USDA Natural Resources Conservation Service

Ecological site F114XB804IN
Silty Eolian 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. 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 (Cleland et al. 2007):
Domain: Humid Temperate Domain
Division: Hot Continental Division
Province: Eastern Broadleaf Forest (Continental)
Province Code: 222

NatureServe Ecological System(s) and/or Associations:
The following NatureServe Explorer Ecological System Record has a substantial 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)
CLASSIFIERS

Ecological site concept

The Silty Eolian Forest historic reference site is a old-growth deciduous forest with a substantial oak component. Species include northern red oak, white oak, bur oak, shagbark hickory, mockernut hickory, and white ash. The understory community on these sites will vary depending on topography, canopy density and finer soil characteristics. Common species include trilliums, viburnums, tick trefoils, spikenards, and serviceberry. Topography differences, including even small changes, will result in subtle differences in species.

White oak, northern red oak, hickories and American beech are common in the better-drained areas. Associate species include ash, elm, and maple. Areas that are less drained and on flat topography may also include wetter species.

Reduction in fire frequency and other disturbances have resulted associate species gaining dominance. Tulip poplar, sugar maple, white ash, American elm, and American hophornbeam now dominant many of the remaining wooded sites.

Few high-quality, old-growth communities remain.

Associated sites

F114XB803IN	**Wet Silty Eolian Forest** The Wet Silty Eolian Forest ecological site and the Silty Eolian Forest ecological site occur on adjacent landscape positions. Silty Eolian Forest either have water table seasonally during the rainy season or no water table where as the Wet Silty Eolian Forest has a water table year round.

Similar sites

F114XB503IN	**Till Upland Forest** Till Upland Forest ecological sites and Silty Eolian Forest ecological sites occurs on similar landscapes such as till plains. These sites have well or moderately well drained soils along with a seasonally high water table. Till Upland Forest soils are formed in till whereas the Silty Eolian Forest soils are formed in loess.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Quercus alba*
Shrub	(1) *Cornus* (2) *Amelanchier*
Herbaceous	(1) *Desmodium* (2) *Trillium*

Physiographic features

These sites are on unique landforms including loess hill, and till plain.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Till plain (3) Esker
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	340–1,020 ft
Slope	0–15%
Water table depth	12–36 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 185 days and ranges from 190 to 225 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	149-159 days
Freeze-free period (characteristic range)	178-190 days
Precipitation total (characteristic range)	41-45 in
Frost-free period (actual range)	136-164 days
Freeze-free period (actual range)	175-194 days
Precipitation total (actual range)	40-47 in
Frost-free period (average)	151 days
Freeze-free period (average)	185 days
Precipitation total (average)	43 in

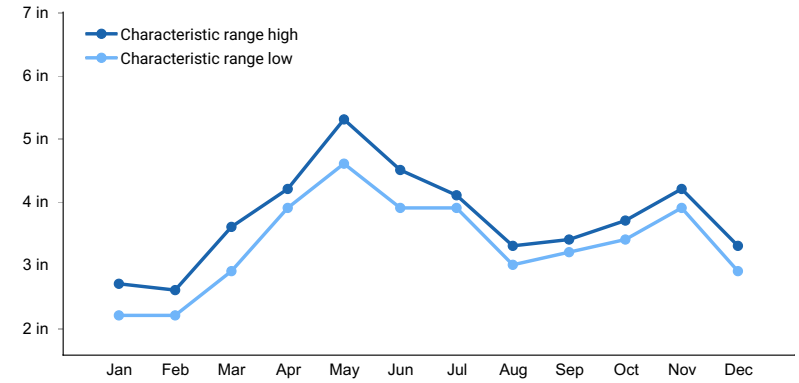


Figure 1. Monthly precipitation range

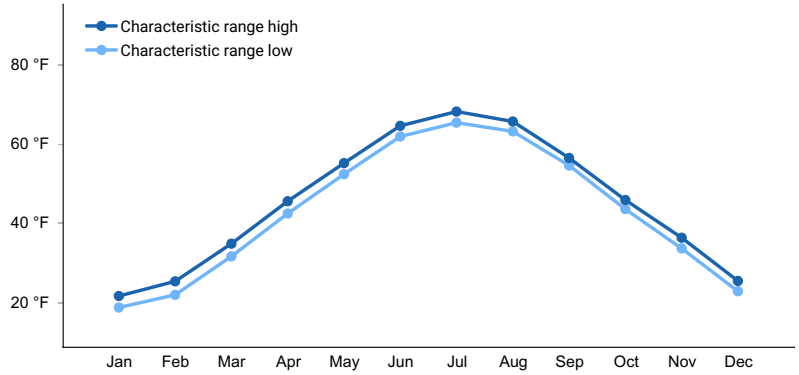


Figure 2. Monthly minimum temperature range

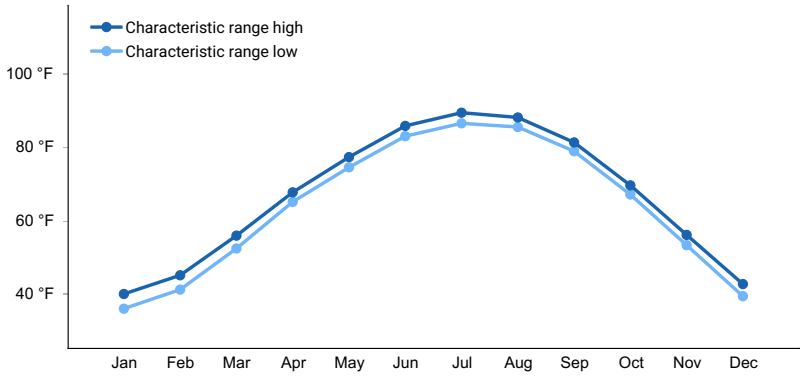


Figure 3. Monthly maximum temperature range

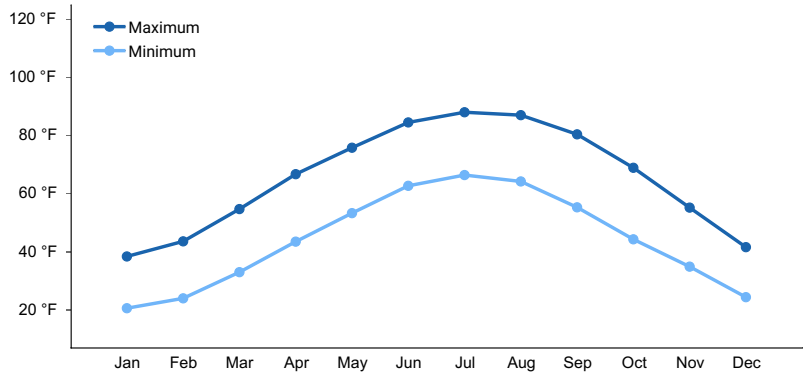


Figure 4. Monthly average minimum and maximum temperature

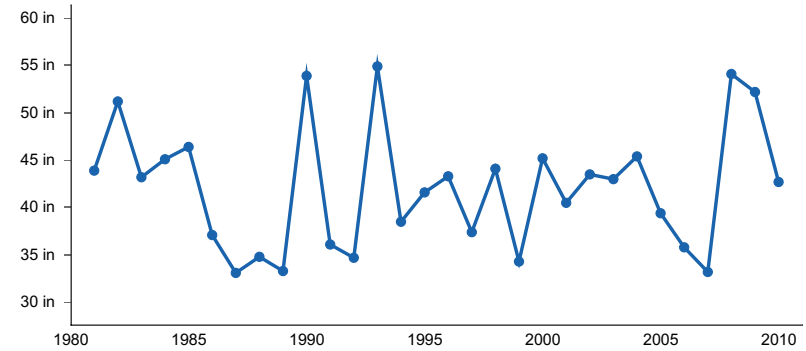


Figure 5. Annual precipitation pattern

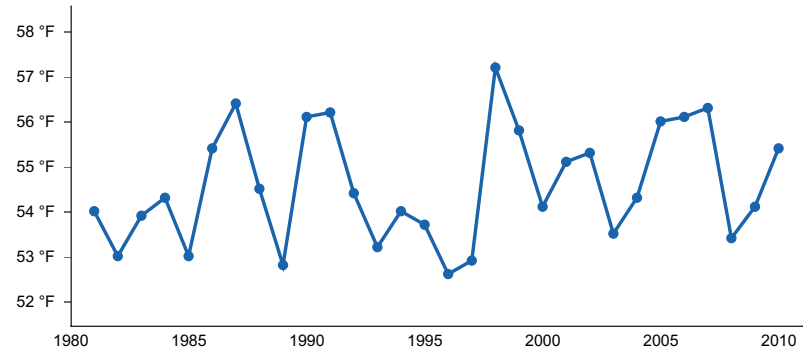


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SPENCER [USC00128290], Spencer, IN
- (2) SPARTA 1 W [USC00118147], Sparta, IL
- (3) BELLEVILLE SIU RSCH [USW00013802], Mascoutah, IL
- (4) HILLSBORO [USC00114108], Hillsboro, IL
- (5) PANA 3E [USC00116579], Pana, IL
- (6) CARLINVILLE [USC00111280], Carlinville, IL

Influencing water features

This ecological site is not influenced by wetland or riparian water features. Many sites in this group are influenced by a seasonal high water table.

Soil features

Soils in this group are very deep, moderately drained to well drained. Most sites have a seasonally high water table. Series currently include Medora, Weisburg, Nabb, and Spickert.

Table 4. Representative soil features

Parent material	(1) Loess
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Fine-silty
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4–7.3 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)	4.5–7.8
Subsurface fragment volume <=3" (0-40in)	0–6%
Subsurface fragment volume >3" (0-40in)	0%

Ecological dynamics

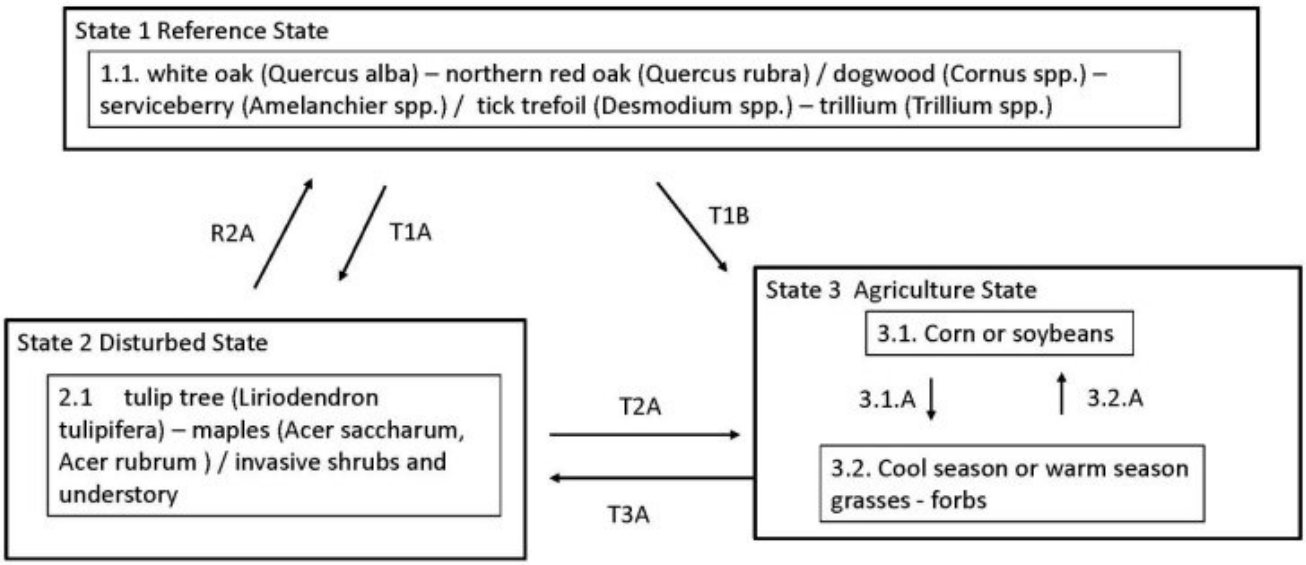
The ecological site concept for these sites is that of a mature deciduous forest with a substantial oak component. Historically, these sites were dominated by fire resistant tree species including northern red oak, white oak, bur oak, shagbark hickory, sugar maple, mockernut hickory, and white ash. The understory community varies depending on topography, canopy density and finer soil characteristics but often included trilliums, viburnums, tick trefoils, spikenards, and serviceberry.

Reduction in fire frequency has resulted in less oak regeneration and associate species to gain dominance. Tulip poplar, sugar maple, red maple, black walnut, white ash, American elm, and American hophornbeam now dominant many of the remaining wooded sites.

Few high-quality, old-growth communities remain. Disturbances include clear cutting, selective removal (removing oaks), non-native vegetation, fire suppression, and grazing. Invasive vegetation is especially problematic in many locations. Agriculture is now the largest use of these soils in MLRA 114X.

State and transition model

MLRA 114B -Illinois and Indiana – Silty Eolian Forest - F114BY804IN



State 1
Reference State

The reference community of a mature, oak-hickory, forest with a variety of oak and hickory species possible including *Quercus rubra*, *Quercus alba*, *Quercus macrocarpa*, *Carya ovata*, *Carya cordiformis*, and Carya alba. Associates may include black walnut, American hophornbeam, tulip poplar, sugar maple, red maple, American elm, and white ash. Numerous species compose the understory.

Dominant plant species

- white oak (*Quercus alba*), tree
- northern red oak (*Quercus rubra*), tree
- mockernut hickory (*Carya tomentosa*), tree
- white ash (*Fraxinus americana*), tree
- dogwood (*Cornus*), shrub
- serviceberry (*Amelanchier*), shrub
- ticktrefoil (*Desmodium*), other herbaceous
- trillium (*Trillium*), other herbaceous
- sanicle (*Sanicula*), other herbaceous

Community 1.1
Reference Community

These sites historically were a mature oak-hickory forest with various associate species. Understory composition is diverse. Common tree species include white oak, northern red oak, mockernut hickory, shagbark hickory, sugar

maple, black walnut, wild black cherry, and white ash. Understory communities are diverse with numerous species possible.

Dominant plant species

- white oak (*Quercus alba*), tree
- northern red oak (*Quercus rubra*), tree
- mockernut hickory (*Carya tomentosa*), tree
- white ash (*Fraxinus americana*), tree
- dogwood (*Cornus*), shrub
- serviceberry (*Amelanchier*), shrub
- ticktrefoil (*Desmodium*), other herbaceous
- trillium (*Trillium*), other herbaceous
- sanicle (*Sanicula*), other herbaceous

State 2
Disturbed Invaded State

The site has incurred substantial disturbances changing the species composition. Often the disturbance is selective harvesting or clearing. Species regeneration will depend on the type and severity of the disturbance, as well as the available seed source and any post management activities. Various species may be present.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- cottonwood (*Populus*), tree
- tuliptree (*Liriodendron tulipifera*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous
- winter creeper (*Euonymus fortunei*), other herbaceous

Community 2.1
Disturbed Invaded Community

Remaining wooded sites generally have a history of disturbance including an altered fire regime, non-native vegetation, selective harvest, past clear cutting, and/or grazing. On many locations the oaks have been removed or fire has been suppressed for so long that the forest community is dominated by species such as maples, ashes, and tulip poplar. Non-native vegetation is a concern on many sites and can include numerous species.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- tuliptree (*Liriodendron tulipifera*), tree
- cottonwood (*Populus*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous
- winter creeper (*Euonymus fortunei*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous

State 3
Agricultural State

This state is characterized by the conversion of the site to agricultural use. Most common practice is row crop production, often a corn and soybean rotation . A small portion of the historic acres are used for forage and pasture. Species will depend upon landowner objectives and management goals.

Dominant plant species

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

Community 3.1
Cropland

Numerous row crops are feasible for these sites and species selection and management will be determined by landowner management goals.

Dominant plant species

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

Community 3.2
Pastureland

This phase is characterized by forage or grazing agriculture. Different mixes of, generally, cool season or warm season grasses and forbs, largely clovers, can be produced.

Dominant plant species

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

Pathway 3.1.A
Community 3.1 to 3.2

Planting of cool or warm season pasture/forage species and management to maintain them.

Pathway 3.2.A
Community 3.2 to 3.1

Planting, either by conventional or no-till methods, of row crop. Management that keeps the site in row crop production. Species will depend upon landowner objectives.

Transition T1A
State 1 to 2

Large scale disturbance (clearing, oak removal) followed by no management. Site will transition based on natural regeneration. The disturbance usually introduces non-native plants. Species will depend on the type and intensity of disturbance and available seed sources.

Transition T1B
State 1 to 3

Forest conversion to agricultural production. Management inputs and species planted will depend upon landowner objectives.

Restoration pathway R2A
State 2 to 1

Restoration of site would include planting of oaks and long-term brush/weed control and timber stand improvement activities to insure oak and hickories thrive.

Transition T2A
State 2 to 3

Transition from forest to agricultural state. Activities would be determined by the landowner's production objectives.

Transition T3A
State 3 to 2

Cropland or pastureland that is abandoned will slowly, but naturally, transition to a mixed deciduous woodland usually dominated fast-growing species such as ash, tuliptree, maples, elms, etc.

Additional community tables

Inventory data references

No field monitoring was conducted as part of this PES development. Future ESD development may result in plant community edits, soil mapunits being added or removed from this grouping, and/or additions or modifications to the narratives, tables, vegetation descriptions and state and transition model.

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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)	A. Arends, ESI Specialist
Contact for lead author	
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:**

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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:**
