

Ecological site F121XY022KY

Somewhat Poorly Drained Fragipan Upland

Last updated: 10/01/2024
Accessed: 05/13/2025

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): 121X–Kentucky Bluegrass

General: MLRA 121 is in Kentucky (83 percent), southern Ohio (11 percent), and southern Indiana (6 percent). It makes up about 10,680 square miles (27,670 square kilometers). The cities of Cincinnati, Ohio, and Louisville, Frankfort, and Lexington, Kentucky, are in this area.

Physiography: This area is primarily in the Lexington Plain Section of the Interior Low Plateaus Province of the Interior Plains.

Soils: The dominant soil orders in MLRA 121 are Alfisols, Inceptisols, and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an udic soil moisture regime, and mixed mineralogy. They are shallow to very deep, generally well-drained, and loamy or clayey. Hapludalfs formed in residuum on hills and ridges (Beasley, Cynthiana, Eden, Faywood, Lowell, and McAfee series) and in loess over residuum on hills and ridges (Carmel and Shelbyville series). Paleudalfs (Crider and Maury series) formed in loess or other silty sediments over residuum on hills and ridges. Fragiudalfs (Nicholson series) formed in loess over residuum on ridges. Hapludolls formed in residuum on hills and ridges (Fairmount series) and in alluvium on floodplains (Huntington series). Eutrudepts (Nolin series) formed in alluvium on flood plains.

Geology: Most of this area has an Ordovician-age limestone that has been brought to the surface in the Jessamine Dome, a high part of a much larger structure called the Cincinnati Arch. The strata of limestone have a propensity to form caves and karst topography. Younger units of thin-bedded shale, siltstone, and limestone occur at the eastern and western edges of the area.

The area has no coal-bearing units. Pleistocene-age loess deposits cover most of the bedrock units in this MLRA, and some glacial lake sediments are at the surface in the northwest corner of the area. Unconsolidated alluvium is deposited in the river valleys.

Classification relationships

Wet depression forest (Kentucky State Nature Preserves Commission, 2009)

Ecological site concept

The Somewhat Poorly Drained Fragipan Upland ecological site is characterized by somewhat poorly drained soils with a fragipan. Representative soils include: Johsburg, Lawrence.

Sites are located mainly on upland flats although some may be found on terraces in a few counties.

This group will be split further based on drainage upon future field work.

Plant species, especially the understory forbs, herbs, vines, and shrubs, are those that prefer a moist to wet

environment. Based on a GIS analysis utilizing current soil (SSURGO 2015) and aerial photography coverages, over 95% of these sites in MLRA 121 are cropland, pasture, urban, highly disturbed or successional woodlands; therefore, the exact characteristics of a true historic reference community is difficult to accurately define. Historical records research and field studies would be required to develop a restoration plan for conservation purposes.

Native forest for these areas would likely have been a mix of water-tolerant oaks, black willow, sweetgum, cottonwood, American sycamore, green ash, red maple, and American beech.

State 2: Pasture

Phase 2.1: Managed Pasture.

Plant species dominants: *Schedonorus arundinaceus* (tall fescue)

Phase 2.2: Minimally Managed Pasture. Plant species dominants: *Rosa multiflora* (multiflora rose)- *Rubus* spp. /*Schedonorus arundinaceus* (tall fescue)-*Eutrochium* spp. (joe pye weed)

Phase 2.3: Native Grass Pasture. Plant species dominants: *Panicum virgatum* (switchgrass) - *Andropogon gerardii* (big bluestem)

State: 3 – Transitional (Abandoned) Field

Phases 3.1: *Acer saccharinum*-*Platanus occidentalis* /*Rosa multiflora*- *Rubus* spp. /*Schedonorus arundinaceus*

State: 4. Old Cropfield Pioneer Woodland

Phase 4.1: Plant species dominants: henbit deadnettle (*Lamium amplexicaule*)- mouse-eared chickweed (*Cerastium* L.)

State 5, Phase 5.1: 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.

Associated sites

F121XY023KY	Well Drained & Moderately Well Drained Fragipan Upland Well Drained and Moderately well Drained Fragipan Upland
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Similar sites

F121XY017KY	Somewhat Poorly Drained Fragipan Terrace Somewhat Poorly Drained Fragipan Terrace
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Table 1. Dominant plant species

Tree	(1) <i>Liquidambar styraciflua</i> (2) <i>Acer rubrum</i>
Shrub	(1) <i>Asimina triloba</i>
Herbaceous	(1) <i>Boehmeria cylindrica</i> (2) <i>Pilea pumila</i>

Physiographic features

These soils are on uplands, have a fragipan layer and are somewhat poorly drained.

Table 2. Representative physiographic features

Landforms	(1) Flat (2) Knob (3) Ridge
Runoff class	Very low to low

Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None
Elevation	219–344 m
Slope	0–4%
Water table depth	30–36 cm
Aspect	Aspect is not a significant factor

Climatic features

These ecological sites are located in MLRA 121 and are at the northern periphery of the humid subtropical climate zone. Generally characterized by hot, humid summers and cold winter, the area has four distinct seasons. The expected annual precipitation for sites included in this ecological site description is generally in the range of 40 to 50 inches. The majority of precipitations falls during the freeze-free months, and thunderstorms with heavy rainfall are common during the spring and summer months. The freeze-free period varies somewhat based on localized topography and longitude.

MLRA climate summary: The average annual precipitation in most of this area is 41 to 45 inches. It is 45 to 52 inches along the southern edge of the area. About one-half of the precipitation falls during the growing season. Most of the rainfall occurs as high-intensity, convective thunderstorms. The annual snowfall averages about 14 inches (370 millimeters). The average annual temperature is 51 to 57 degrees F (10 to 14 degrees C). From: 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, 2006)

Table 3. Representative climatic features

Frost-free period (characteristic range)	160-178 days
Freeze-free period (characteristic range)	186-199 days
Precipitation total (characteristic range)	1,092-1,143 mm
Frost-free period (actual range)	155-183 days
Freeze-free period (actual range)	186-205 days
Precipitation total (actual range)	1,092-1,143 mm
Frost-free period (average)	169 days
Freeze-free period (average)	193 days
Precipitation total (average)	1,118 mm

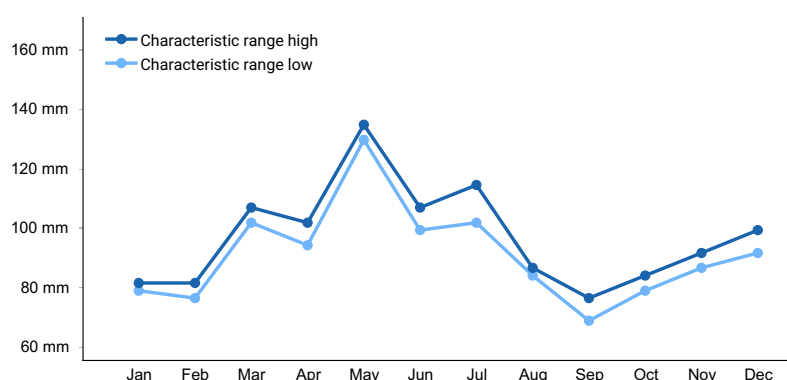


Figure 1. Monthly precipitation range

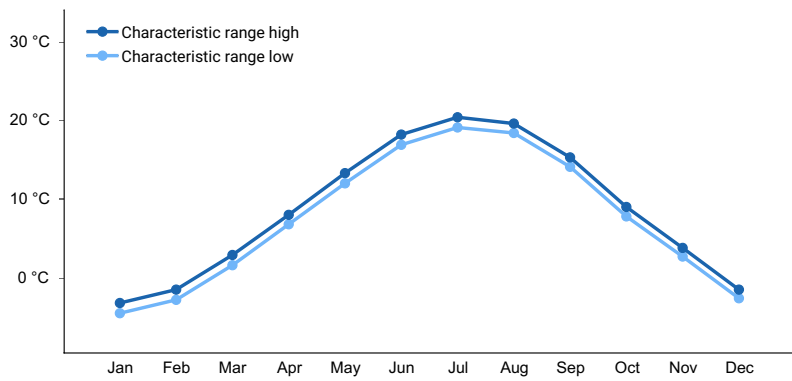


Figure 2. Monthly minimum temperature range

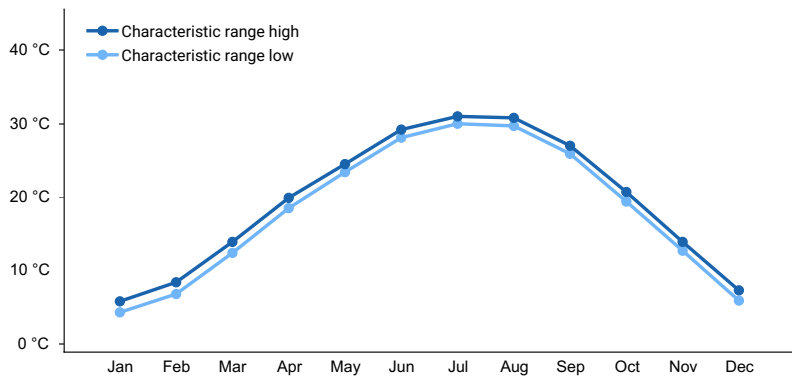


Figure 3. Monthly maximum temperature range

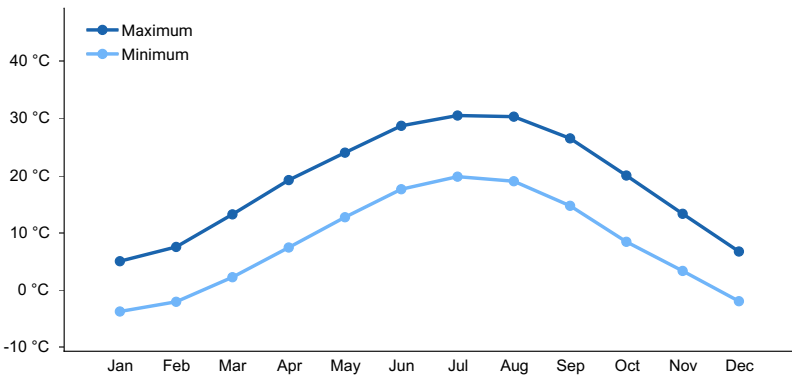


Figure 4. Monthly average minimum and maximum temperature

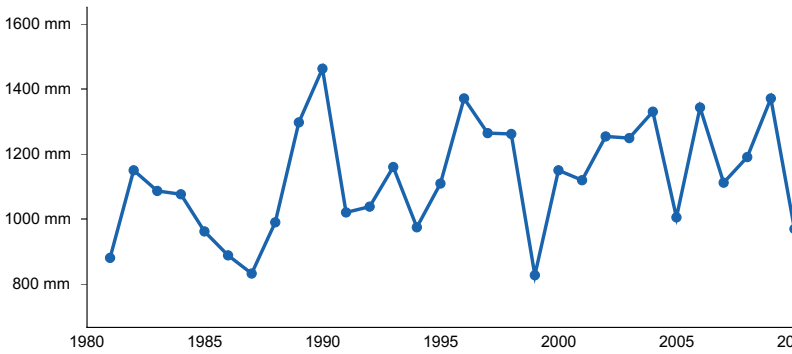


Figure 5. Annual precipitation pattern

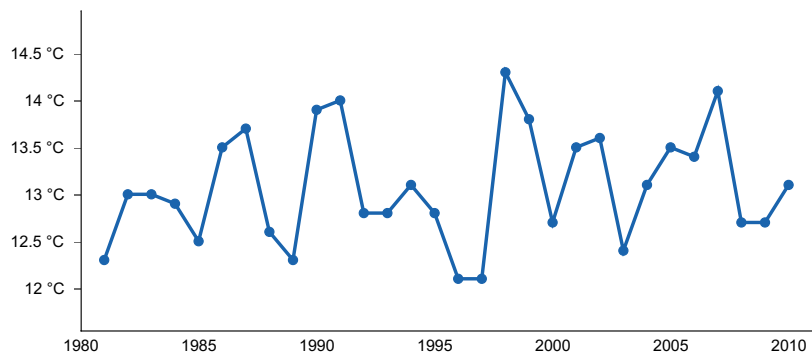


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CINCINNATI NORTHERN KY AP [USW00093814], Burlington, KY
- (2) LEXINGTON BLUEGRASS AP [USW00093820], Lexington, KY
- (3) LOUISVILLE INTL AP [USW00093821], Louisville, KY

Influencing water features

These soils are somewhat poorly drained and may be influenced by a shallow water table that is within 12" to 14" of the surface.

Soil features

This group includes somewhat poorly drained soils on uplands. Representative soils include: Johsburg, Lawrence.

Table 4. Representative soil features

Parent material	(1) Residuum
Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Soil depth	61–102 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–15.24 cm
Soil reaction (1:1 water) (0-101.6cm)	3.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

These sites are characterized by somewhat poorly drained soils with a fragipan. Sites are located mainly on upland flats although some may be found on terraces in a few counties.

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State and transition model

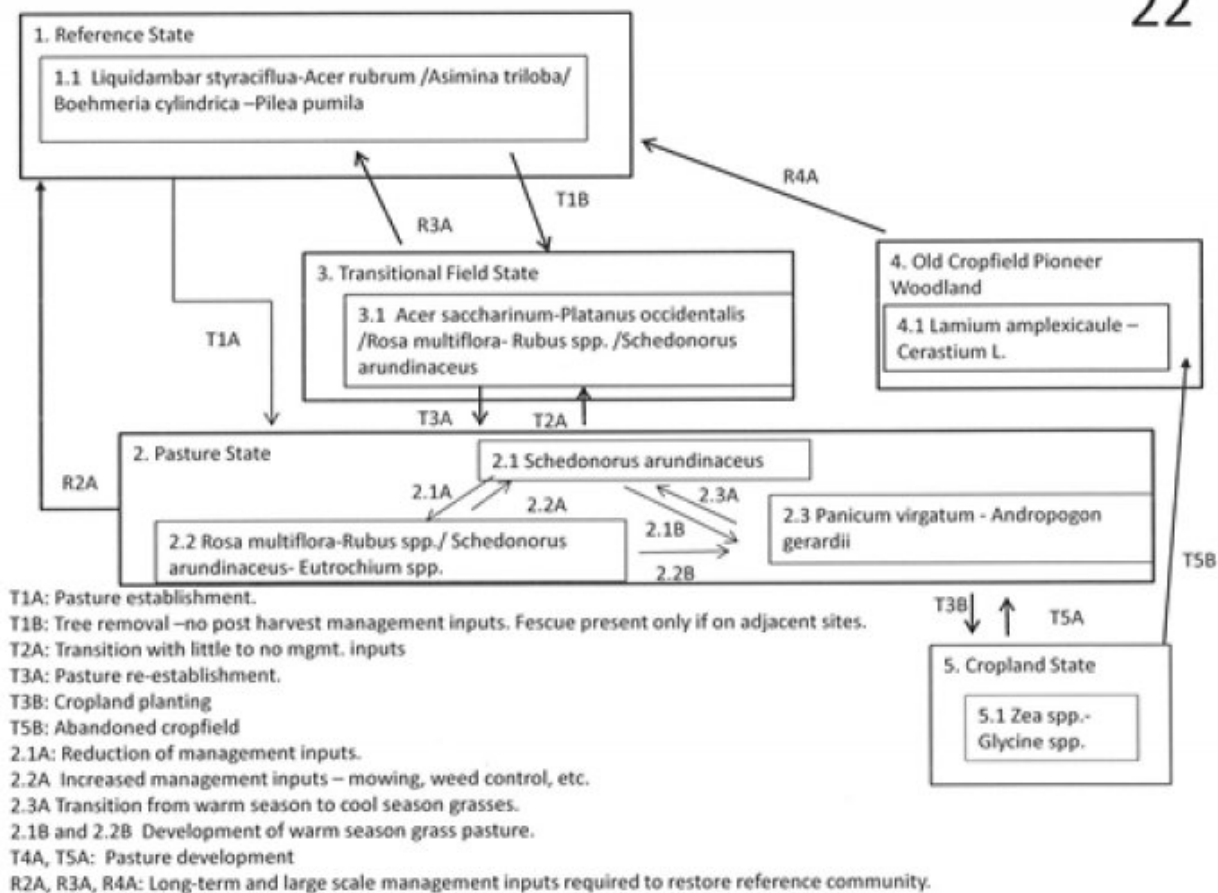


Figure 7. MLRA 121, Group 22

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.

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Contributors

Anita Arends

Approval

Greg Schmidt, 10/01/2024

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	05/13/2025
Approved by	Greg Schmidt
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:**
