

Ecological site F121XY018KY

Moderately Well Drained Fragipan Terrace

Last updated: 10/01/2024
Accessed: 11/09/2024

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

Interior Highlands Mesic Hardwood Forest. (Plant Communities of the Midwest).

Deep soil Mesophytic Forest (Kentucky State Nature Preserves Commission).

Calcareous Mesophytic Forest ((Kentucky State Nature Preserves Commission).

Ecological site concept

The Moderately Well Drained Fragipan Terrace ecological site includes soils that are moderately well drained with a fragipan. Representative soils include: Captina, Monogahela, Otwell, Otwood, Pekin, Sciotoville.

These sites are generally found on terraces within MLRA 121. Sites included in this provisional grouping are on a

number of differing aspects, slope shapes, profile positions and geomorphic components. Future field work is needed to refine this grouping into potentially multiple ESDs.

The majority of these sites in MLRA 121 are now pastureland, cropland, urban development or poor-quality stands of highly disturbed hardwoods.

State 1. (Reference): Provisional Ecological Site (PES)

State 1, Phase 1.1: Plant species dominants:

Quercus alba-*Liriodendron tulipifera*/*Sanicula odorata*-*Agrimonia*
(white oak – tulip poplar // common black snakeroot – agrimony)

Narrative: These sites are found on moderately well drained terraces with fragipans. These sites are now mostly agricultural but historically were likely dominated by a tall and closed tree canopy, a well-developed shrub layer and a diverse understory. Some sites may be subject to short-duration flooding.

Common tree species may include: *Acer saccharum* (sugar maple), *Fagus grandifolia* (beech), *Fraxinus* spp. (ash), *Juglans nigra* (black walnut), *Tilia americana*, and *Carya cordiformis* (bitternut hickory). Community composition will vary depending on site conditions, disturbances, and micro-topography. Other tree species may include: *Quercus* spp., *Carya laciniata*, *Acer nigrum*, *Acer negundo*, *Gymnocladus dioica*, *Ulmus americana*, *Liquidambar styraciflua*, *Aesculus glabra*, *Magnolia acuminata*, and *Nyssa sylvatica*. Shrub may include *Asimina triloba*, *Lindera benzoin* and *Arundinaria gigantea*.

State 2, Phase 2.1: Managed Pasture. Plant species dominant: *Schedonorus arundinaceus* (tall fescue)

State 2, Phase 2.2: Minimally Managed Pasture. Plant species dominants: *Rosa multiflora*- *Rubus* spp. /*Schedonorus arundinaceus*

State 2, Phase 2.3: Warm-season Pasture. Plant species dominants depend on landowner objectives and site characteristics, but may include: switchgrass (*Panicum virgatum*), little bluestem (*Andropogon scoparius*), indianagrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), and eastern gamagrass (*Tripsacum dactyloides*).

State 3, Phases 3.1: Plant species dominants: *Juniperus virginiana*-*Liriodendron tulipifera*/ *Rubus* spp. - *Rosa multiflora*/ *Vernonia gigantea* -*Schedonorus arundinaceus*. (Eastern red cedar- tulip poplar/ berries-multiflora rose/ ironweed-tall fescue)

State 4, Phase 4.1: Plant species dominants: *Acer saccharum* –*Liriodendron tulipifera* /*Lonicera maackii*.

State 5, Phase 5.1: Plant species dominants: dependent upon seeding and management. Most common crops are corn and soybeans.

Associated sites

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

Tree	(1) <i>Quercus alba</i> (2) <i>Liriodendron tulipifera</i>
Shrub	Not specified
Herbaceous	(1) <i>Sanicula</i> (2) <i>Agrimonia</i>

Physiographic features

Site: Moderately well drained terrace soils that have a fragipan located within MLRA 121.

Geology(NASIS data):

Parent Material Kind: Alluvium, Colluvium, Lacustrine deposits, Loess

Parent Material Origin: sedimentary rock, shale and siltstone

Landform: terrace

Landscape: valley

Soil mapunits included in this provisional ES include: Captina, Monongahela, Otwell, Otwood, Pekin, and Sciotoville

Future field work may determine that this grouping be modified or split into multiple ESDs.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Stream terrace
Runoff class	Low to very high
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to frequent
Elevation	410–1,250 ft
Slope	0–12%
Ponding depth	0–15 in
Water table depth	15–33 in
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)	43-45 in
Frost-free period (actual range)	155-183 days
Freeze-free period (actual range)	186-205 days

Precipitation total (actual range)	43-45 in
Frost-free period (average)	169 days
Freeze-free period (average)	193 days
Precipitation total (average)	44 in

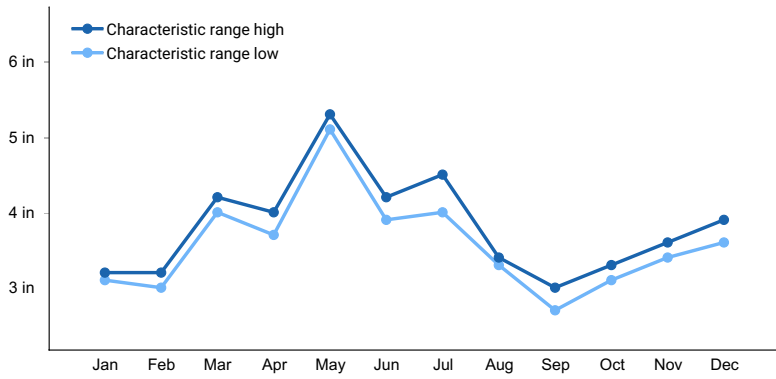


Figure 1. Monthly precipitation range

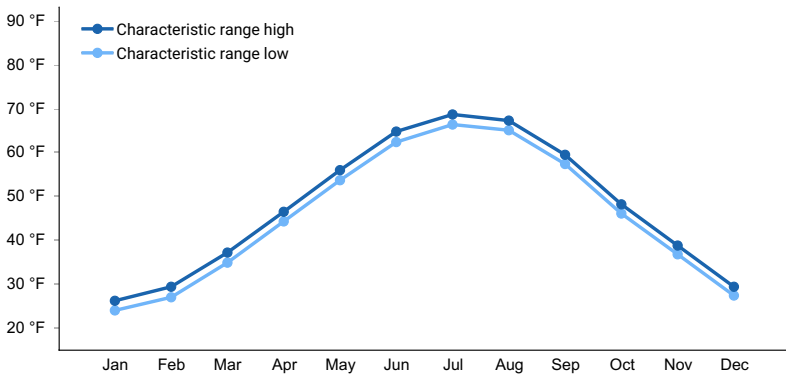


Figure 2. Monthly minimum temperature range

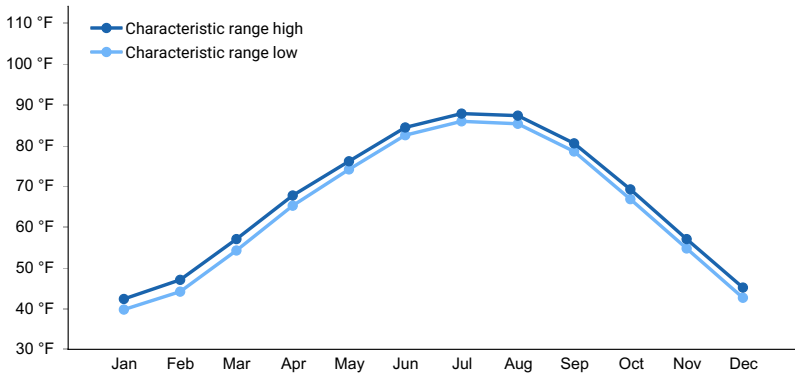


Figure 3. Monthly maximum temperature range

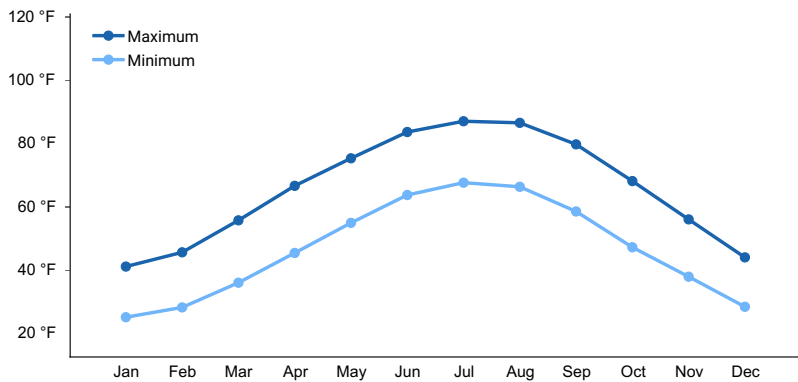


Figure 4. Monthly average minimum and maximum temperature

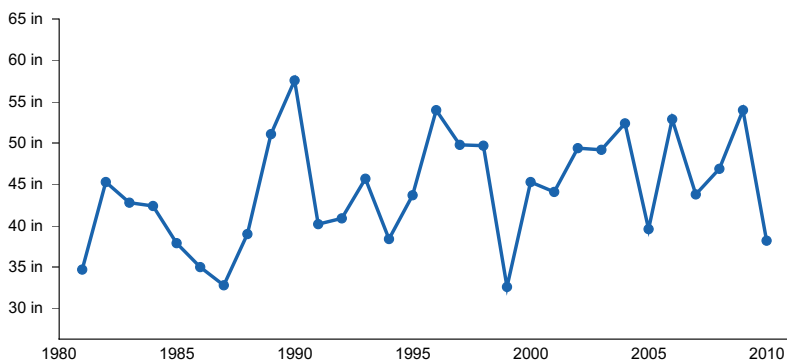


Figure 5. Annual precipitation pattern

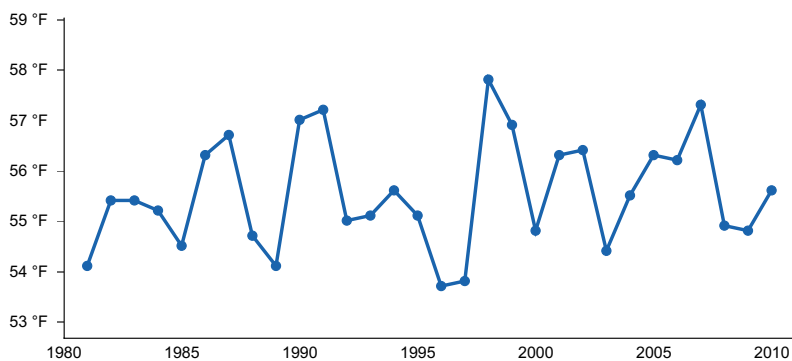


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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 sites may incur extremely brief to brief episodes of flooding or ponding.

Soil features

Very deep, moderately well drained soils with a fragipan located on terraces in MLRA 121. Representative soils include: Captina, Monogahela, Otwell, Otwood, Pekin, Sciotoville.

Table 4. Representative soil features

Parent material	(1) Alluvium
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Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained
Permeability class	Very slow
Soil depth	18–31 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–6 in
Soil reaction (1:1 water) (0-40in)	3.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–9%

Ecological dynamics

State and transition model

Moderately Well Drained Fragipan Terraces, F121XY018KY

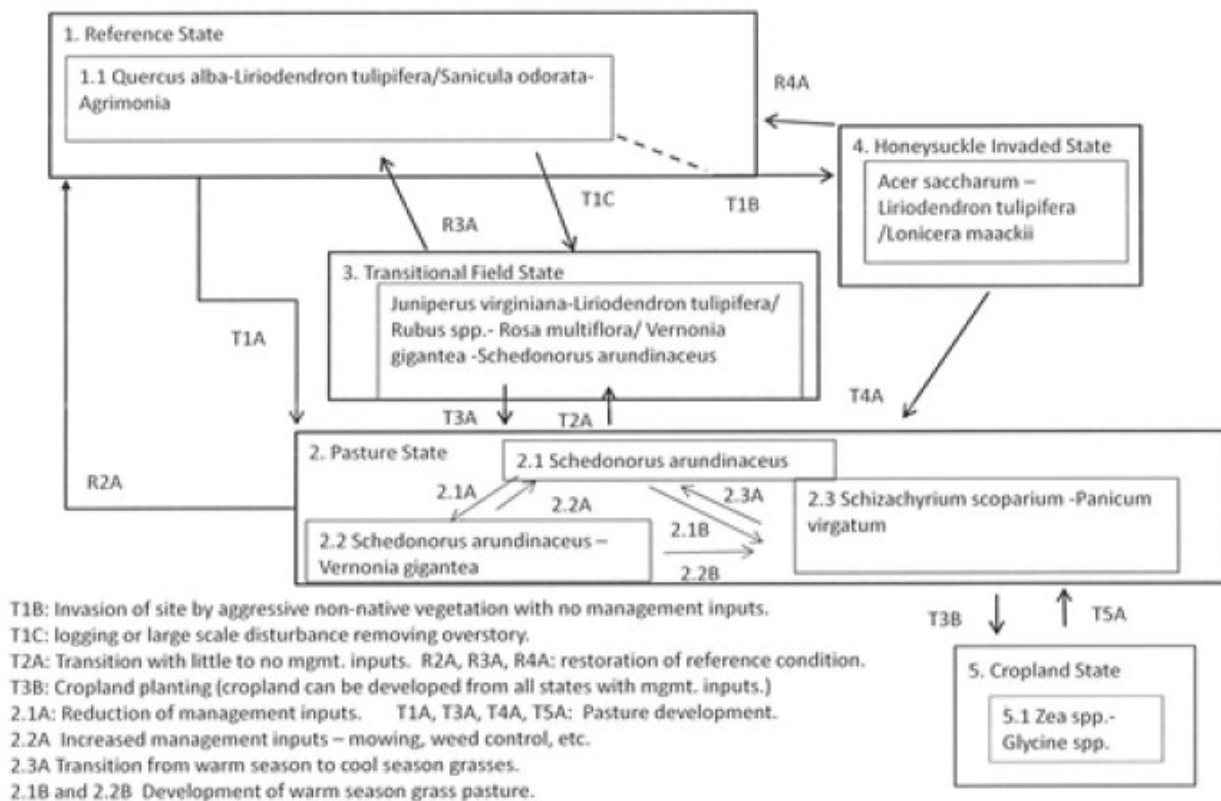


Figure 7. MLRA 121, Group 18

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

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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	11/09/2024
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:**
