

Ecological site F122XY029TN Tennessee River Fragipan Terraces

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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): 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” (Talbot 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, Lynnvill, 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). Udupts 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

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

Ecological site concept

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: (Reference): Forestland

Plant species dominants:

Quercus spp. (oaks) – *Carya* spp. (hickories)/ *Leersia* spp. (whitegrass) -*Chasmanthium* spp. (woodoats)

NASIS county soil surveys list trees on these sites as southern red oak, white oak, cherrybark oak, sweetgum, hickories, yellow poplar, and pines. Southern red oak and sweetgum are the predominant trees in NASIS.

State: 2. Phase 2.1. Pasture

Managed Pasture. Plant species dominants: *Schedonorus arundinaceus* (tall fescue)

Pasture plant species are dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals.

State: 3. Phase 3.1. Transitional (Abandoned) Field

Plant species dominants: maples (*Acer* spp.) – tulip poplar (*Liriodendron tulipifera*) / berries (*Rubus* spp.) / tall 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.

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

Plant species dominants: *Zea* spp. – *Glycine* spp.

Plants on these sites will be 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.

Table 1. Dominant plant species

Tree	(1) <i>Quercus</i> (2) <i>Carya</i>
Shrub	Not specified
Herbaceous	(1) <i>Leersia</i> (2) <i>Chasmanthium</i>

Physiographic features

These sites are found on stream terraces along the Tennessee River and it's tributaries.

Table 2. Representative physiographic features

Landforms	(1) Terrace
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	107–198 m

Slope	0–12%
Water table depth	33–61 cm

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 (average)	179 days
Freeze-free period (average)	201 days
Precipitation total (average)	1,422 mm

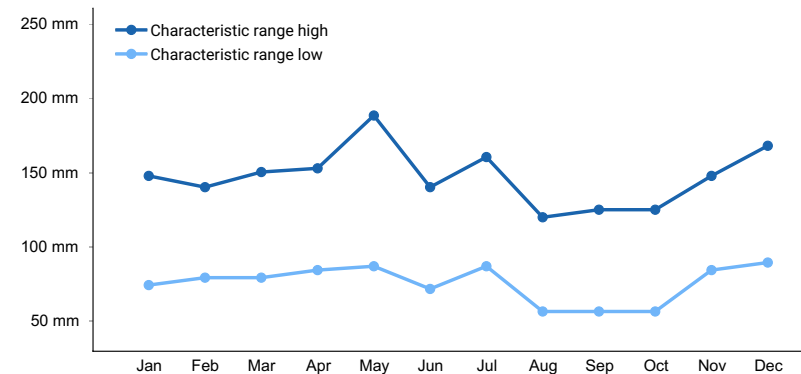


Figure 1. Monthly precipitation range

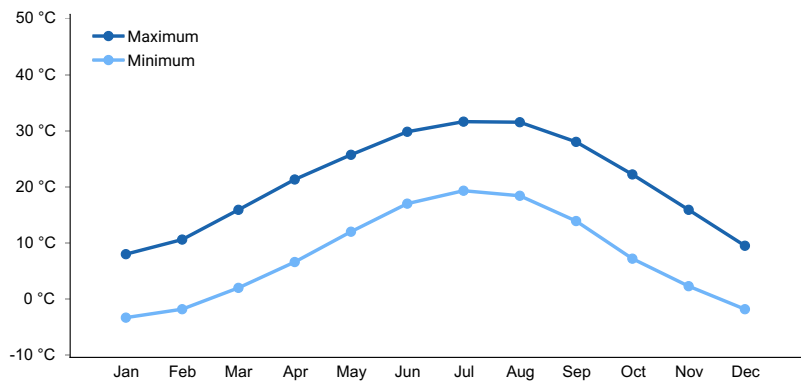


Figure 2. Monthly average minimum and maximum temperature

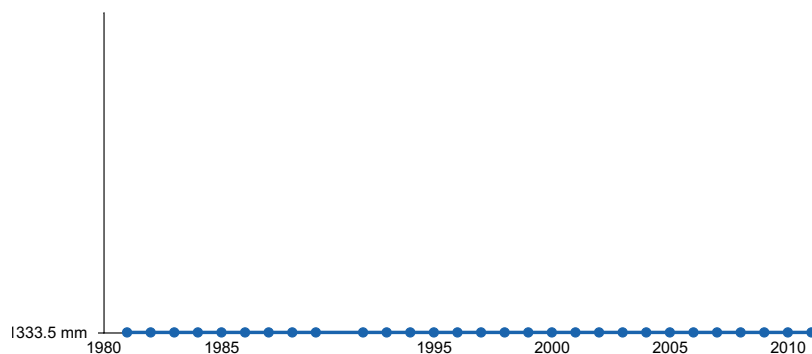


Figure 3. Annual precipitation pattern

Climate stations used

- (1) GREENSBURG [USC00153430], Greensburg, KY
- (2) CLARKSVILLE WWTP [USC00401790], Clarksville, TN
- (3) COOKEVILLE [USC00402009], Cookeville, TN
- (4) WAYNESBORO [USC00409502], Waynesboro, TN

Influencing water features

These sites have no influencing water features.

Soil features

Mapunits in this group are moderately well drained, with a fragipan layer.

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	46–71 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.73–17.27 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5–6
Subsurface fragment volume <=3" (Depth not specified)	2–3%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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MLRA 122

Soil series mapunits included in this preliminary grouping: Paden.

Official soil series description (OSD): The Paden series consists of very deep, moderately well drained soils with a fragipan in the subsoil. The soil formed in 1.5 to 4 feet of silty material and the underlying older alluvium or residuum. The soils are on stream terraces, primarily those associated with the Tennessee River and its tributaries. Vegetation: Most of the acreage has been cleared and is used for growing cotton, corn, soybeans, hay and pasture. A small acreage is in trees chiefly oak, hickory, elm, and beech.

Future ecological site description (ESD) development may result in mapunits being added and removed from this initial group.

The natural vegetation of these sites will vary in relationship to the setting, patterns of drainage, disturbances, and previous vegetation communities. Individual sites deserve a detailed understanding before conservation and restoration practices are implemented. The provisional ecological site (PES) communities described in this document reflect plant communities that can be found on these soils but does not encompass the entire complexity or diversity possible on these sites. Future field work is required to develop a full ecological site description which can be utilized for conservation planning purposes.

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: (Reference): Forestland

Plant species dominants:

Quercus spp. (oaks) – *Carya* spp. (hickories) / *Leersia* spp. (whitegrass) -*Chasmanthium* spp. (woodoats)

NASIS county soil surveys list trees on these sites as southern red oak, white oak, cherrybark oak, sweetgum, hickories, yellow poplar, and pines.

Southern red oak and sweetgum are the predominant trees in NASIS.

State: 2. Phase 2.1. Pasture

Managed Pasture. Plant species dominants: *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 (Abandoned) Field

Plant species dominants: maples (*Acer* spp.) – tulip poplar (*Liriodendron tulipifera*) / berries (*Rubus* spp.) / tall fescue (*Schedonorus arundinaceus*)

Tree species 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), slope, and aspect. Other successional tree species may include hackberry, boxelder, ashes, elms, sycamore, cottonwood, and tulip poplar.

Transitioning this state to a reference condition would require timber stand improvement practices.

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

Plant species dominants: *Zea* spp. – *Glycine* spp.

Plants on these sites will be dependent upon seeding and management. Most common crops are corn and soybeans. Due to the drainage issues on these soil, many have been tilled extensively to facilitate crop production.

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

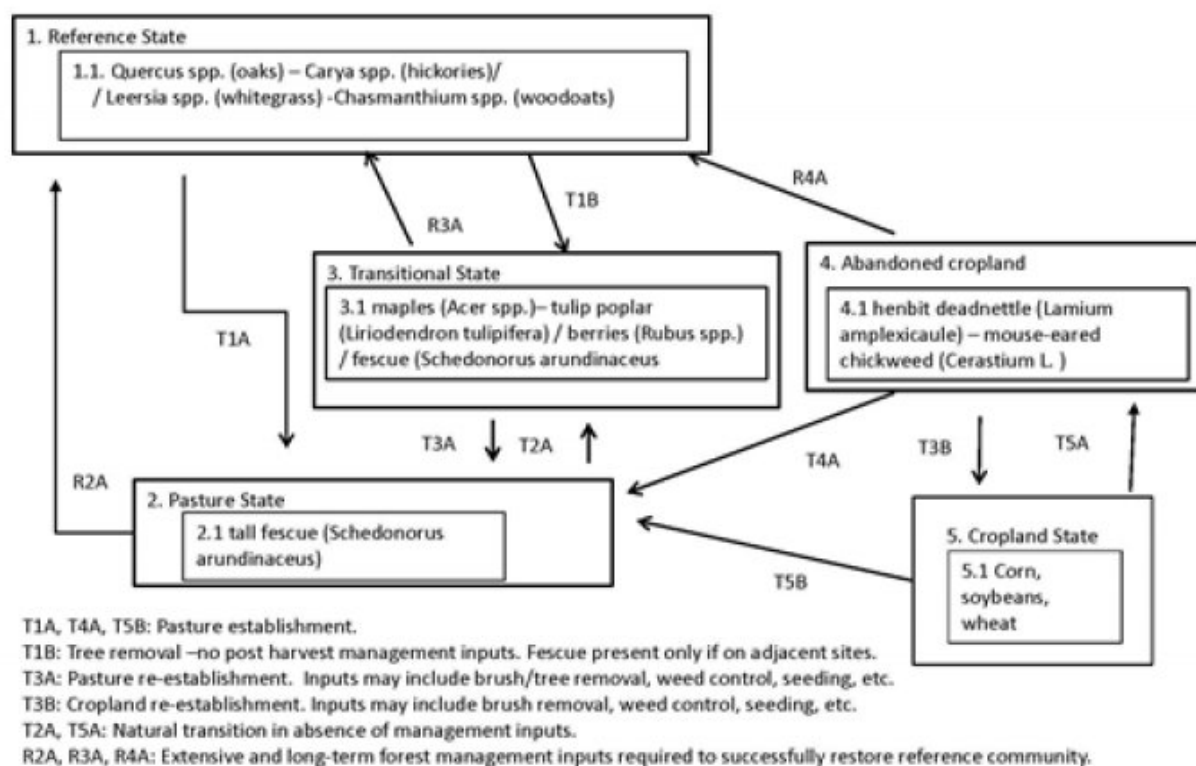


Figure 5. 29 TN River Fragipan Terraces

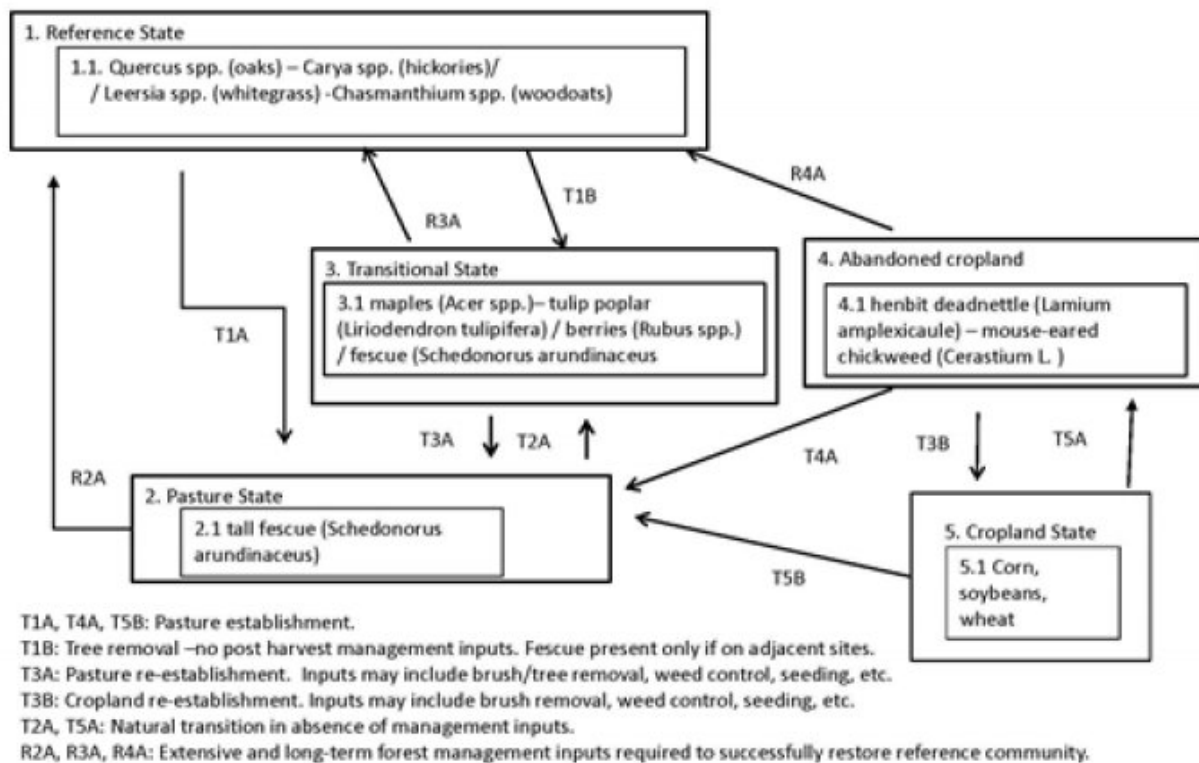


Figure 6. 29 TN River Fragipan Terraces

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):**

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:**
