USDA Natural Resources
Conservation Service

Ecological site F122XY026TN
Clayey Limestone Terraces And Uplands

Last updated: 5/14/2025
Accessed: 12/17/2025

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): 122X–Highland Rim and Pennyroyal

MLRA 122 is in Tennessee (47 percent), Kentucky (43 percent), Indiana (7 percent), and Alabama (3 percent). It makes up about 21,530 square miles (55,790 square kilometers).

SOILS:
Many of the soils in this MLRA are Udalfs. The moderately deep to very deep, well drained, clayey soils formed in limestone residuum. They are dominantly in rolling to steep areas of the “Outer Basin” (Mimosa, Braxton, Gladdice, and Hampshire series) and the undulating to hilly areas of the “Inner Basin” (Talbott and Bradyville series). The most agriculturally productive soils are the very deep, well drained, clayey or loamy soils that formed in alluvium and/or loess over alluvium or limestone residuum in nearly level to undulating areas (Armour, Cumberland, Harpeth, Lomond, and Maury series). The less extensive soils generally are moderately well drained to somewhat poorly drained and formed in loamy or clayey alluvium and/or residuum (Byler, Capshaw, Colbert, and Tupelo series). This MLRA has a significant acreage of Mollisols. Shallow or moderately deep, well drained, clayey Udolls (Ashwood and Barfield series) formed in limestone residuum dominantly in rolling to steep areas. Very shallow, well drained, clayey Rendolls (Gladeville series) formed in limestone residuum dominantly in undulating to rolling areas of the “Inner Basin.” Very deep, well drained or moderately well drained Udolls (Arrington, Egam, Lynnville, and Staser series) and somewhat poorly drained or poorly drained Aquolls (Agee, Godwin, and Lanton series) formed in loamy or clayey alluvium derived from limestone on flood plains. Most of the remaining soils on flood plains are moderately well drained or well drained Udepts (Lindell and Ocana series). Udults are of small extent in this area. Most are very deep, well drained, and loamy and formed in gravelly colluvium or colluvium and the underlying residuum on steep hillsides (Dellrose soils). Rock outcrops

are common on uplands.

BIOLOGICAL RESOURCES:
This area supports mixed oak forest vegetation. White oak, black oak, northern red oak, and some scarlet oak are the dominant tree species. Shagbark hickory, bitternut hickory, pignut hickory, and mockernut hickory also occur. Oak, blackgum, flowering dogwood, sassafras, Virginia pine, pitch pine, and shortleaf pine grow mostly on ridgetops.

(Excerpt from 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.)

Classification relationships

Scientific Name: Southern Interior Low Plateau Dry-Mesic Oak Forest, Unique Identifier: CES202.898

Ecological site concept

The communities described in this provisional document reflect plant communities that are likely to be found on these soils and have not been field verified. This PES describes hypotheses based on available data of many different scales and sources and has not been developed utilizing site-specific ecological field monitoring. This PES does not encompass the entire complexity or diversity of these sites. Field studies would be required for detailed conservation planning or to develop a comprehensive and science-based restoration plan.

Ecological Dynamics
Only two tree species can be selected for entry into the ESIS/EDIT database as dominants; however, multiple tree species may be co-dominant on these sites and it will vary depending on aspect, soil depth, seed sources, management, and disturbance history.

State 1. Phase 1.1. Forestland
southern red oak (*Quercus falcata*)- white oak (*Quercus alba*) / hophornbeam (*Ostrya virginiana*) - sassafras (*Sassafras albidum*) / mayapple (*Podophyllum peltatum*)

Most areas of these soils are used to grow corn, soybeans, wheat and hay or utilized for pasture.
Very few areas are still in native forest.

State: 2. Phase 2.1. Pasture
Most common plant species dominant: *Schedonorus arundinaceus* (tall fescue)

Pasture plant species are dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals. Individual site and soil characteristics, along with management activities, will influence production levels.

State: 3. Phase 3.1. Transitional Field
eastern red cedar (*Juniperus virginiana*) - tulip poplar (*Liriodendron tulipifera*) / sumac (Rhus spp.) - berries (Rubus spp.) / fescue (*Schedonorus arundinaceus*)

State 4: Phase 4.1. Abandoned Croplands
Plant species dominant:
henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)

Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be predominate followed by grasses, shrubs and finally, pioneers trees.

State 5: Phase 5.1. Cropland
Dependent upon seeding and management. Most common crops are corn and soybeans.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

Similar sites

F122XY027TN	**Loamy Terraces** - Loamy Terraces

Table 1. Dominant plant species

Tree	(1) *Quercus falcata* (2) *Quercus alba*
Shrub	(1) *Ostrya virginiana* (2) *Sassafras albidum*
Herbaceous	(1) *Podophyllum peltatum*

Physiographic features

These sites are found predominately on upland hills and, in some counties, on terraces.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Terrace
Runoff class	Low to very high

Flooding duration	Extremely brief (0.1 to 4 hours) to long (7 to 30 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	350–1,700 ft
Slope	2–60%
Water table depth	24–36 in
Aspect	Aspect is not a significant factor

Climatic features

Climate
The average annual precipitation in this area is 43 to 63
inches (1,090 to 1,600 millimeters), increasing to the south. The maximum precipitation occurs in winter and early in spring, and the minimum occurs in fall. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall may occur in winter. The average annual temperature is 52 to 60 degrees F (11 to 16 degrees C), increasing to the south. The freeze-free period averages 210 days and ranges from 185 to 235 days. The longer freeze-free periods occur in the more southerly parts of the area.

(Excerpt from 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.)

Table 3. Representative climatic features

Frost-free period (characteristic range)	162-169 days
Freeze-free period (characteristic range)	192-204 days
Precipitation total (characteristic range)	51-57 in
Frost-free period (actual range)	159-171 days
Freeze-free period (actual range)	188-206 days
Precipitation total (actual range)	51-59 in
Frost-free period (average)	165 days
Freeze-free period (average)	197 days
Precipitation total (average)	54 in

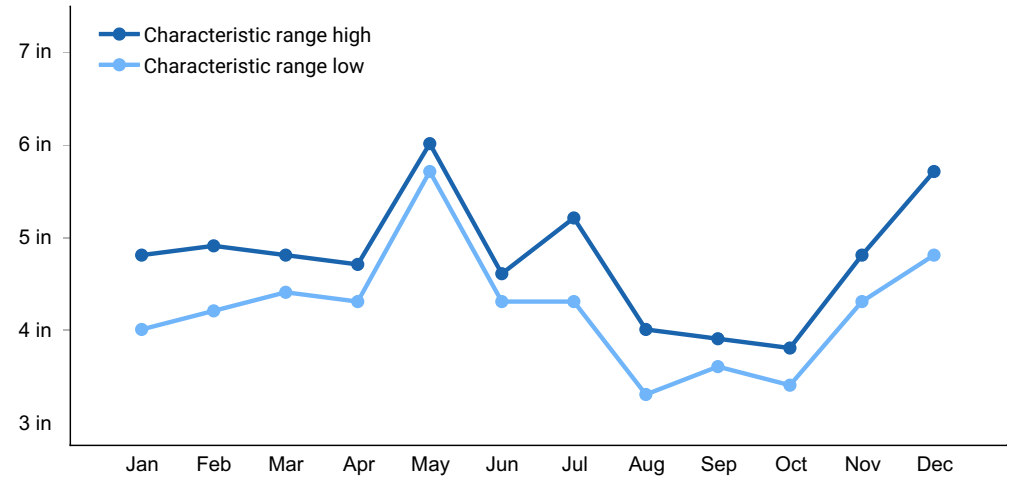

Figure 1. Monthly precipitation range

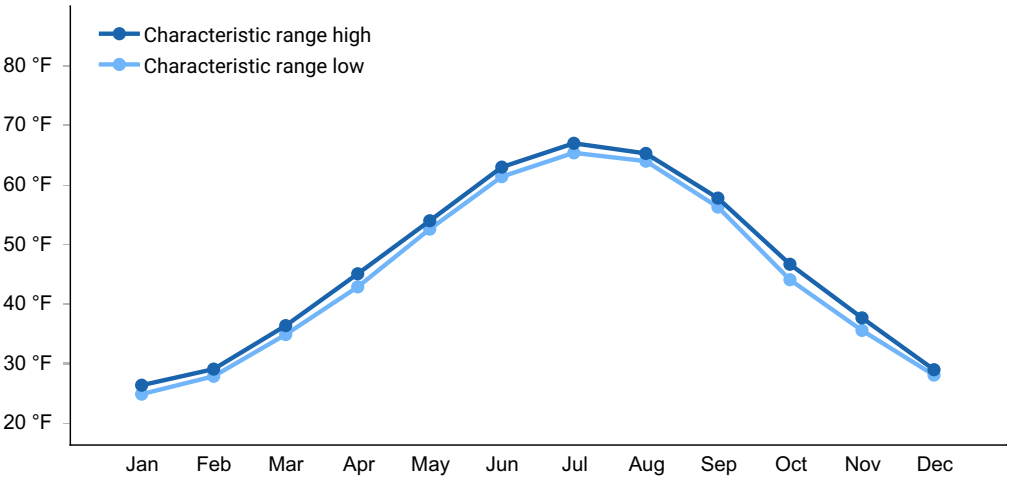

Figure 2. Monthly minimum temperature range

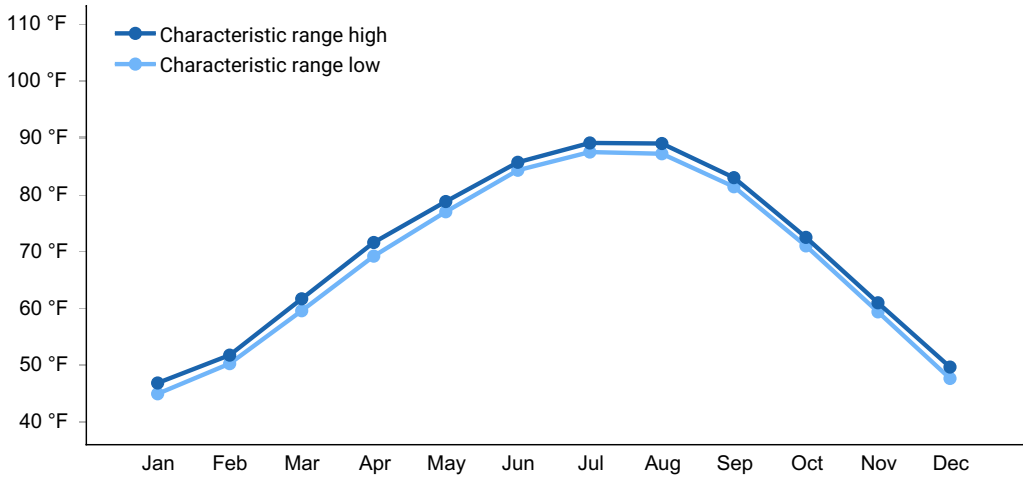

Figure 3. Monthly maximum temperature range

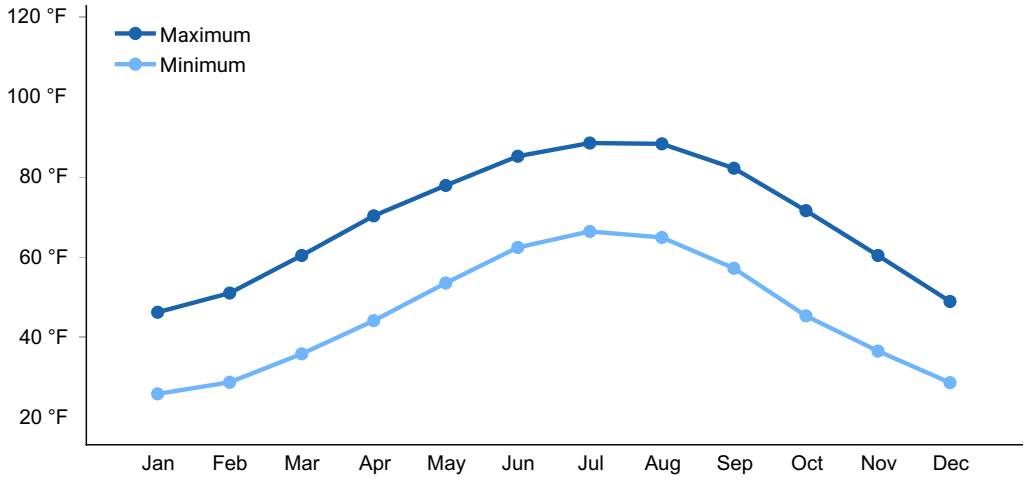

Figure 4. Monthly average minimum and maximum temperature

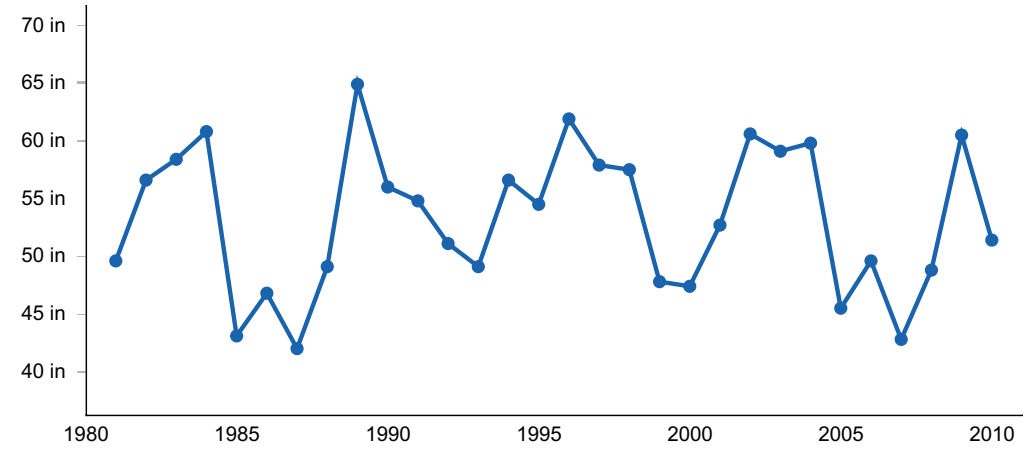

Figure 5. Annual precipitation pattern

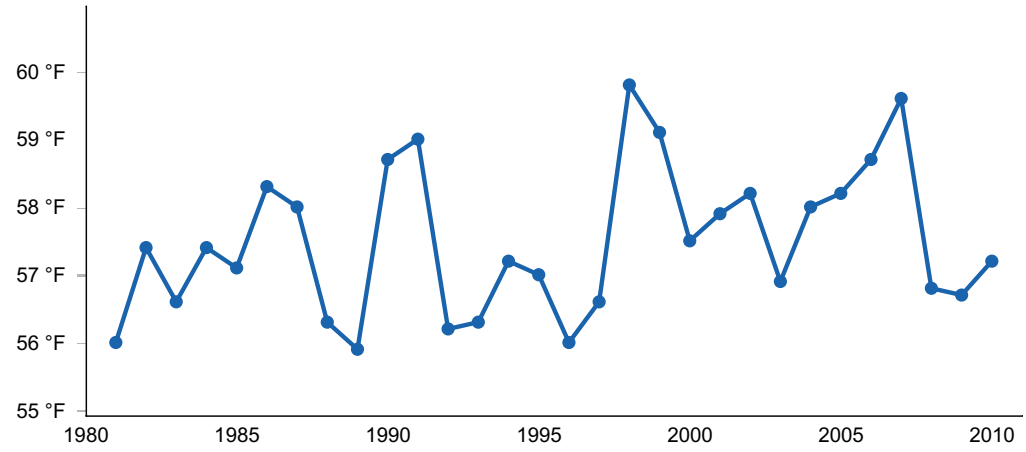

Figure 6. Annual average temperature pattern

Climate stations used

- (1) GREENSBURG [USC00153430], Greensburg, KY
- (2) COOKEVILLE [USC00402009], Cookeville, TN
- (3) SCOTTSVILLE [USC00157215], Scottsville, KY
- (4) CLARKSVILLE WWTP [USC00401790], Clarksville, TN

- (5) WAYNESBORO [USC00409502], Waynesboro, TN

Influencing water features

These sites have no influencing water features.

Soil features

Soils in this group are clayey limestone.

Table 4. Representative soil features

Parent material	(1) Residuum–cherty limestone (2) Alluvium–sandstone and shale
Surface texture	(1) Silt loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4.5–7.7 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5–6
Subsurface fragment volume <=3" (Depth not specified)	0–27%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

26 – Clayey Limestone Terrace and Uplands
Thermic
MLRA 122

Mapunits in this preliminary grouping: Cookeville, Cumberland, Decatur, Dewey, Fullerton, Sengtown, Waynesboro, Wolftever. Future ESD development may result in adding or removing soil mapunits from this initial group.

It should be noted that the communities described in this provisional document reflect plant communities that are likely to be found on these soils and have not been extensively field verified. This document also does not encompass the entire complexity or diversity possible. Additional field studies or ESD development is needed for conservation planning uses.

The PES reference community was determined by information gathered from NASIS, NRCS county soil surveys (trees on site, common trees) and Glendon Smalley's U.S. Forest Service technical report SO-43 entitled, "Classification and Evaluation of Forest Sites on the Eastern Highland Rim and Pennyroyal."

NRCS county soil surveys listed trees on site as southern red oak, white oak, black oak, pignut hickory, white hickory, "hybrid" hickory, tulip poplar, and pines.

NASIS trees-on-site showed a predominance of southern red oak and white oak on these sites. Other trees listed in NASIS include black oak, northern red oak, black walnut, tulip poplar, multiple pines, eastern red cedar, and flowering dogwood.

The following information is from Glendon Smalley's U.S. Forest Service technical report SO-43 entitled, "Classification and Evaluation of Forest Sites on the Eastern Highland Rim and Pennyroyal."

Description of Landtype 14:
Hilly Redlands-North Aspect
Dominant soils include Fullerton, Decatur, Dewey, Waynesboro
Vegetation: Southern red oak, scarlet oak, white oak, chestnut oak, black oak, red maple, hickories, yellow-poplar, northern red oak, and eastern redcedar. Occasional. American beech, elms, white ash, black walnut, black cherry, bur oak, sugar maple, loblolly pine, shortleaf pine, hackberry, and Virginia pine. Flowering dogwood, persimmon, sassafras, sourwood, eastern hophornbeam, wild plum, and red mulberry are common in the understory.

Description of Landtype 15:
Hilly Redlands-South Aspect
Dominant soils include Fullerton, Decatur, Dewey, Waynesboro
Vegetation: southern red oak, scarlet oak, white oak, hickories, black oak, and eastern redcedar. Occasional trees: chestnut oak, bur oak, post oak, red maple, elms, hackberry, white ash, sugar maple, black walnut, black cherry, shortleaf pine, Virginia pine, and loblolly pine. Flowering dogwood, persimmon, sassafras, sourwood, eastern hophornbeam, wild plum, winged elm, and vacciniums are common in the understory.

Description of Landtype 16:
Redland Slopes-North Aspect
Dominant soils: Cumberland Decatur, Dewey, Waynesboro
Vegetation: White oak, black oak, northern red oak, hickories, yellow-poplar, red maple, and elms. Occasional southern red oak, scarlet oak, American beech, bur oak, black walnut, black cherry, white ash, sugar maple, eastern redcedar, shortleaf pine, Virginia pine, and loblolly pine. Flowering dogwood, persimmon, sassafras, sourwood, red mulberry, eastern hophornbeam, wild plum, winged elm, and vacciniums are common in the understory.

Description of Landtype 17:
Redland Slopes-South Aspect
Dominant soils: Cumberland Decatur, Dewey, Waynesboro
Black oak, white oak, scarlet oak, northern red oak, southern red oak, hickories, and eastern redcedar; occasional chestnut oak, post oak, bur oak, yellow-poplar, red maple, elms, American beech, white ash, black walnut, black cherry, sugar maple, shortleaf pine, Virginia pine, and loblolly pine. Flowering dogwood, persimmon, eastern hophornbeam, sassafras, wild plum, winged elm, and vacciniums are common in the understory,

Description of Landtype 4:
Cherty North Slopes
Dominants soils include Fullerton
Vegetation -White oak, black oak, southern red oak, yellow-poplar, northern red oak, hickories, blackgum, red maple; occasional scarlet oak, chestnut oak, chinkapin oak, post oak, elms, white oak, black walnut, black cherry, eastern redcedar, American beech, sugar maple, shortleaf pine, loblolly pine, and Virginia pine, Flowering dogwood, sassafras, persimmon, eastern hophornbeam, eastern redbud, devil’s club, euonymuses, hydrangea, and vacciniums are in the understory.

Description of Landtype 5:
Cherty South Slopes
Dominants soils include Fullerton
Vegetation: White oak, scarlet oak, chestnut oak, chinkapin oak southern red oak, post oak, hickories, black oak, eastern redcedar, loblolly pine, Virginia pine, and shortleaf pine. Occasional trees include red maple, elms, blackgum, and yellow-poplar. Eastern redbud, eastern hophornbeam, flowering dogwood, vacciniums, euonymuses, winged elm, sassafras, and wild plum are in the understory.

Ecological Dynamics
Only two tree species can be selected for entry into the ESIS/EDIT database as dominants; however, multiple tree species may be co-dominant on these sites and it will vary depending on aspect, soil depth, seed sources, management, and disturbance

history.

State 1. Phase 1.1. Forestland
southern red oak (*Quercus falcata*)- white oak (*Quercus alba*) / hophornbeam (*Ostrya virginiana*) - sassafras (*Sassafras albidum*) / mayapple (*Podophyllum peltatum*)

Most areas of these soils are used to grow corn, soybeans, wheat and hay or utilized for pasture.
Very few areas are still in native forest.

State: 2. Phase 2.1. Pasture
Most common plant species dominant: *Schedonorus arundinaceus* (tall fescue)

Pasture plant species are dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals. Individual site and soil characteristics, along with management activities, will influence production levels.

Many species of grass, both warm and cool season, are available and suitable for these sites. Common forage species include tall fescue, orchard grass, Kentucky bluegrass, Johnson grass, timothy, and various species of clover. Depending on levels of management, dozens of weed species may be present.

Management of pasture sites should follow conservation planning standards and protocols which include watershed protection, soil health, and adequate forage species.

Transitioning this state to a reference condition would require long-term timber stand improvement practices to control non-native vegetation and manage for desired hardwood species.

State: 3. Phase 3.1. Transitional Field
eastern red cedar (*Juniperus virginiana*) - tulip poplar (*Liriodendron tulipifera*) / sumac (Rhus spp.) - berries (Rubus spp.) / fescue (*Schedonorus arundinaceus*)

A mix of species including eastern red cedar and pines would be found on these sites. Seedlings and saplings of Acer spp., (especially red maple, sugar maple, and boxelder), tulip poplar (*Liriodendron tulipifera*), sassafras (*Sassafras albidum*), black locust (*Robinia pseudoacacia*), hackberry (*Celtis occidentalis*), Quercus spp., and Carya spp. may be present depending on disturbance levels and adjacent seed sources. The shrub layer would likely include poison ivy, sumac, blackberries, dewberries, multiflora rose, Carolina rose, and other successional species.

Tree regeneration on these sites will depend on the severity and duration of disturbance, soil characteristics, adjacent plant communities and seed sources, post-disturbance management inputs, presence or absence of continued site disturbances (grazing, fire,

timber cutting), slope, and aspect.

Transitioning this state to a reference condition would likely require timber stand improvement practices to control non-native vegetation and manage for desired tree species.
State 4: Phase 4.1. Abandoned Croplands
Plant species dominant:
henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)

Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be predominate followed by grasses, shrubs and finally, pioneers trees.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

State 5: Phase 5.1. Cropland
Dependent upon seeding and management. Most common crops are corn and soybeans.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

TO VALIDATE THE INFORMATION IN THIS PROVISIONAL ECOLOGICAL SITE DESCRIPTION FUTURE FIELD WORK IS NEEDED. This will include detail field inspections and monitoring and multi-site data collection including medium to high intensity vegetation sampling, soil correlations, and an in-depth analysis of gathered data. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce a document to be utilized for accurate on-site conservation planning.

State and transition model

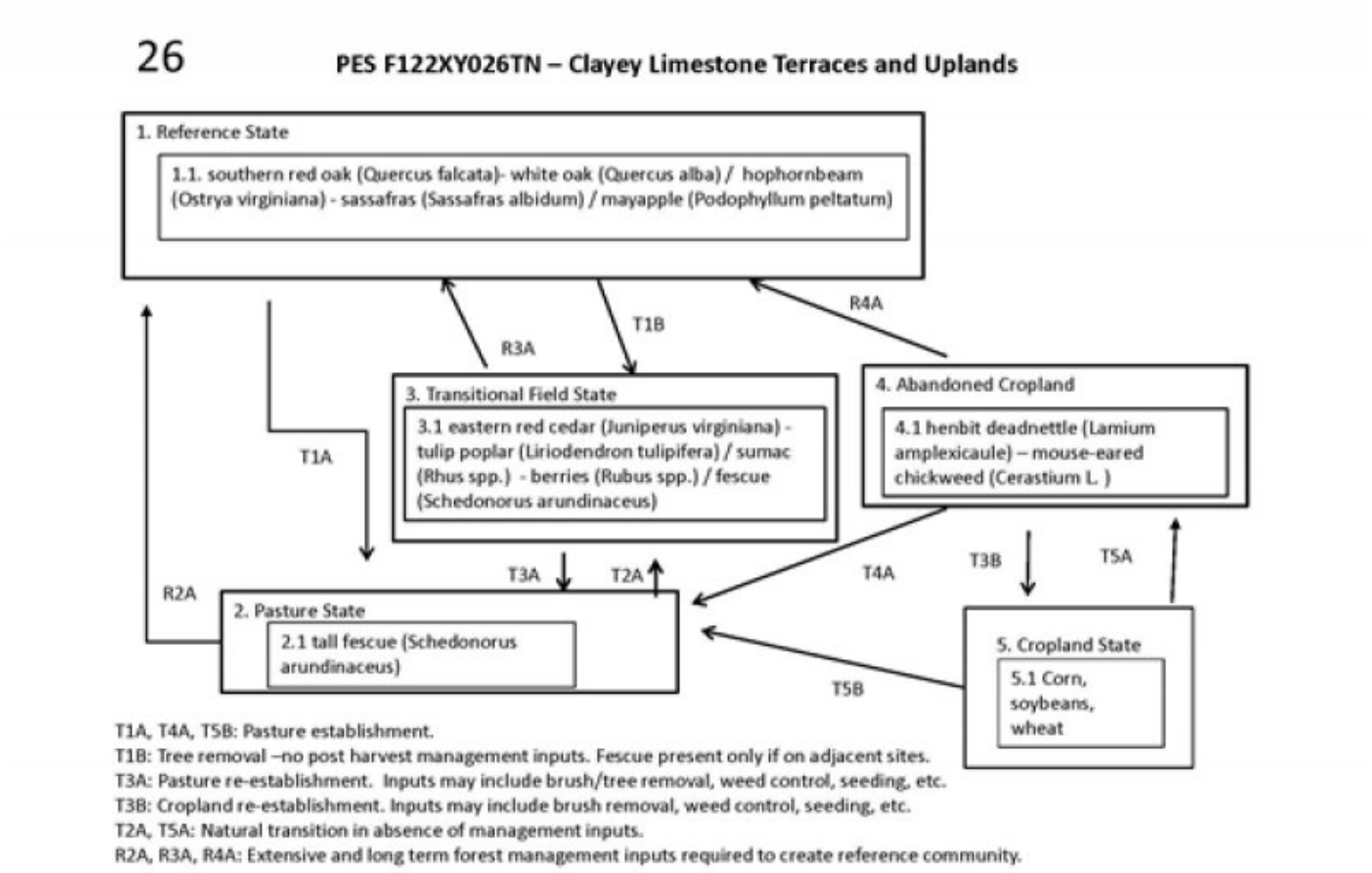

Figure 7. 26-Clayey Limestone Uplands

Inventory data references

Site Development and Testing Plan
Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

Other references

Abrams, M.D. 1992. Fire and the development of oak forests. BioScience, 42: 346–353.

Abrams, M.D. and G.J.Nowacki. 2008. Native Americans as active and passive promoters of mast and fruit trees in the eastern USA. The Holocene 18.7. pp. 1123-1137.

Alexander, H.D. and M.A. Arthur, D.L. Loftis, and S.R. Green. 2008. Survival and growth

of upland oak and co-occurring competitor seedlings following single and repeated prescribed fires. Forest Ecology and Management 256: 1021–1030.

Anderson, Michelle D. 2003. *Juniperus virginiana*. In: Fire Effects Information System, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, and Fire Sciences Laboratory.

Anderson, R.C. & Brown, L.E. 1983. Comparative effects of fire on trees in a Midwestern savannah and an adjacent forest. Bulletin of the Torrey Botanical Club, 110: 87–90.

Baskin, J.M., C.C. Baskin, and E.W. Chester. 1994. The Big Barrens of Kentucky and Tennessee: Further observations and considerations. Castanea 59:226-254.

Black, B.A., Abrams, M.D. 2001. Influence of Native Americans and surveyor biases on metes and bounds witness tree distribution. Ecology. 82:2574-2586.

Braun, E.L. 1950. Deciduous forests of Eastern North America. Blakinston Co., Pennsylvania. Reprinted in 2001 by Blackburn Press, Caldwell, New Jersey.

Carmean. W.H. 1970. Site quality for eastern hardwoods. The silviculture of oaks and associated species. USDA Forest Service Research paper, Northeast. Forest Exp. Sta., Upper Darby, PA, NE-144: 36-56.

Carmean, W.H. 1971. Soil-site relationships of the upland oaks. Oak Symp. Proc. USDA Forest Service Research Paper. Northeast. Forest Exp. Sta., Upper Darby, PA. p. 23-29.

Carmean, Willard H.; Hahn, Jerold T.; Jacobs, Rodney D. 1989. Site index curves for forest species in the eastern United States. Gen. Tech. Rep. NC-128. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station.

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

Curtis, J. T., 1959. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Virginia. .

Denevan, W.M. 1992. The pristine myth: the landscape of the Americas in 1492. Annals of the Association of American Geographers, 82 (3), 369–385.

DeSelm, H. R. 1994. Tennessee barrens. Castanea 59(3):214-225.

Faber-Langendoen, D., editor. 2001. Plant communities of the Midwest: Classification in an ecological context. Association for Biodiversity Information, Arlington, VA. 61 pp. + appendix (705 pp.).

Fenneman, N.M. 1917. Physiographic subdivisions of the United States. Proceedings of the National Academy of Sciences of the United States of America. Vol. 3(1). pp. 17 -22.

Gleason, H.A. and A. Cronquist. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. 2nd edition. The New York Botanical Garden, Bronx.

Griffith, G. E., J. M. Omernik, and S. H. Azevedo. 1998. Ecoregions of Tennessee. (Two-sided color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, VA. Scale 1:940,000.

Kartesz, J.T., The Biota of North America Program (BONAP). 2011. North American Plant Atlas (http://www.bonap.org/MapSwitchboard.html). Chapel Hill, N.C. [maps generated from Kartesz,
J.T. 2010. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)].

Keever, C. 1978. A study of the mixed mesophytic, western mesophytic, and oak chestnut regions of the eastern deciduous forest including a review of the vegetation and sites recommended as potential natural landmarks. Millersville State College, Pennsylvania.

Kuchler, A.W. 1964. Potential natural vegetation of the conterminous United States. Spec. Publ. 36 New York, NY: American Geographical society.

Land Resource Regions and Major Land Resource Areas of the United States. United States Department of Agriculture Soil Conservation Service Handbook 296. Dec. 1981. 87-88.

Landfire [Landfire National Vegetation Dynamics Database]. 2007a. Landfire National Vegetation Dynamics Models. Landfire Project, USDA Forest Service, U.S. Department of Interior. (January - last update)

Lawless, P. J., Baskin, J. M. and C. C. Baskin. 2006. Xeric Limestone Prairies of Eastern United States: Review and Synthesis. The Botanical Review 73(4): 303–325. The New York Botanical Garden.

Lunt, I.D. & Spooner, P.G. 2005. Using historical ecology to understand patterns of biodiversity in fragmented agricultural landscapes. Journal of Biogeography, 32:1859–1873.

McNab, W.H. and P.E. Avers. 1994. Ecological subregions of the United States. U.S.

Forest Service. Prepared in cooperation with Regional Compilers and the ECOMAP Team of the Forest Service.

Miller, J.H., Chambliss, E.B. and Loewenstein, N.J. 2010. A field guide for the Identification of Invasive Plants in Southern Forests. US Forest Service Southern Research Station, General Technical Report SRS-119.

Parker, G.R. 1989. Old-growth forests of the Central Hardwood Region. Nat. Areas J. 9(1): 5-11.

Quarterman, E. and R.L. Powell. 1978. Potential ecological/geological natural landmarks on the Interior Low Plateaus. pp. 7-73. U.S. Department of the Interior, Washington, D.C. Quarterman,

Stritch, L.R. 1990. Landscape-scale restoration of barrens-woodland within the oak-hickory forest mosaic. Restoration & Management Notes 8: 73-77.

Somers, P., L. R. Smith, P. B. Hamel, and E. L. Bridges. 1986. Preliminary analyses of plant communities and seasonal changes in cedar glades of middle Tennessee. ASB Bulletin 33:178-192.

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service. Soil surveys of Tennessee counties in MLRA 123.

U.S. Department of Agriculture-Forest Service, Agriculture Handbook 654, Silvics of North America.

Zollner, D., M.H. MacRoberts, B.R. MacRoberts, & D. Ladd. 2005. Endemic vascular plants of the Interior Highlands, U.S.A. Sida 21:1781-1791.

Websites:

Cleland, D. T., J. A. Freeouf, J. E. Keys, Jr., G. J. Nowacki, C. A. Carpenter, and W. H. McNab. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States.
GTR-WO-76C-1. http://fsgeodata.fs.fed.us/other_resources/ecosubregions.html

Ecosystem classification of the United States; Ecological Subregions of the United States.1994. Compiled by W. Henry McNab, Peter E. Avers, et al. Forest Service, U.S. Department of Agriculture [USDA], Washington, DC., USA: http://www.fs.fed.us/land/pubs/ecoregions

Environmental Mapping and Assessment Program (EMAP). 2004. Washington, DC., USA:

http://www.epa.gov/docs/emap/

Geospatial Data Gateways: https://gdg.sc.egov.usda.gov/

Landfire: http://www.landfire.gov

NatureServe. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. http://www.natureserve.org/explorer

Nashville Basin Limestone Glade and Woodland, Ecological System Comprehensive Report
http://http://explorer.natureserve.org/servlet/NatureServe?searchSystemUid=ELEMENT_GLOBAL.2.723170

Official Soil Series Descriptions, USDA-NRCS:
https://soilseries.sc.egov.usda.gov/osdname.asp

Silvics of North America, US Forest Service.
http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

USDA Plants: http://plants.usda.gov/java/

U.S. Geological Survey (USGS), Center for Biological Informatics (CBI) 2004. U.S. Department of the Interior: http://biology.usgs.gov/cbi

Vascular Plant Image Library: http://botany.csdl.tamu.edu/FLORA/imaxxara.htm

Vegetation Mapping Program, National Vegetation Classification Standard. 2004. Vegetation Classification Standard, Vegetation Subcommittee, U.S. Geological Survey [USGS; U.S. Department of the Interior], Reston, Virginia, USA.
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation

Vegbank: www.vegbank.org

Web Soil Survey, USDA-NRCS: http://websoilsurvey.nrcs.usda.gov/app/

Woodland Wildflowers of Illinois:
http://www.illinoiswildflowers.info/woodland/woodland_index.htm

U.S. Department of Agriculture, Forest Service. 1994. Ecosystem classification of the United States; Ecological Subregions of the United States. Compiled by W. Henry McNab, Peter E. Avers, et al., Washington, DC. http://www.fs.fed.us/land/pubs/ecoregions

U.S. Department of the Interior. 2004. Vegetation Mapping Program, National Vegetation

Classification Standard. http://biology.usgs.gov/npsveg

U.S. Geological Survey (USGS), Center for Biological Informatics (CBI) 2004. U.S. Department of the Interior. http://biology.usgs.gov/cbi

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	12/17/2025
Approved by	Matthew Duvall
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:**