USDA Natural Resources
Conservation Service

Ecological site F123XY005TN
Floodplains

Last updated: 9/06/2018
Accessed: 05/11/2025

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): 123X–Nashville Basin

123—Nashville Basin
This area is entirely in Tennessee (fig. 123-1). It makes up about 5,625 square miles (14,580 square kilometers). The cities of Nashville, Franklin, Hendersonville, Columbia, Murfreesboro, and Shelbyville are in this area.

Physiography
Most of this area is in the Nashville Basin Section of the Interior Low Plateaus Province of the Interior Plains. A small part of the northeast corner and the western and southern fourth of the area are in the Highland Rim Section of the same province and division. Most of the outer part of the Nashville Basin is deeply dissected and consists of steep slopes between narrow, rolling ridgetops and narrow valleys. The inner part of the basin is dominantly undulating and rolling. In many areas the land surface is deeply pitted by limestone sinks, and outcrops of limestone are almost everywhere. Elevation generally is about 650 feet (200 meters), but it is 1,000 to 1,325 feet (305 to 405 meters) on isolated hills and is as low as 450 feet (135 meters) in some of the more deeply cut stream channels.

Geology
The bedrock geology in this area consists of Ordovician limestone exposed by geologic erosion of the top of the Nashville Dome (a high part of the Cincinnati Arch) throughout this area. Sinkholes are common in the limestone and are either open to the subsurface or are covered by soils and colluvium that have collected in the depressions formed on the land surface above the sinkhole. Younger rocks occur as a rim just outside this area. Surficial deposits include loess on the less eroded landforms and alluvium along the rivers and streams.

Source: 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: South-Central Interior Large Floodplain. Unique Identifier: CES202.705

Scientific Name: South-Central Interior Small Stream and Riparian
Unique Identifier: CES202.706

Ecological site concept

This PES grouping is in the thermic temperature regime. Soils are alluvium and on or near floodplains in MLRA 123 in central Tennessee. Historic vegetation was a variety of water tolerant hardwood tree species.

Most of these sites have historically been disturbed either through logging, grazing, other agricultural practices or development. Currently a large portion of these soils are used as croplands. The native vegetation is a mixed hardwood forest of oaks, tulip poplar, birch, sycamore, beech, elm, hickory, and maples. Species vary depending on flooding regime, available soil moisture, past disturbance severity, ongoing disturbances, and other soil properties. On soils with poorer drainage, the natural vegetation would be water tolerant oaks, sweet gum, willows, cottonwood, elm, ash, alder and maples.

Many areas are highly disturbed by decades of agricultural practices and urban development. Natural hydrology on many sites have been altered through ditching or tiling greatly altering the vegetation of present sites.

Future ESD development will result in further refinement of this group into multiple ESDs based on soil characteristics and flooding regimes.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Liriodendron tulipifera*
Shrub	(1) *Asimina triloba* (2) *Lindera benzoin*
Herbaceous	(1) *Boehmeria cylindrica* (2) *Athyrium filix-femina*

Physiographic features

These ecological sites are found throughout MLRA 123 mainly on floodplains.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Runoff class	Low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	300–900 ft
Slope	0–5%
Ponding depth	0–15 in
Water table depth	11–60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate:
The average annual precipitation in this area is 48 to 57 inches (1,220 to 1,450 millimeters). The maximum precipitation occurs in midwinter and early in spring, and the minimum occurs in autumn. Rainfall primarily occurs during high-intensity, convective thunderstorms. Some snow occurs in winter, but it does not remain on the ground for long periods.
The average annual temperature is 56 to 60 degrees F (14 to 16 degrees C). The freeze-free period averages 210 days and ranges from 195 to 230 days. The longer freeze-free periods occur in the southern part of the area.

Source: 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 (average)	170 days
Freeze-free period (average)	194 days
Precipitation total (average)	55 in

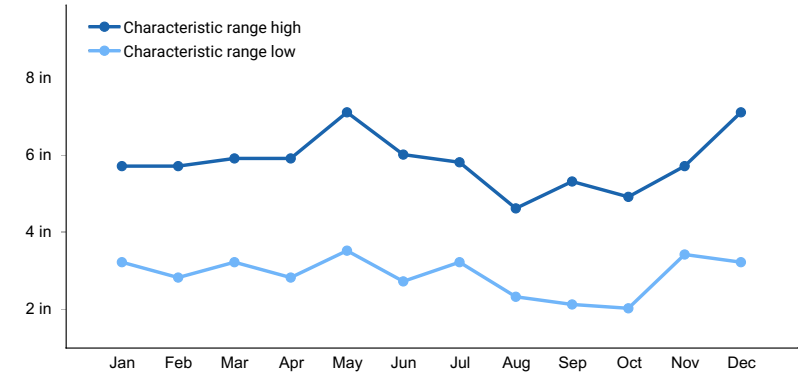


Figure 1. Monthly precipitation range

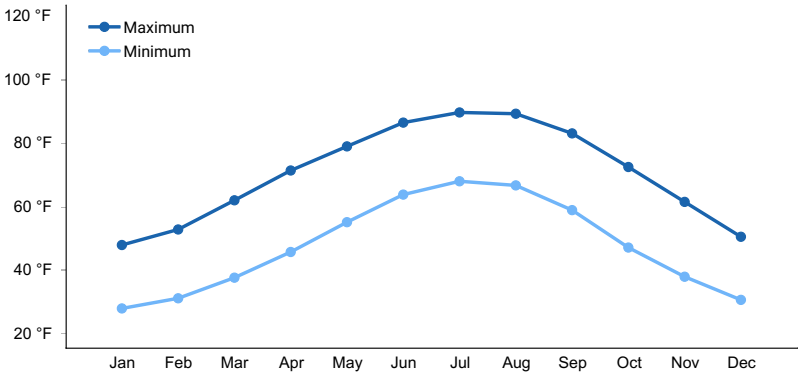


Figure 2. Monthly average minimum and maximum temperature

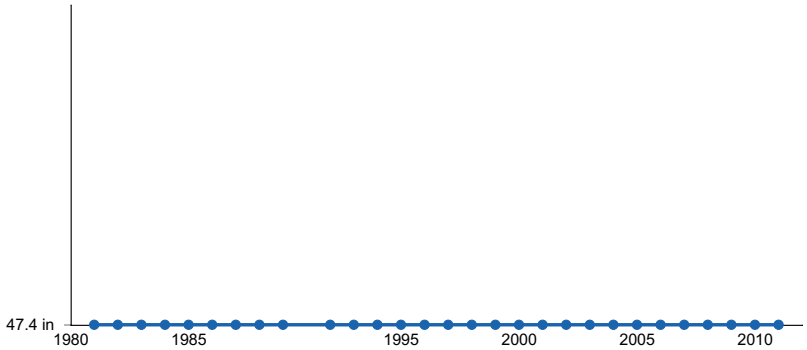


Figure 3. Annual precipitation pattern

Climate stations used

- (1) FAYETTEVILLE WTP [USC00403074], Fayetteville, TN
- (2) COLUMBIA 3 WNW [USC00401957], Columbia, TN
- (3) NASHVILLE INTL AP [USW00013897], Nashville, TN
- (4) GAINESBORO [USC00403370], Gainesboro, TN

Influencing water features

Sites may be influenced by flooding of varying depths and durations. Future ESD development will result in further refinement of this PES grouping with flooding regime (depth, duration, and frequency) as a factor of refinement.

Soil features

This initial PES grouping consists of floodplain soils in MLRA 123. Fieldwork for ESD development will result in this group being split into multiple ESDs. Main soil series included here are Staser, Ocana, Nolin, Lynnville, Lindside, Lindell, Huntington, Egam, Captina, Cannon and Arrington.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Colluvium
Surface texture	(1) Gravelly sandy loam (2) Loam (3) Silt loam (4) Fine sandy loam (5) Silty clay loam
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately rapid
Depth to restrictive layer	60 in
Soil depth	60 in
Available water capacity (Depth not specified)	5.2–8.3 in
Electrical conductivity (Depth not specified)	0 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	5.5–7

Ecological dynamics

Provisional Ecological Site (PES): F123XY005TN - Floodplains
Major Land Resource Area (MLRA) 123

This PES describes ecological communities likely to be found on soil in the PES soil grouping. Future field work is required to develop detailed and accurate ecological site descriptions (ESDs) that can be used by conservation planners for restoration and planning activities. This PES describes hypotheses based on available data from many different sources and scales and has not been developed using site specific ecological field monitoring. Future ESD development will result in this initial PES group being split into more refined ecological communities.

Soil series currently included in this initial PES project are: Arrington, Cannon, Captina, Egam, Ennis, Greendale, Huntington, Lindside, Lindell, Lynnville, Nolin, Ocana, and Staser. Mapunits will be added or removed from this group during future ESD development.
Vegetation as listed in Official Soil Series Descriptions (OSDs):
Arrington: The native vegetation was bottom land oaks, hickory, elm, hackberry, maple, beech, black walnut, ash, yellow-poplar, and sycamore.
Cannon: The original vegetation was hardwood forest, chiefly of oaks, maple, elm, gums, ash, sycamore, beech, and hickory.
Captina: Native vegetation was hardwood forests with small openings of tall grass prairies.
Egam: The original vegetation was hardwood forest, chiefly of oaks, maple, elm, gums, ash, sycamore, beech, and hickory.
Ennis: The native vegetation was bottomland hardwoods, consisting chiefly of oak, hickory, maple, elm, yellow-poplar, and sycamore.
Greendale: Most areas are cleared and used for pasture or hay.
Huntington: Where wooded--mixed hardwoods.
Lindside: Where wooded- mixed hardwoods
Lindell: The native vegetation was mixed hardwoods
Lynnville: Used principally for growing corn, hay, and pasture.
Nolin: Forested areas are bottomland hardwoods, such as river birch, yellow-poplar, sycamore, elm, willow,

boxelder, oak, hickory, and red maple. Many stream banks and narrow flood plains consist of native canebrakes.
Ocana: The native vegetation was mixed hardwoods.
Staser: The native vegetation was hardwood forest consisting chiefly of oaks, hickories, maples, elm, and yellow-poplar.
Trees listed in NASIS for the mapunits within this PES group are: white oak, northern red oak, southern red oak, water oak, tulip tree, black walnut, black cherry, white ash, American sycamore, swamp white oak, cherrybark oak, eastern cottonwood, cucumber tree, red maple, eastern red cedar, loblolly pine, and shortleaf pine. The most prevalent trees in NASIS for this group were white oak, southern red oak, northern red oak, water oak, tulip poplar, and black walnut.

Trees listed for PES map units in the USDA-NRCS Tennessee County Soil Surveys including white oak, northern red oak, water oak, southern red oak, yellow poplar, black walnut, loblolly pine, shortleaf pine, and sweetgum. The most prevalent trees in NRCS county soil surveys for this group were white oak, northern red oak, southern red oak, water oak, tulip poplar and black walnut.

Ecological Dynamics
State 1, Phase 1.1: Plant species dominants:
Mixed Oak (Quercus spp.) – tulip poplar (*Liriodendron tulipifera*) / paw paw (*Asimina triloba*) – northern spicebush (*Lindera benzoin*) /smallspike false nettle (*Boehmeria cylindrica*) – Asplenium ladyfern (*Athyrium filix-femina* (L.) Roth ssp. asplenioides (Michx.) Hultén)
This PES describes a hardwood forest community in well drained and moderately well drained floodplains throughout the Nashville Basin area of Tennessee. Only two tree species can be selected for entry into the ESIS database as dominants: however, multiple tree species may be co-dominant on these sites. The overstory canopy will be mixed and include multiple oaks along with hickories (mockernut, shagbark), black walnut, tulip tree, American elm, maples, ashes, and American sycamore.
The subcanopy/shrub layer will include flowering dogwood, northern spicebush, coralberry, paw paw, black cherry, black gum, and American hornbeam.
The understory in most locations is dense with a variety of species including smallspike false nettle, asplenium ladyfern, woodland bluegrass, ferns and sedges.
This initial PES group consists of soils with differing levels of flooding. There will be a gradient of tree species depending on drainage and flooding frequency. Well-drained sites with little or no flooding frequency will favor more upland species while sites with more frequent flooding will include more bottomland hardwood species. Detailed community composition will vary depending on flooding regime, drainage, seed sources, past and present management (including hydrologic modifications), disturbance history, fire regime, and topography. Future field monitoring of high quality sites is required to develop ecological site descriptions (ESDs) to support future conservation planning. Multiple ESDs may be developed from this initial PES group.

State 2. Pastureland
State 2, Phase 2.1: Managed Pasture.
Plant species dominants: *Schedonorus arundinaceus* (tall fescue)
Plant species within pasture phases depend on seeding, management, and concurrent land uses. As with all sites, soil characteristics and management inputs will influence production levels.
Many species of warm-season or cool-season grasses are feasible for these sites. Common forage species include tall fescue, orchard grass, Johnson grass, and timothy.

Management of pasture sites should follow conservation planning standards and protocols which will benefit water quality, forage production, and soil health.

Transitioning this state to a reference condition would likely require extensive and long-term timber stand improvement practices including control of non-native vegetation and management for desired native tree, shrub and understory species.

State 3. Transitional Field
State 3, Phase 3.1: Plant species dominants: tulip poplar (*Liriodendron tulipifera*) -eastern red cedar (Juniperous virginiana) / roses (Rosa spp.) – berries (Rubus spp.) / poison ivy (*Toxicodendron radicans*) - tall fescue (*Schedonorus arundinaceus*)

Tree species would be dependent upon several factors including severity and duration of disturbance, adjacent plant communities, available seed sources, post-disturbance management (control of invasive plants, grazing, etc.). A wide range of hardwoods is possible and may include tulip poplar, maples, ashes, locust, black cherry, eastern red cedar, pines, and if seed sources are nearby, oaks and hickories. Common shrubs would be berries, roses, and sumac.

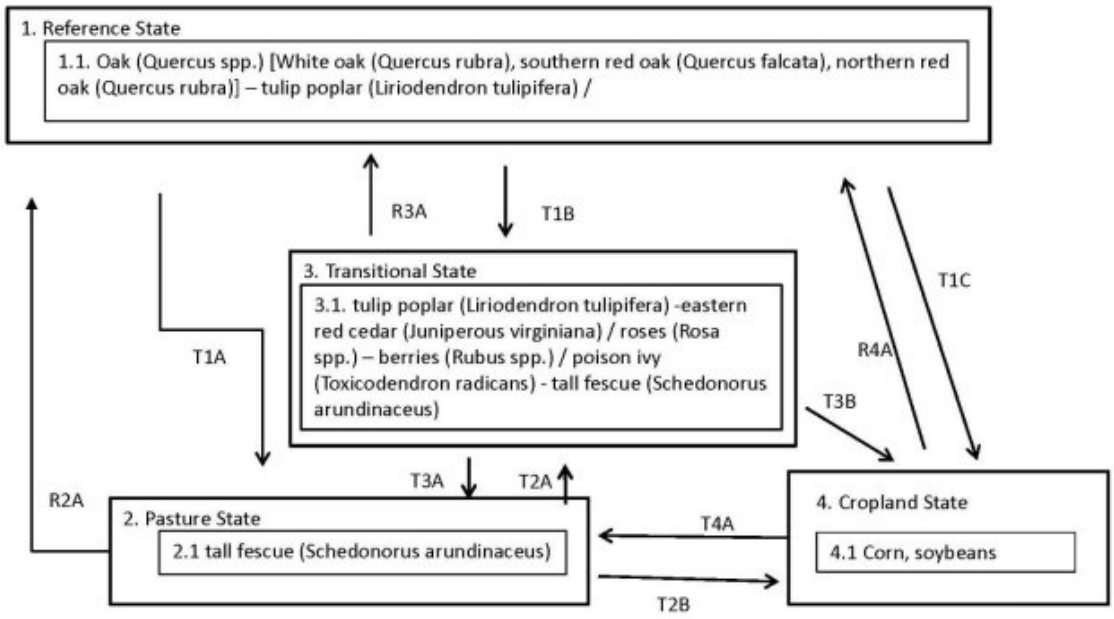
Transitioning this state to a reference condition will require long-term timber stand improvement practices to control non-native vegetation and manage for higher quality oak -hickory species. Hydrological modifications such as tiling and draining may be present on these sites.

State 4. Croplands
Dependent upon seeding and management. Corn and soybeans are commonly planted on these sites, but a wide variety of crops may be grown.

Abandonment of cropland would result in weed species taking over the site. Dozens of species are possible depending on the seed sources. Initially annual weeds would predominate followed annual and perennial grasses, shrubs, and finally, pioneer tree species such as poplar, pines, eastern red cedar, tulip poplar, locusts, maples, ashes, and elms. Restoration would be required to return this State to a reference community, including oak regeneration, control of non-native vegetation, and planting of native understory species. Protection from disturbance (grazing) and restoration of the natural hydrology would also be required.

Transitioning this state to a reference condition will require long-term timber stand improvement practices to control non-native vegetation and manage for oak - hickory species. Hydrological modifications such as tiling and draining may be present on some of the wetter sites.

State and transition model



T1B: Tree removal –no post-harvest management. Fescue present only if managed as pasture previously.
T1A, T3A, T4A: Pasture establishment. Inputs may include brush/tree removal, weed control, seeding, etc.
T3B, T1C, T2B: Cropland establishment. Inputs may include brush removal, weed control, seeding, etc.
T2A: Natural transition in absence of management inputs.
R2A, R3A, R4A: Extensive and long-term forest management inputs required to successfully restore reference community.

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

Approval

Nels Barrett, 9/06/2018

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)	Anita Arends
Contact for lead author	
Date	08/07/2018
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	

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:**