USDA Natural Resources Conservation Service

Ecological site F114XB103IN
Wet Lacustrine Forest

Last updated: 11/16/2023
Accessed: 04/26/2024

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): 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. Local relief is mainly 10 to 50 feet (3 to 15 meters), but it can be 50 to 100 feet (15 to 30 meters) along drainageways and streams. It generally is low on broad, flat till plains and flood plains and high on the dissected hills bordering rivers or drainage systems.

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:
Domain: Humid Temperate Domain
Division: Hot Continental Division
Province: Eastern Broadleaf Forest (Continental)
Province Code: 222

Ecological site concept

The Wet Lacustrine Forest reference community is a wet deciduous forest with a substantial oak component. Dominant canopy species include pin oak (Quercus palustris) and/ or swamp white oak (Quercus bicolor). Other hardwood trees include silver maple (Acer saccharinum), green ash (Fagus pennsylvanica), and sweetgum (Liquidambar styraciflua). Differences in topography will result in a mosaic of plant species ranging from wet to wet-mesic. Due to microtopography and flooding/ponding regimes, the understory composition of these communities will vary. Common species on the wettest areas include willows (Salix spp.), Osmunda, buttonbush (Cephalanthus occidentalis), alders (Alnus spp.) and hollies (Ilex spp.). Drier zones will include more mesic forest understory species.

Associated sites

F114XB104IN	**Lacustrine Forest** Lacustrine Forest ecological sites and Wet Lacustrine Forest ecological sites occur on similar landscape positions such as lake plains and terraces. Lacustrine Forest sites generally have less clay percentages resulting in better drainage. Lacustrine Forest have slopes greater than 5% and Wet Lacustrine Forest are less than 5%.

Similar sites

F114XB203IN	**Wet Floodplain Forest** Both the Wet Floodplain Forest and Wet Lacustrine Forest ecological sites occur on floodplains and low stream terraces with little to no slope. These sites often have frequent ponding with a similar diverse vegetation community. The Wet Lacustrine Forest parent material is Lacustrine deposits from lakes where as Wet Floodplain Forest is alluvium and carried by streams and creeks.

Table 1. Dominant plant species

Tree	(1) *Quercus palustris* (2) *Quercus bicolor*
Shrub	(1) *Cornus* (2) *Salix*
Herbaceous	(1) *Carex* (2) *Boehmeria cylindrica*

Physiographic features

Sites are generally found on depressions, flats, lake plains and terraces

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Flat (3) Lake plain (4) Terrace
Runoff class	Low to high
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	340–1,000 ft
Slope	0–2%
Ponding depth	0–6 in
Water table depth	0–24 in
Aspect	Aspect is not a significant factor

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)	143-158 days
Freeze-free period (characteristic range)	175-186 days

Precipitation total (characteristic range)	41-46 in
Frost-free period (actual range)	134-166 days
Freeze-free period (actual range)	174-187 days
Precipitation total (actual range)	41-48 in
Frost-free period (average)	150 days
Freeze-free period (average)	181 days
Precipitation total (average)	44 in

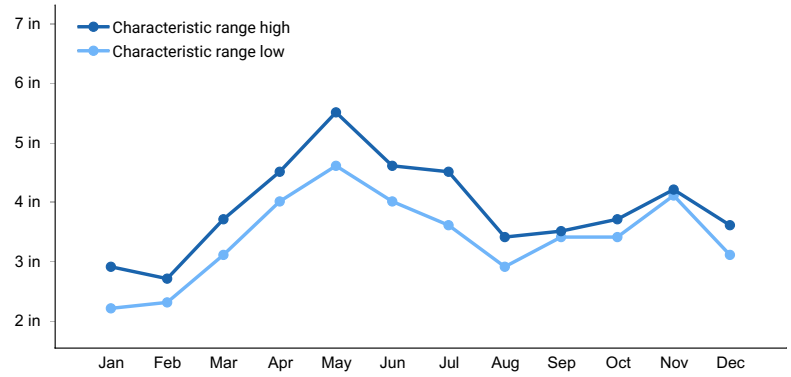


Figure 1. Monthly precipitation range

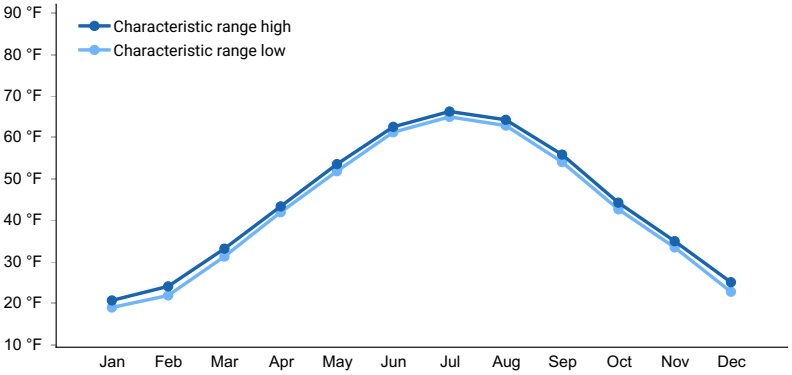


Figure 2. Monthly minimum temperature range

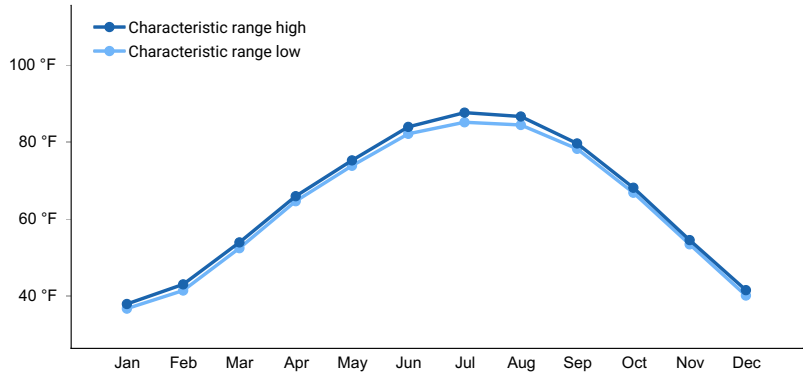


Figure 3. Monthly maximum temperature range

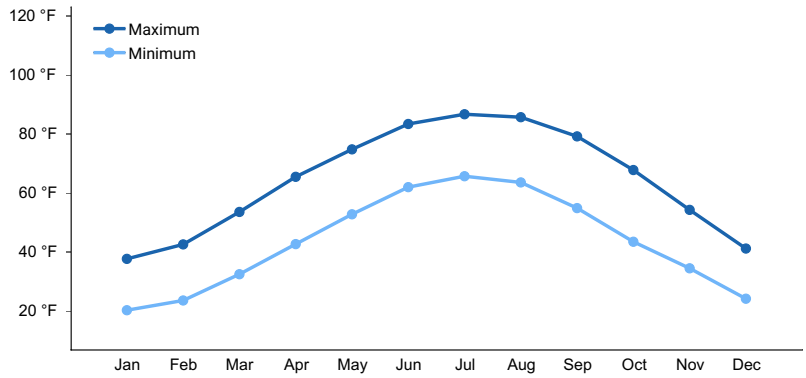


Figure 4. Monthly average minimum and maximum temperature

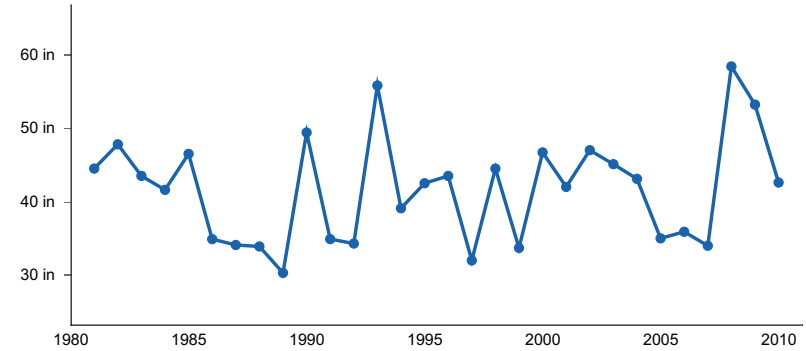


Figure 5. Annual precipitation pattern

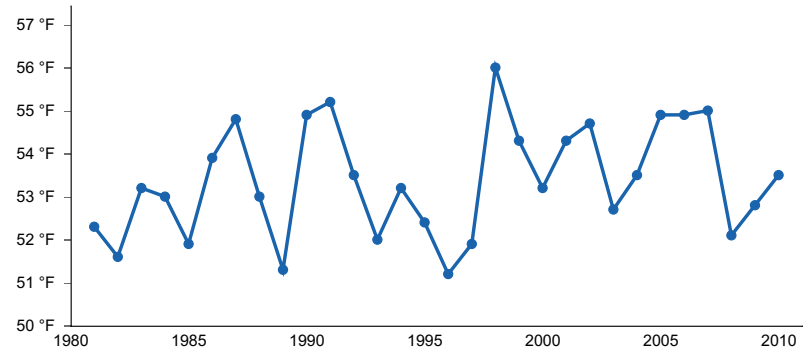


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SHAKAMAK SP [USC00127959], Jasonville, IN
- (2) PANA 3E [USC00116579], Pana, IL
- (3) JERSEYVILLE 2 SW [USC00114489], Jerseyville, IL
- (4) CARBONDALE SOUTHERN IL AP [USW00093810], De Soto, IL
- (5) SPENCER [USC00128290], Spencer, IN

Influencing water features

These sites may be influenced by both flooding and ponding. Flooding can be rarely with a brief (2-7 days) duration. Ponding is often frequent with a duration of very brief to brief. Ponding depth has an average maximum of 6 inches. (Source: Ecosite summary report from NASIS, 9/19)

Soil features

Soils are poorly drained to somewhat poorly drained, and very slow to moderate permeable soils, with strongly acidic to neutral soil reaction, that formed in loess and lacustrine deposits. Series currently include Bartelso, Floraville, McGary, Montgomery, Muren, Okaw, Peoga, Wagner, and Zipp. Floraville, Okaw, and Wagner have an

abrupt textural change usually found between 10 to 20 inches in depth.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits (2) Loess
Surface texture	(1) Silt loam (2) Silty clay loam (3) Silty clay
Family particle size	(1) Coarse-silty over sandy or sandy-skeletal (2) Fine-silty
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to moderate
Soil depth	60–80 in
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5–8 in
Calcium carbonate equivalent (0-40in)	0–5%
Soil reaction (1:1 water) (0-40in)	4.5–7.3
Subsurface fragment volume <=3" (0-40in)	0–2%
Subsurface fragment volume >3" (0-40in)	0%

Ecological dynamics

These sites formed in lacustrine parent materials. The soils in this group somewhat poorly drained to poorly drained. Sites generally occur on nearly level to depressional areas of stream terraces, till plains, and glacial lake plains. Sites may incur frequent flooding and/or ponding.

The historic reference state for these sites was likely a mixed oak forest with pin oak and swamp white oak dominant. Other common trees would include silver maple, red maple, sweetgum and green ash. Most of these sites have been cleared for agricultural use. The remaining wooded sites usually have a history of disturbance including selective harvest, clearing, grazing, or hydrological modification. Few high quality older communities remain intact today. Most wooded sites are dominated by shade tolerant, quick growing, tree species that propagate easily such as maples, ashes, and cottonwoods.

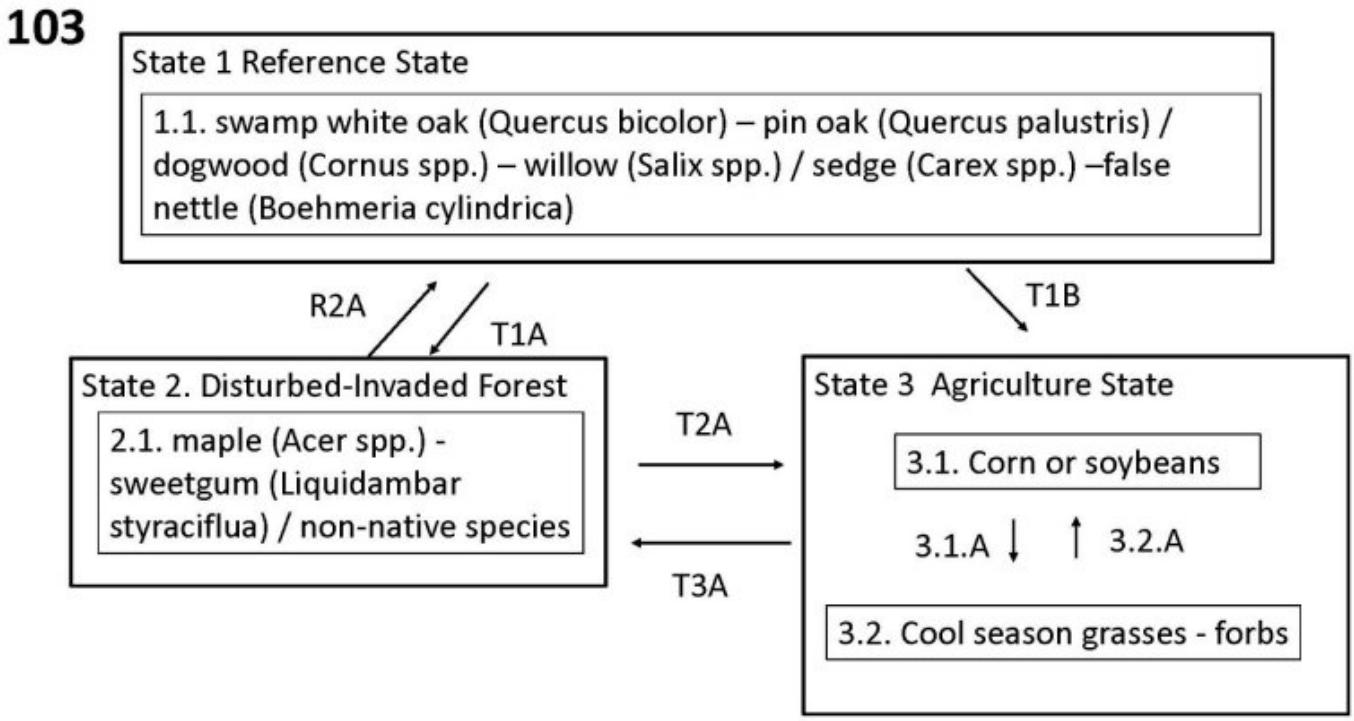
Topography and seasonal fluctuation of water (ponding) on these sites may create a diverse vegetative community that gradients from wet-mesic upland tree species to zones of flood-tolerant lowland tree species. Inundation of the site generally occurs in the spring and depending on the length of inundation, may leads to a sparse understory.

Historically, fire did periodically occur on these sites, but frequent and high intensity fires were very rare.

Ponding in the spring followed by summer drought along with small patch windthrow were the most dominant natural disturbance factors for mature forests. Most of these sites now have had repeated anthropogenic disturbances including clearing, grazing, hydrological modifications, and/or selective timber harvest that has removed the more desirable oak species. That results in a site where the canopy is dominated by fast-growing, shade-tolerant, species such as green ash, red maple, silver maple, boxelder, and black gum. Oak regeneration is greatly reduced in these cases. A large percentage of these sites have substantial hydrological modifications to allow for agriculture (tiling, ditching). Most of the converted acres are used for small grain rotations, specifically corn and soybeans. A smaller percentage of these sites are still used for growing forage. These sites are predominately

cool season grass species and legumes such as tall fescue and clover species.

State and transition model



State 1
Reference State

Historically, this state is a wet deciduous forest with a major oak component. Species included swamp white oak, pin oak, silver maple, green ash, red maple, sweetgum, cottonwood and black gum. The understory was an array of wet tolerant understory native species that varied in density and species richness depending on topography, drainage, presence/absence of flooding. Today, most sites have had the oaks removed and the hydrology modified. Maples and ash are common.

Dominant plant species

- swamp white oak (*Quercus bicolor*), tree
- pin oak (*Quercus palustris*), tree
- silver maple (*Acer saccharinum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- willow (*Salix*), shrub
- alder (*Alnus*), shrub
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- smallspike false nettle (*Boehmeria cylindrica*), other herbaceous
- osmunda (*Osmunda*), other herbaceous

Community 1.1
Forestland

The historic reference state for these sites was a wet deciduous forest with an oak component with pin oak and swamp white oak dominant. Other common trees would include silver maple, red maple, sweetgum and green ash.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree
- silver maple (*Acer saccharinum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- willow (*Salix*), shrub
- dogwood (*Cornus*), shrub
- alder (*Alnus*), shrub
- sedge (*Carex*), grass
- smallspike false nettle (*Boehmeria cylindrica*), other herbaceous
- osmunda (*Osmunda*), other herbaceous

State 2
Disturbed-Invaded State

This phase is characterized by canopy disturbance such as clearing the site or removal of high value tree species (usually oaks) with little to no timber standing improvement activities following the harvest or disturbance. The result is often a mixed deciduous woodland without a major oak component. Common species are often am mix of red maple, silver maple, green ash, cottonwood, sweetgum, and hackberry. Numerous non-native species can invade these states. Hydrology may have been altered. Species will depend on disturbance severity/length and seed sources.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- cottonwood (*Populus*), tree
- honeysuckle (*Lonicera*), shrub
- sedge (*Carex*), grass
- reed (*Phragmites*), grass
- purple loosestrife (*Lythrum salicaria*), other herbaceous
- garlic mustard (*Alliaria petiolata*), other herbaceous

Community 2.1
Disturbed-Invaded Woodland

This phase is characterized by substantial disturbances such as clearing the site or removal of oaks. The result is often a mixed deciduous woodland without a major oak component. Common species are often am mix of red maple, silver maple, green ash, boxelder, cottonwood, sweetgum, and hackberry. Species composition will depend on seed sources. Disturbances, such as timber harvesting, often introduce non-native species that can gain dominance.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- cottonwood (*Populus*), tree
- sedge (*Carex*), grass
- reed (*Phragmites*), grass
- purple loosestrife (*Lythrum salicaria*), other herbaceous

State 3
Agriculture

This state is characterized by the conversion of the site to agricultural use. 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 planted will depend on landowners management objectives.

Dominant plant species

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

Community 3.1
Cropland

Species will vary depending on owner's management objectives. Corn - soybean rotations are common. Many sites will require ditching/tiling.

Dominant plant species

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

Community 3.2
Pasture / Forage Community

Warm and/or cool season grasses may be utilized, with cool season grasses the most common. Pasture seeding usually includes forbs such as white or red clover. Exact species composition will depend on Landowner management and production goals.

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

Transition of a crop field to pasture will require a number of management inputs including seeding and weed control. Numerous species may be planted depending on landowner goals.

Pathway 3.2.A
Community 3.2 to 3.1

This pathway is from forage production or pasture to a cropland phase. Management inputs will including site preparation, seeding, and weed control. Hydrological modifications may also be implemented. Species will depend on landowner goals and objectives. Common row crops including corn, soybeans, wheat and other small grains.

Transition T1A
State 1 to 2

Removal of high value timber; specifically, the removal of oaks. Little or no post-harvest timber stand management. Disturbance often results in the introduction of non-native species.

Transition T1B
State 1 to 3

Clearing of mature high-quality forest for conversion to agricultural production. Landowners should be aware of wetland protection requirements prior to clearing.

Restoration pathway R2A
State 2 to 1

Restoration of site would include planting of oaks and timber stand improvement activities to insure high value trees thrive. Long-term management efforts to control invasive species. Restoration of natural hydrology may be needed.

Transition T2A
State 2 to 3

Transition from forest to agricultural state. Activities and species planted would be determined by the landowner's production objectives. Landowners should be aware of wetland protection requirements prior to clearing.

Transition T3A
State 3 to 2

Cropland or pastureland that is abandoned will over time transition to a mixed deciduous woodland usually dominated by fast growing trees such as maple, ash, elm, etc. Non-native species may be a large component of the site.

Constraints to recovery. Abandonment

Additional community tables

Inventory data references

No field plots were evaluated for this PES. A review of the scientific literature was 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 based on the sources identified in ecological site description (ESD). ESD development is needed to conduct field surveys and verify the hypotheses in this PES narrative.

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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)	
Contact for lead author	
Date	04/26/2024
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:**

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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):**

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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:**
