Ecological site F128XY513WV
Mesic Limestone And Dolomite 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 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 or colluvium on uplands underlain by limestone or dolomite. Mixed hardwood forests will be most common. On limestone substrates where rock outcrop occurs or where soils are more shallow, barrens have been noted. They are an important conservation concern on this site.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Fagus grandifolia*
Shrub	(1) *Rhamnus caroliniana*
Herbaceous	Not specified

Physiographic features

This PES occurs dominantly in residuum or colluvium on uplands underlain by limestone or dolomite.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Interfluve (3) Ridge
Elevation	140 – 1,000 m
Slope	0 – 60 %
Water table depth	150 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)	150 days
Freeze-free period (average)	180 days
Precipitation total (average)	1,140 mm

- (1) TAZEWELL [USC00408868], Tazewell, TN
- (2) PENNINGTON GAP [USC00446626], Pennington Gap, VA
- (3) PULASKI 2 E [USC00446955], Pulaski, VA
- (4) STAFFORDSVILLE 3 ENE [USC00448022], Pearisburg, VA
- (5) ROANOKE RGNL AP [USW00013741], Roanoke, VA
- (6) SALTVILLE 1N [USC00447506], Saltville, VA

Influencing water features

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

Soil features

These soils formed dominantly in residuum or colluvium on uplands underlain by limestone or dolomite. The slopes range from 0 to 80 percent. They are moderately deep to very deep (20 to more than 60 inches) to bedrock, and range from moderately well to somewhat excessively drained. The available water capacity of these soils ranges from low to high. The depth to a seasonal high water table is more than 6 feet. They are not subject to flooding or ponding. The soil reaction ranges from extremely acid to moderately alkaline (pH from 3.5 to 8.4).

The soil series associated with this site are: Bland, Brushy, Caneyville, Chilhowie, Claiborne, Clarksville, Colbert, Collegedale, Dewey, Dunmore, Faywood, Frederick, Fullerton, Hagerstown, Minvale, Poynor, Talbott, and Watahala.

Parent Material Kind: Residuum, Colluvium, and Creep deposits.

Parent Material Origin: Limestone, Limestone (cherty), Limestone interbedded with sandstone, siltstone, or shale, Argillaceous limestone, and Limestone and dolomite.

Table 4. Representative soil features

Parent material	(1) Residuum – cherty limestone (2) Colluvium – argillaceous limestone
Surface texture	(1) Channery clay (2) Gravelly loam (3) Extremely gravelly sandy loam
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Rapid
Soil depth	60 – 140 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	4.06 – 19.05 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 6.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 80 %
Subsurface fragment volume >3" (Depth not specified)	0 – 60 %

Ecological dynamics

Two of the three available vegetation classification plots from the Virginia Department of Natural Heritage (VA-DNH) have the community listed as Dry-Mesic Calcareous Forest. The third available plot classifies it under Limestone / Dolomite Barren. The calcareous vegetation associated with this PES may be due to different mapunit components. This will be investigated in field projects in the future. For the purposes of this provisional description, we assume the vegetation is similar to the thermic equivalent ESD. That vegetation community is characterized by white oak and pignut hickory in the overstory. This may change under the mesic temperature regime. Ecological dynamics are also interpreted to be similar. Future field investigations are needed.

DeSelm had numerous vegetation plots on these soil map units in the following TN Counties: Claiborne, Bradley, Union, Loudon and Campbell. The plot in Loudon County is likely not representative since that is in the thermic temperature regime. Although he describes multiple forest types, the most common is dominated by white oak or other oaks (chestnut oak, mixed oak, black oak, etc.) with other oaks or hickories as strong co-dominants. In one case, he describes barren with probably planted schizachyrium, which was probably not in a natural state for this site. However, it does match the Natural Heritage data describing a barren. He also describes a few plots with calcareous oak species. That may be due to some spatial error or because (most likely) he was sampling on a bluff. On bluffs, where dolomite is exposed, more calcareous species can gain a foothold. He also describes hemlocks on bluffs. This has been observed in Anderson County, Tennessee close to the thermic/mesic temperature delineation. The presence of hemlock in that case is likely due to the proximity to Norris lake and the Clinch river. Sinkholes and other karst features may also be important on this site. Field investigations are needed.

In general this PES occurs as a mixed hardwood forest dominated by oak, hickory, beech and maple. In some cases, on areas with shallow soils, barrens can occur. Anthropogenic barrens are probably also important and native warm season grasses have been noted to occur. Grazing is an important past land-use. Depending on location, timber production could also be important.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
tuliptree	LITU	*Liriodendron tulipifera*	Native	18.3-33.5	30-35	33-50.8	–
red maple	ACRU	*Acer rubrum*	Native	4-8.8	5-25	7.6-10.2	–
black oak	QUVE	*Quercus velutina*	Native	15.2-39.6	5-25	55.9-96.5	–
white oak	QUAL	*Quercus alba*	Native	15.2-42.7	20-25	45.7-73.7	–
sugar maple	ACSA3	*Acer saccharum*	Native	4-22.9	5-10	17.8-40.6	–
southern red oak	QUFA	*Quercus falcata*	Native	12.2-30.5	5-10	68.6	–
pignut hickory	CAGL8	*Carya glabra*	Native	4-4.6	0-5	0-5.1	–
American beech	FAGR	*Fagus grandifolia*	Native	4-7.6	0-5	10.2-12.7	–
black cherry	PRSE2	*Prunus serotina*	Native	7.6-10.7	0-5	0-22.9	–
sourwood	OXAR	*Oxydendrum arboreum*	Native	6.1-13.4	1-2	20.3-25.4	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Forb/Herb					
American cancer-root	COAM	*Conopholis americana*	Native	0-0.2	0-1
bedstraw	CRUCI2	*Cruciata*	Native	0-0.2	0-1
Canadian woodnettle	LACA3	*Laportea canadensis*	Native	0-0.2	0-1
ticktrefoil	DESMO	*Desmodium*	Native	0-0.3	0-1
Shrub/Subshrub					
mapleleaf viburnum	VIAC	*Viburnum acerifolium*	Native	0-1.4	0-5
Carolina buckthorn	FRCA13	*Frangula caroliniana*	Native	0-0.6	0-1
bursting-heart	EUAM9	*Euonymus americanus*	Native	0-0.3	0-1

Tree					
American beech	FAGR	*Fagus grandifolia*	Native	1.4-4	5-10
sugar maple	ACSA3	*Acer saccharum*	Native	0.2-4	1-10
pawpaw	ASTR	*Asimina triloba*	Native	1.4-4	2-5
black cherry	PRSE2	*Prunus serotina*	Native	0-0.2	1-2
white oak	QUAL	*Quercus alba*	Native	0.2-0.3	0-2
pignut hickory	CAGL8	*Carya glabra*	Native	0-0.3	1-2
sassafras	SAAL5	*Sassafras albidum*	Native	0-1.4	0-2
tuliptree	LITU	*Liriodendron tulipifera*	Native	0.2-0.3	0-1
red maple	ACRU	*Acer rubrum*	Native	0-0.2	0-1
sweetgum	LIST2	*Liquidambar styraciflua*	Native	0.3-0.6	0-1
flowering dogwood	COFL2	*Cornus florida*	Native	0-0.3	0-1
blackgum	NYSY	*Nyssa sylvatica*	Native	0-1.4	0-1
eastern redbud	CECA4	*Cercis canadensis*	Native	0.2-0.3	0-1
common serviceberry	AMAR3	*Amelanchier arborea*	Native	0-0.6	0-1
Vine/Liana					
muscadine	VIRO3	*Vitis rotundifolia*	Native	0-0.3	0-10
greenbrier	SMILA2	*Smilax*	Native	0-0.6	0-1
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	0.2-1.4	0-1
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0-0.6	0-1
saw greenbrier	SMBO2	*Smilax bona-nox*	Native	0-0.6	0-1

Table 8. Community 1.2 plant community composition

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

Table 9. Community 2.1 plant community composition

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

Table 10. Community 3.1 plant community composition

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

Table 11. Community 3.2 plant community composition

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

Table 12. Community 3.3 plant community composition

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

Other references

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Contributors

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Approval

Marji Patz, 5/22/2025

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	09/17/2026
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:**

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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:

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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:**
