USDA Natural Resources
Conservation Service

Ecological site F122XY006KY
Moderately Well Drained Fragipan Uplands

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): 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

Field work is required to better evaluate the exact community composition of these sites. The sites visited showed great variation in species composition.

Ecological site concept

6-Moderately Well-Drained Fragipan Uplands
MLRA 122
Ecological Dynamics:

This PES describes hypotheses based on available data of many different scales and sources. This PES also does not encompass the entire complexity or diversity of these sites. Additional field studies would be required for conservation planning purposes or to develop a comprehensive and science-based restoration plan for these sites.

Ecological Dynamics
This PES describes a forest community on very deep, moderately well-drained soils with a fragipan layer between 20-40 inches deep. The range of variation in plant composition on these sites vary mainly due to soil depth, available water, management, disturbance history, and in some cases, aspect. Actual field work is required to develop a full ecological site description (ESD), a field-based state and transition model, and accurate plant community phases to support future conservation planning.

Most areas of these soils are used to grow corn, soybeans, wheat and hay. Some areas are used for permanent pasture, and only a few of these areas are still in native forest.

State 1. (Reference)
Phase 1.1: White oak (*Quercus alba*) - black oak (*Quercus velutina*) / flowering dogwood (*Cornus florida*) – sassafras (*Sassafras albidum*) / Canadian black snakeroot (*Sanicula canadensis*) - ebony spleenwort (*Asplenium platyneuron*).

NASIS trees-on-site data showed a great deal of variation in tree dominance. The oak component will vary depending on slope, topography, previous and on-going disturbances, moisture, and seed sources. Oaks and hickories documented on these soils in NASIS include: white oak, black oak, cherrybark oak, hybrid hickory, and northern red oak. Other trees recorded in NASIS for these sites include tulip poplar, white ash, sweetgum, sugar maple and American beech. These are likely successional forest stages which would consist of shade tolerant, fast growing species.

The understory communities are variable depending on management, disturbances, topography, and seed sources. Sites may include agrimony, bedstraws, snakeroots, Virginia creeper, spleenworts, and Solomon's seal. The shrub layer likely includes dogwood, sassafras, hophornbeam, and northern spicebush. In wetter areas, paw paw may be present.

Additional State and Phase information is in the Community Phase Data Section.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Cornus florida* (2) *Sassafras albidum*
Herbaceous	(1) *Sanicula canadensis* (2) *Podophyllum peltatum*

Physiographic features

These sites are on uplands. Soils are moderately well drained and have a fragipan layer in the profile.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Flat (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	350–1,400 ft
Slope	0–12%
Water table depth	20–30 in

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)	175 days
Freeze-free period (average)	197 days
Precipitation total (average)	54 in

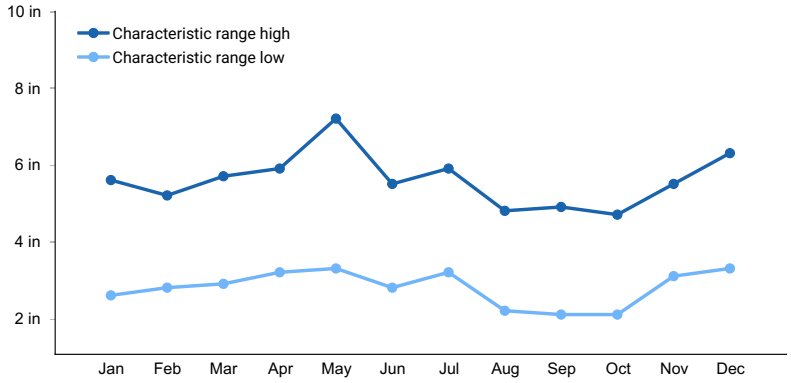

Figure 1. Monthly precipitation range

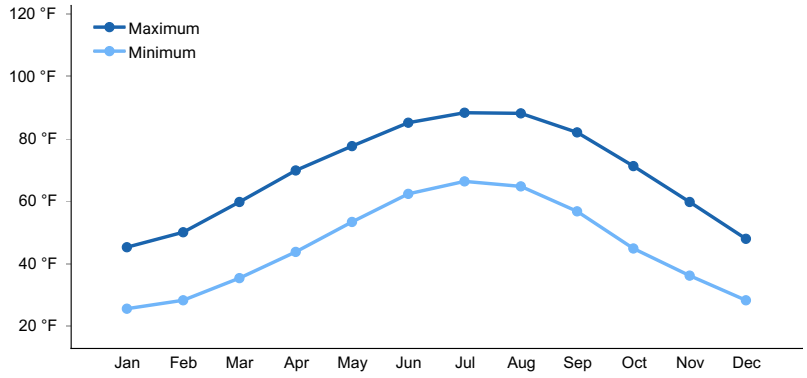

Figure 2. Monthly average minimum and maximum temperature

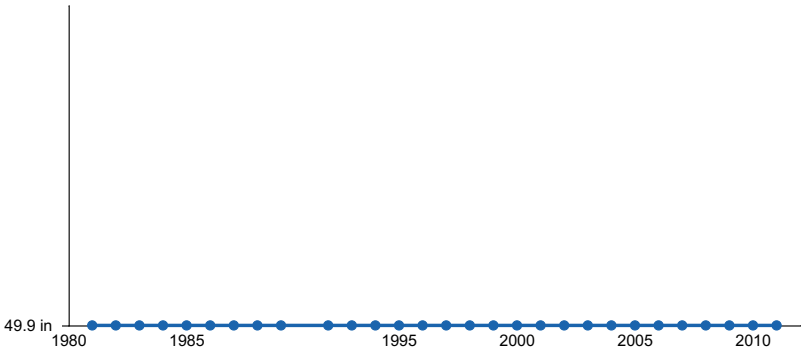

Figure 3. Annual precipitation pattern

Climate stations used

- (1) GREENSBURG [USC00153430], Greensburg, KY
- (2) SALEM [USC00127755], Salem, IN
- (3) CLARKSVILLE WWTP [USC00401790], Clarksville, TN
- (4) COOKEVILLE [USC00402009], Cookeville, TN
- (5) WAYNESBORO [USC00409502], Waynesboro, TN

Influencing water features

There are no influencing water features on these upland sites.

Soil features

Soils are moderately well drained and have a fragic properties in the soil profile.

Table 4. Representative soil features

Parent material	(1) Loess–limestone (2) Residuum–sandstone and shale (3) Alluvium–limestone and siltstone
Surface texture	(1) Sandy loam (2) Sandy clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained
Permeability class	Very slow to moderate
Soil depth	60–100 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4–7 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)	4.5–5.5

Subsurface fragment volume <=3" (Depth not specified)	0–13%
Subsurface fragment volume >3" (Depth not specified)	0–3%

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State and transition model

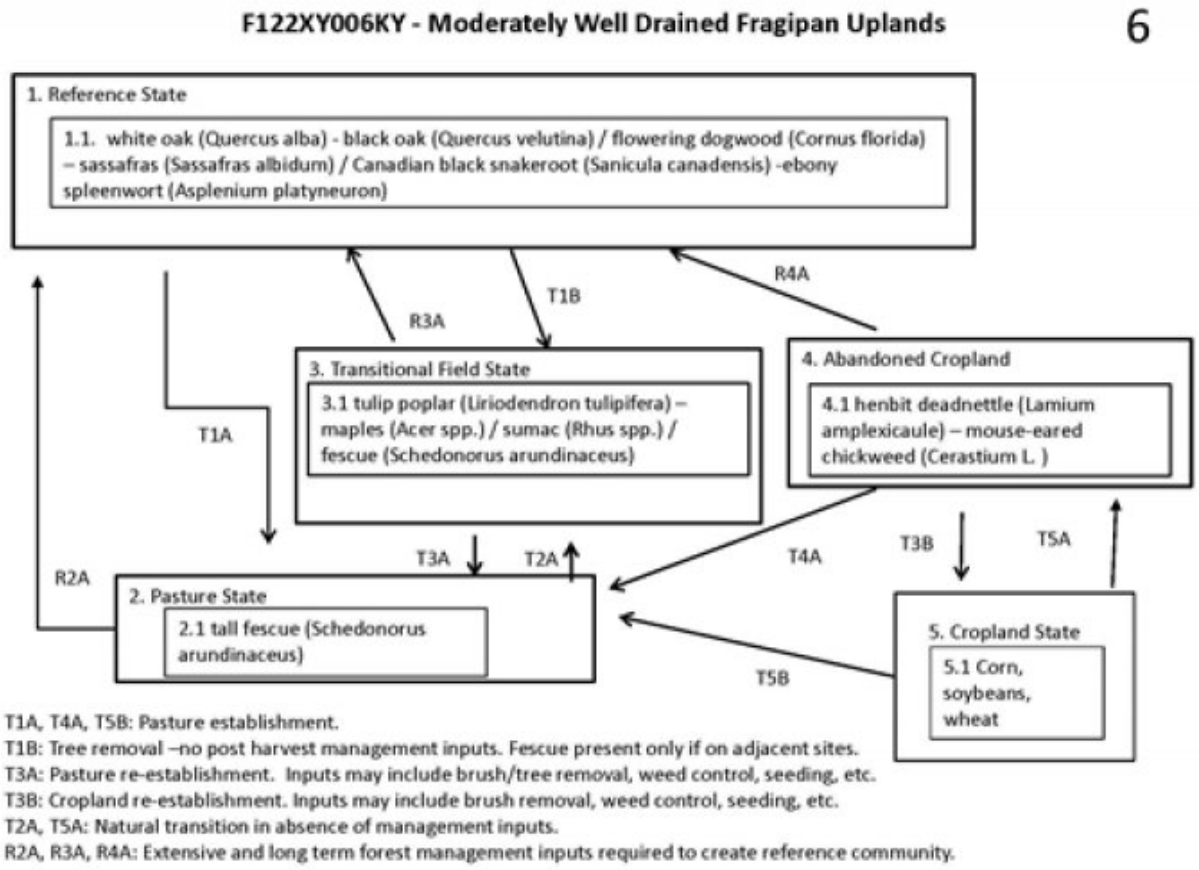

Figure 5. Group 6

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:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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):**

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:**