USDA Natural Resources Conservation Service

Ecological site F114XB104IN
Lacustrine Forest

Last updated: 11/16/2023
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): 114X–Southern Illinois and Indiana Thin Loess and Till Plain

This MLRA is a loess-covered till plain with broad, nearly level summits and steeper slopes in areas. dissected by tributaries of the Ohio and Mississippi Rivers. It is used to produce cash crops, feed grain, and livestock. This MLRA is in Indiana (47 percent), Illinois (38 percent), and Ohio (15 percent) in four separate areas. It makes up about 10,388 square miles (26,904 square kilometers).

This area is in the Till Plains section of the Central Lowland province of the Interior Plains. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level or gently sloping. Steep slopes are along rivers and streams. Elevation ranges from 310 feet (90 meters) on the southernmost flood plains to 1,340 feet (410 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 100 feet (15 to 30 meters) along drainageways and streams.
The Little Miami River flows through the part of this MLRA in Ohio. The Ohio River flows along the southernmost boundary in some parts of this area in Ohio. The Kaskaskia River flows through the part of this area in Illinois. Tributaries to the Mississippi and Ohio Rivers drain this MLRA.

This area is covered dominantly by loess and Illinoian-age till or outwash. Most of the loess is Late Wisconsin-age Peoria Loess. In some places the Peoria Loess in underlain by Early Wisconsin-age Roxana Silt or by sandier or grittier loess. The loess ranges from 3 to 7 feet (1 or 2 meters) in thickness on stable summits and does not occur on some of the steeper slopes. The underlying Illinoian-age till and outwash commonly contain a paleosol. Meltwater outwash and lacustrine and alluvial deposits are on some of the stream terraces along the major tributaries. The till and outwash are underlain by several bedrock systems. Mississippian and Pennsylvanian bedrock occurs mostly in the western part of the MLRA. Ordovician, Silurian, and Devonian bedrock occurs mostly in the central part. Bedrock outcrops are common on the bluffs along the large rivers and their major tributaries. They also are evident at the base of steep slopes along minor streams and drainageways.

The average annual precipitation ranges from 39 to 47 inches (990 to 1,190 millimeters) with a mean of 42 inches (1,060 millimeters). The annual temperature ranges from 53 to 56 degrees F (11.8 to 13.6 degrees C) with a mean of 55 degrees F (13 degrees C). The freeze-free period ranges from 185 to 215 days with a mean of 200 days.

The dominant soil orders are Alfisols and Entisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They are deep or very deep, poorly drained to well drained, and loamy, silty, or clayey. Although limited in extent, some soils have a natric horizon in the part of the MLRA in Illinois. The main soils and their series: Albaqualfs that formed in loess or loess over pedisediment on till plains (Marine series); Endoaqualfs that formed in loess or loess over pedisedimenton till plains (Oconee series); Fluvaquents that formed in alluvium on flood plains (Wakeland series); Fragiudalfs that formed in loess over pedisediment over till (Cincinnati series) and loess over till (Rossmoyne series) on till plains; Glossaqualfs that formed in loess over till on till plains (Avonburg, Clermont, and Cobbsfork series) Hapludalfs that formed in till (Hickory series) and loess over pedisediment (Homen series) on till plains.

The soils on uplands support natural hardwoods. Oak, hickory, beech, and sugar maple are the dominant species. Native grasses grow in some scattered areas between the trees. The soils in low-lying areas support mixed forest vegetation. Pin oak, shingle oak, sweetgum, and black oak are the dominant species on the wetter sites. White oak, black oak, northern red oak, hickory, yellow-poplar, ash, sugar maple, and black walnut grow on the better drained sites. Honey locust is dominant on soils that formed in shaly limestone residuum. Silver maple, eastern cottonwood, American sycamore, pin oak, elm, and sweetgum grow along rivers and streams. Black walnut is abundant on very deep, well drained soils on some small flood plains. Sedge and grass meadows and scattered trees are on some low-lying sites.

Most of this MLRA is in farms and used to produce corn, soybeans, and livestock. Some small grains, including winter wheat, oats, and grain sorghum, also are grown. A small acreage is used for specialty crops, such as popcorn and apple orchards. The grassland supports introduced and native grasses. The forested areas are mainly on steep valley sides and in low-lying parts of flood plains. Surface coal mines make up a small acreage. (USDA, Natural Resources Conservation Service. 2022)

LRU notes

LRU 114XB is in two separate areas in Illinois (66 percent) and Indiana (34 percent). It makes up about 7,005 square miles (18,150 square kilometers). It includes the towns of Brazil, Bloomfield, Cloverdale, and Spencer, Indiana, and Carlyle, Nashville, Hillsboro, Greenville, Vandalia, and Pinckneyville, Illinois. Interstates 55, 64, and 70 cross the part of the MLRA in Illinois. They converge in St. Louis, which is just west of this MLRA. The east edge of the Scott Air Force Base is on the western edge of the area in Illinois. This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. Both large and small tributaries of the West Fork of the White River, the Eel River, the Kaskaskia River, and the Little Muddy River dissect the nearly level to very steep uplands. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level to gently sloping. Elevation ranges from 350 feet (105 meters) on the southernmost flood plains along the Ohio and Wabash Rivers to 1,190 feet (365 meters) on the highest ridges.

Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2022):
114X–Southern Illinois and Indiana Thin Loess and Till Plain

U.S. Forest Service Ecoregions (Cleland et al. 2007):
Domain: Humid Temperate Domain
Division: Hot Continental Division
Province: Eastern Broadleaf Forest (Continental)
Province Code: 222

The following NatureServe Explorer Ecological System Record(s) have a high level of probability to match the ecological site reference community found on these soils.
NORTH-CENTRAL INTERIOR DRY-MESIC OAK FOREST AND WOODLAND (CES202.046)

Ecological site concept

The Lacustrine Forest site is a mesic deciduous forest with a substantial oak component. Species listed in NASIS for these soils include white oak, northern red oak, black oak, sugar maple, tulip tree, and sweetgum. NRCS county soil surveys list the following trees on these sites: white oak, northern red oak, sugar maple, tulip poplar, sweetgum, sugar maple, slippery elm, pin oak, and white ash. Understory vegetation density and composition will vary greatly on these sites depending on canopy cover, micro-topography, and disturbance history. The protected, high-quality sites will exhibit a diverse array of native herbaceous species including numerous native spring wildflowers. The most abundant component of the shrub layer is often samplings of canopy trees. Viburnums, witch hazel, and spicebush may also be in the shrub layer.

On many previously disturbed sites, the dominant canopy trees are now sugar maple and/or tulip poplar as oaks have historically been removed. Associate species may include basswood, white ash, yellow buckeye, hornbeam,

and hop-hornbeam. On mature sites, a dense tree canopy will form a thick layer of ground-level humus and leaf litter. Understory plants are usually species that are shade tolerant.

A large percentage of sites have been converted to agriculture or incurred historic anthropogenic disturbances.

Associated sites

F114XB103IN	**Wet Lacustrine Forest** Wet Lacustrine Forest ecological sites and Lacustrine Forest ecological sites occur on similar landscape positions such as lake plains and terraces. Wet Lacustrine Forest sites generally have more clay percentages resulting in poor drainage. Lacustrine Forest have slopes greater than 5% and Wet Lacustrine Forest are less than 5%.

Similar sites

F114XB502IN	**Wet Till Upland Forest** Wet Till Upland Forest and Lacustrine Forest sites have transitioned from high-quality, old-growth communities to fast-growing, shade-tolerant species or converted into agricultural land. Wet Till Upland Forest has a parent material of till and occurs on till plains, ground moraines, hillslopes and ridges; where Lacustrine Forest has Lacustrine deposits coming from lakes and occur on lake plain, lake terraces, stream terraces and terrace.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Quercus alba*
Shrub	(1) *Lindera benzoin*
Herbaceous	(1) *Sanicula* (2) *Claytonia virginica*

Physiographic features

These sites are found on lake plains, terraces, lake terraces, and stream terraces.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Lake terrace (3) Terrace (4) Stream terrace
Runoff class	Medium to high
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	330–1,000 ft
Slope	5–35%
Water table depth	6–72 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

About 60 percent of the precipitation falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms during summer. Snowfall is common in winter. The freeze-free period averages about 180 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	143-164 days
Freeze-free period (characteristic range)	175-189 days
Precipitation total (characteristic range)	43-47 in
Frost-free period (actual range)	134-168 days
Freeze-free period (actual range)	174-194 days
Precipitation total (actual range)	41-48 in
Frost-free period (average)	153 days
Freeze-free period (average)	183 days
Precipitation total (average)	45 in

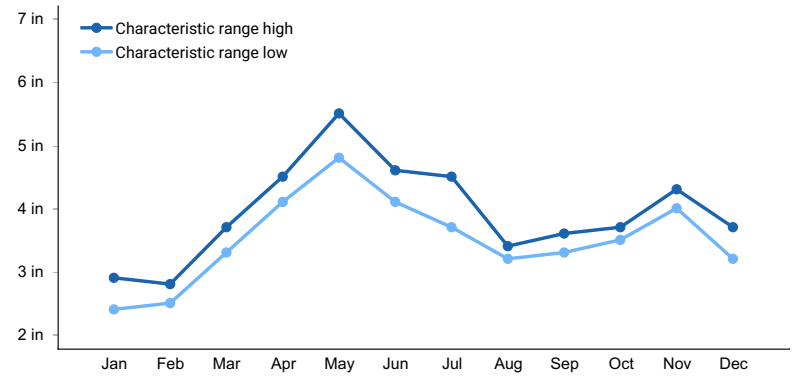


Figure 1. Monthly precipitation range

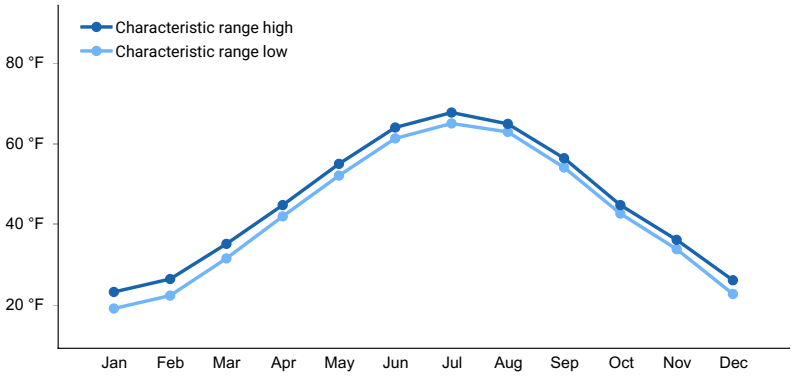


Figure 2. Monthly minimum temperature range

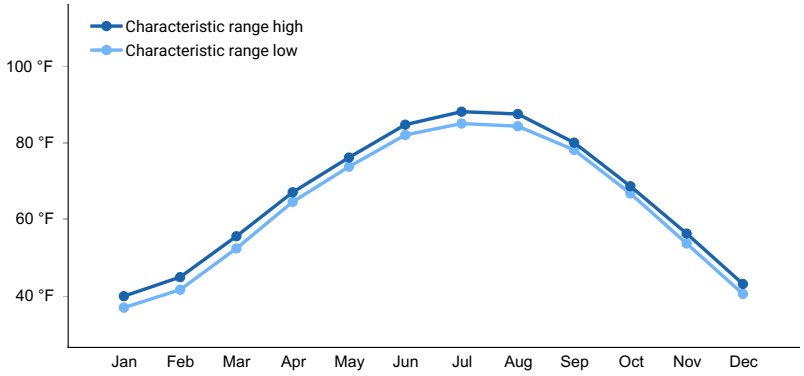


Figure 3. Monthly maximum temperature range

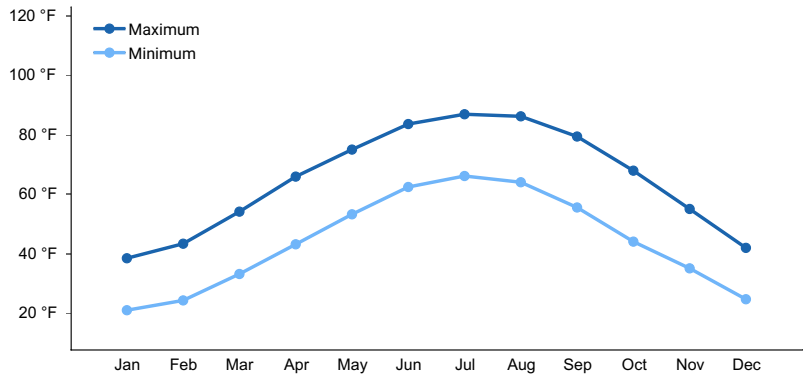


Figure 4. Monthly average minimum and maximum temperature

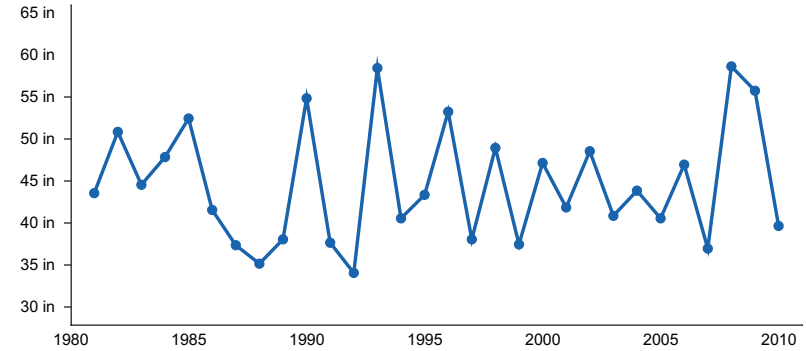


Figure 5. Annual precipitation pattern

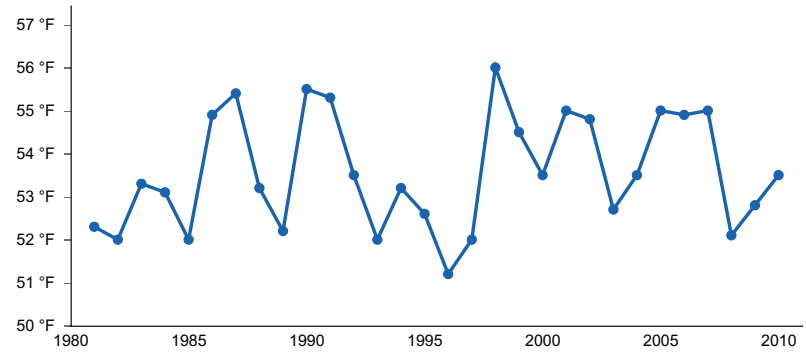


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SPENCER [USC00128290], Spencer, IN
- (2) CARBONDALE SEWAGE PLT [USC00111265], Carbondale, IL
- (3) JERSEYVILLE 2 SW [USC00114489], Jerseyville, IL
- (4) WATERLOO [USC00119002], Waterloo, IL
- (5) SHAKAMAK SP [USC00127959], Jasonville, IN

Influencing water features

Some mapunits in this group may be influenced by riparian features as they are mapped as rarely flooded.

Soil features

Soils are very deep to moderately deep, somewhat poorly drained to well drained, and very slow to moderate permeable soils. They have a very acidic to neutral soil reaction and are formed in very thin to thin loess over lacustrine deposits, lacustrine deposits, thin loess and the underlying paleosol in lacustrine deposits. Series currently include Bartle, Colp, Dubois, Elkinsville, Haubstadt, Markland, Otwell, and Redbud.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits (2) Loess
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Fine (2) Fine-silty
Drainage class	Somewhat poorly drained to well drained
Permeability class	Slow to moderate
Depth to restrictive layer	7–40 in
Soil depth	60–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–7 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.5–7.8
Subsurface fragment volume <=3" (0-40in)	0–3%
Subsurface fragment volume >3" (0-40in)	0%

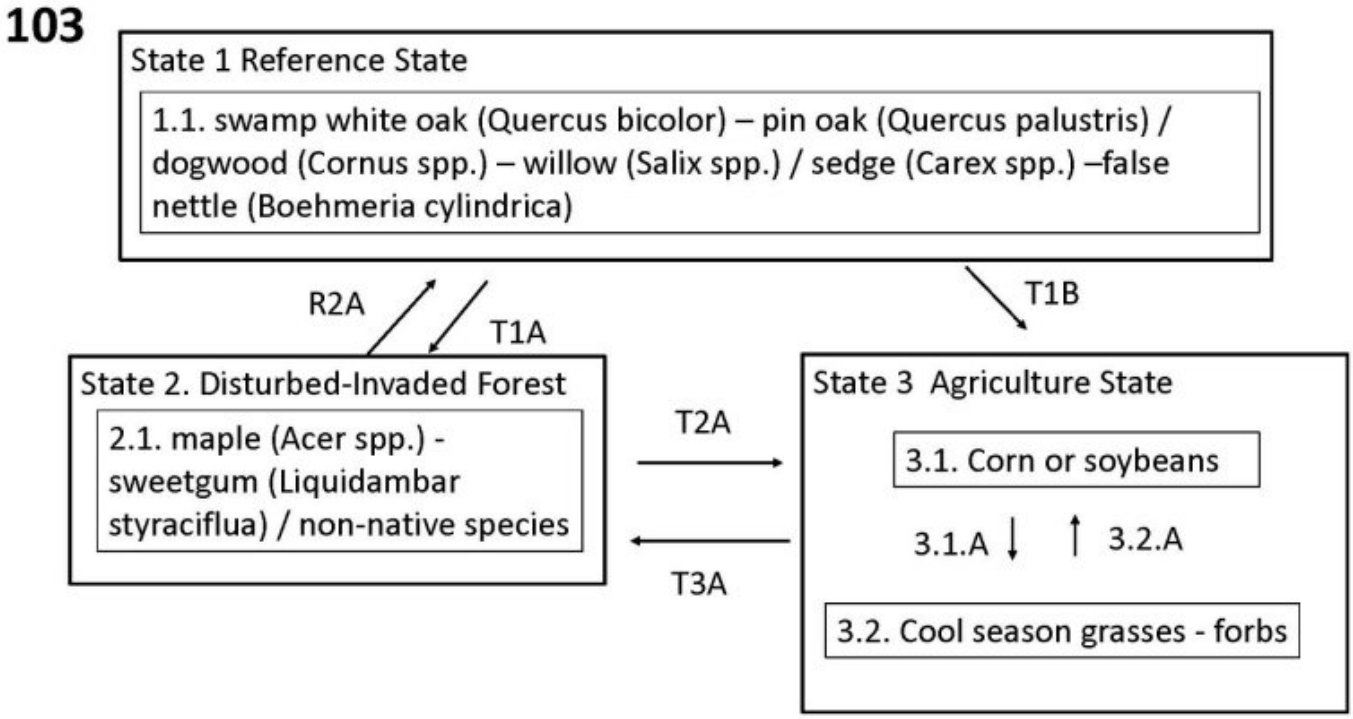
Ecological dynamics

The historic plant community for these ecological sites was a mesic hardwood forest with a substantial oak component. On high quality sites, the major canopy species included northern red oak (*Quercus rubra*), white oak (*Q. alba*), sugar maple (*Acer saccharum*), hickories (Carya spp.), American elm (*Ulmus americana*), and white ash (*Fraxinus americana*). Other associates included American beech (*Fagus grandifolia*), black walnut (*Juglans nigra*), common hackberry (*Celtis occidentalis*), and hophornbeam (*Ostrya virginiana*).

Understory community structure and species will vary depending on topography, canopy density, drainage class and aspect. Future ESD development may result in soils being added or removed from this initial PESD grouping.

Most sites have a history of repeated disturbances including selective logging, clearcutting, grazing, crop production, and the introduction of non-native invasive plant species. Sites that have had oaks removed are usually now dominated by quick growing, shade tolerant species such as sugar maple and tulip poplar.

State and transition model



State 1
Reference State - Forestland

In reference condition, this site was dominated by oaks (northern red oak, white oak), sugar maple, white ash, American elm, and hickories. Other species present may include American beech, hophornbeam, tulip poplar, hackberry, red maple, and black walnut. Historically, full stand replacing disturbance events on these sites were uncommon. Small gap disturbance was the most common disturbance event that allowed propagation of these species. Most sites today have been disturbed and/or cleared for agriculture. Higher sloping sites may still be wooded but have often been disturbed through selective harvest (oak removal), clearcutting, grazing, or introduction of non-native invasive species. Many sites are now dominated by tulip poplar, sugar maple and ash.

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- white oak (*Quercus alba*), tree
- hybrid hickory (*Carya*), tree
- elm (*Ulmus*), tree
- northern spicebush (*Lindera benzoin*), shrub
- sanicle (*Sanicula*), other herbaceous
- springbeauty (*Claytonia*), other herbaceous

Community 1.1
Forestland

The historic plant community for these ecological sites was a deciduous forest with a substantial oak component.

Canopy species included northern red oak (*Quercus rubra*), white oak (*Q. alba*), hickories (Carya spp.), American elm (*Ulmus americana*), and white ash (*Fraxinus americana*). Other associates included American beech (*Fagus grandifolia*), black walnut (*Juglans nigra*), common hackberry (*Celtis occidentalis*), and hophornbeam (*Ostrya virginiana*). Understory community structure and species will vary depending on topography, canopy density, and aspect. Most sites today have been disturbed through oak removal, hydrological modifications, and agricultural uses.

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- white oak (*Quercus alba*), tree
- hybrid hickory (*Carya*), tree
- northern spicebush (*Lindera benzoin*), shrub
- sanicle (*Sanicula*), other herbaceous
- springbeauty (*Claytonia*), other herbaceous

State 2
Disturbed Invaded State

This state is characterized by the establishment and eventual dominance of invasive species in the midstory and/or understory. This greatly reduces the tree, shrub and understory species richness and diversity of the site. Trees that are usually found on these sites include species that are the shade tolerant such as maple and ash. Common invasives in Illinois and Indiana forests include, but are not limited to, Asian bush honeysuckle (*Lonicera maackii*), Callery pear (*Pyrus calleryana* Decne.), garlic mustard (Alliaria petiolate), Japanese stiltgrass (*Microstegium vimineum*), tree-of-heaven (Ailanthus), Japanese honeysuckle (*Lonicera japonica*), and wintercreeper (Euonymus fortune).

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

Community 2.1
Disturbed Invaded State

This phase is characterized by the understory being dominated by woody, mostly non-native, invasive species. Many different species may be present depending on disturbance history and seed sources. Fast growing species such as maple, ash and poplar are often common. The understory is often impacted by non-native species.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

State 3
Agricultural State

Most common practice is a corn and soybean rotation of various types. A small portion of the historic acres are used for forage and pasture. Species will depend upon landowner management objectives.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), other herbaceous
- white clover (*Trifolium repens*), other herbaceous
- corn (*Zea mays*), other herbaceous
- soybean (*Glycine max*), other herbaceous

Community 3.1
Cropland

Most lower slope sites are utilized for agriculture production. Species depend on landowner objectives, but common crops include corn and soybeans.

Dominant plant species

- corn (*Zea mays*), other herbaceous
- soybean (*Glycine max*), other herbaceous

Community 3.2
Forage/Pastureland

This phase is characterized by forage or grazing agriculture. Different mixes of warm and/or cool season grasses and forbs, largely clovers, can be grown. Species selection will depend on site specifics and landowner management objectives.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- brome (*Bromus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- red clover (*Trifolium pratense*), other herbaceous
- white clover (*Trifolium repens*), other herbaceous

Pathway 3.1.A
Community 3.1 to 3.2

Planting of cool and/or warm season forage species and management to maintain them. Forbs may be included in the seeding mix. Species selection will be dependent upon management objectives and site specifics.

Pathway 3.2.A
Community 3.2 to 3.1

Planting, either by conventional or no-till methods, of row crops. Inputs are management activities that keeps the site in row crop production. This pathway is appropriate for lower slope sites only. Species will depend upon landowner management objectives.

Transition T1A
State 1 to 2

Substantial disturbance and the establishment of invasive understory species with no management to control their abundance or distribution.

Transition T1B
State 1 to 3

Clearing of trees and other wood species. Site prepared for planting desired agricultural crops. Practices and species selection depend on management objectives.

Restoration pathway R2A
State 2 to 1

Restoration of these sites will include long-term management inputs including planting of desired species, timber stand improvement activities, brush and weed control, and restoration of hydrology is previously modified.

Transition T2A
State 2 to 3

Clearing of trees and other wood species. Prepare the site for planting desired agricultural crops. Practices and species selection depend on management objectives.

Transition T3A
State 3 to 2

Abandonment of farm fields leads to successional species including a number of weed and brush species. Establishment of invasive understory species may occur with no management to control their abundance or distribution. Tree species will depend on seed sources and favor fast-growing species.

Additional community tables

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities and ecological dynamics for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional. Reference and alternative states within the state-and-transition model are not yet well-documented or supported and will require additional field sampling for refinement.

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Approval

Suzanne Mayne-Kinney, 11/16/2023

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)	
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Date	05/11/2025
Approved by	Suzanne Mayne-Kinney
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):**

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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):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**