acid shale (2) Colluvium–sandstone and shale
Surface texture	(1) Channery fine sandy loam (2) Extremely channery loam (3) Gravelly sandy loam
Drainage class	Moderately well drained to excessively drained
Permeability class	Rapid
Soil depth	30–203 cm
Surface fragment cover <=3"	0–9%
Surface fragment cover >3"	0–9%

Available water capacity (0-101.6cm)	2.29–17.02 cm
Soil reaction (1:1 water) (0-101.6cm)	4.6–5.8
Subsurface fragment volume <=3" (Depth not specified)	0–75%
Subsurface fragment volume >3" (Depth not specified)	0–90%

Ecological dynamics

This vegetation community on this PES is largely Northeastern Interior Dry Oak Forest, as classified by NatureServe. Hardwoods are most important in forested stands, but a Virginia/pitch pine component is present in places. Oak species characteristic of dry-mesic conditions (e.g., *Quercus rubra*, *Quercus alba*, *Quercus velutina*, and *Quercus coccinea*) and Carya spp. are dominant in mature stands. Quercus prinus may be present but is generally less important than the other oak species. *Castanea dentata* was a prominent tree before chestnut blight eradicated it as a canopy constituent.

NatureServe has also classified vegetation on this site in places as "Southern Ridge and Valley Dry Calcareous Forest". While there may be some species similarity, these sites cannot be classified as calcareous as soils range from slightly acidic throughout to extremely acid. Due to the variation in topography on this site and the range of slopes (0 - 80% in one case, 0 - 100% in another), microsite conditions can affect vegetation. In places, Appalachian cove forests might occur. The VDNH plots also indicate Montane Dry Calcareous Forest and Woodlands in one place. That plot fell on a Berks-Chiswell complex, 55 to 80 percent slopes mapunit. It is unclear whether or not that is due to a spatial error or perhaps is a correct classification of the community, which can occur on some calcareuous shale on interbedded geologies. It could also be due to an error in the soils map. Further investigation into the importance and abundance of this, more calcareous, plant community is needed on this site. For now, it will not be included in the PES description due to lack of data.

The Virginia Department of Natural Heritage plots on these soils fall under the following classifications: Rich Cove / Slope Forest, Montane Dry Calcareous Forest / Woodland, Eastern Hemlock - Hardwood Forest (not confident), and Oak / Heath Forest.

Rich Cove/Slope Forests are characterized by the VA-DNH 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

Oak-Heath forests were described in two VA-DNH plots that fell on Weikert-Berks complex, 15 to 45 percent slopes

Weikert-Rock outcrop complex, 45 to 70 percent slopes mapunits. This group of oak-dominated forests is prominent on xeric, infertile upland sites in every physiographic province of Virginia, and is wide-ranging in the Appalachians and adjacent provinces outside of the Commonwealth. Fire plays an important role in this community. A full description can be found here: http://www.dcr.virginia.gov/natural_heritage/natural_communities/ncTIIIe.shtml

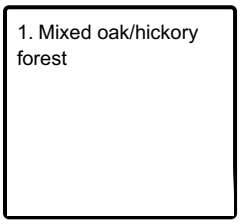
Because the VA-DNH was not confident about the classification on the one plot with Eastern Hemlock - Hardwood Forest, it will not be discussed in this PES description at this point in time. It may be revisited in the future, based on newly available information, including field visits.

A majority of this site has been converted to pasture/hay and cropland, especially on southern exposures. Principal crops are corn, wheat, oats, barley, Christmas trees and hay.

DeSelm had a few vegetation plots on Berks-Weikert soil map units in Union County, TN. He classified them as mixed mesophytic beech-buckeye-mixed oak, white oak-sugar maple, and beech-tulip poplar. This description does not match either NatureServe classification but does mesh well with the VDNH classification of Rich Cove/Slope Forest. That is probably the appropriate classification for this PES but could change with aspect. It is unclear whether or not the soil maps reflect change in aspect on this PES. That will have to be investigated in the field. There may be a dry forest component to this site that is important. DeSelm would have located his plots where there were the biggest trees so, his work might not correctly reflect the importance of aspect.

State and transition model

Ecosystem states



State 1
Mixed oak/hickory forest

In general, the reference community for these sites is mixed hardwood forests with oaks dominating. Species recorded on pedon description sheets for Berks and Weikert series include chestnut oak, hickory spp., northern red oak, white oak, and shortleaf pine.

Other references

DeSelm, Hal. 1989 – 2009. Natural Terrestrial Vegetation of Tennessee (Vegetation Plot Data). Unpublished raw data. http://treeimprovement.utk.edu/DeSelmData/DataDSC.htm

Griffith, G.E., Omernik, J.M., and Azevedo, S.H., 1997, Ecoregions of Tennessee: Corvallis, Oregon, U.S. Environmental Protection Agency EPA/600R-97/022, 51 p.

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.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Vegetation plot data. 2015. Retrieved from: http://vegbank.org/vegbank/index.jsp

Vegetation community description. 2015.

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:**

   _____

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):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
