USDA Natural Resources Conservation Service

Ecological site R114XB902IN
Wet Upland Prairie

Last updated: 11/16/2023
Accessed: 05/07/2024

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

The following NatureServe Ecological System has a high level of probability to match the ecological site found on these soils: Central Tallgrass Prairie CES205.683

Ecological site concept

The Wet Upland Prairie sites are part of the Central Tallgrass Prairie System (NatureServe) which ranges from eastern Kansas and Nebraska to northwestern Indiana. This system differs from other prairie systems to the north and south by being the most mesic with primarily deep, rich Mollisol soils. These soils are usually greater than 1 meter deep. This system is dominated by tallgrass species such as big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). These species typically grow to 1-2 m tall in the rich soils found in this system. Wet grasses include prairie cordgrass (Spartina pectinata), rush (Juncus spp.), and bluejoint (Calamagrostis canadensis). Other mid- and shortgrass species, such as sideoats grama (Bouteloua curtipendula) and little bluestem (Schizachyrium scoparium) are often present and can be common or locally

dominant on patches of this system, particularly slopes or other areas with drier habitats. Herbaceous species on Wet Upland Prairie sites include common cinquefoil (Potentilla simplex), rattlesnake master (Eryngium yuccifolium), fourflower yellow loosestrife (Lysimachia quadriflora), sawtooth sunflower (Helianthus grosseserratus), and narrow-leaved meadowsweet (Spiraea alba).

Historically, fires prevented the invasion of shrubs and trees.

High-quality examples of Wet Upland Prairie sites have trees and shrubs widely scattered or clustered in areas that are wetter and/or more sheltered from fire than the surrounding grassland. Fire, drought, and grazing are the primary natural dynamics influencing this system and help prevent woody species from invading.

Most of these sites have been converted to agricultural production and few, high-quality communities still exist.

Associated sites

R114XB903IN	**Upland Prairie** The Upland Prairie ecological site and the Wet Upland Prairie ecological site occurs on similar landscapes with the Upland Prairie site on higher landscapes such as till plains, knolls, and ridges. The Upland Prairie sites are moderately well to well drained with a season water table from 24 to 42 inches in depth whereas Wet Upland Prairie sites are somewhat poorly to poorly drained with a year round water table from 0 to 24 inches in depth.
R114XB901IN	**Sodium Affected Uplands** Sodium Affected Upland ecological site and the Wet Upland Prairie ecological site occurs on similar landscapes and are often intermixed with little to no slope. The Sodium Affected Upland sites have high sodium soils that include a restrictive layer.

Similar sites

R114XB903IN	**Upland Prairie** The Upland Prairie ecological site and the Wet Upland Prairie ecological site occurs on similar landscapes such as ground moraines and till plains. Both sites have very deep soils; however, the Upland Prairie sites are moderately well to well drained with a season water table from 24 to 42 inches in depth whereas Wet Upland Prairie sites are somewhat poorly to poorly drained with a year round water table from 0 to 24 inches in depth.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cornus obliqua* (2) *Cornus racemosa*
Herbaceous	(1) *Andropogon gerardii* (2) *Panicum virgatum*

Physiographic features

Site are found on depressions, ground moraines, and till plains.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Ground moraine (3) Till plain
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent

Elevation	330–1,020 ft
Slope	0–5%
Water table depth	6–24 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 185 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	147-167 days
Freeze-free period (characteristic range)	178-193 days
Precipitation total (characteristic range)	41-45 in
Frost-free period (actual range)	136-169 days
Freeze-free period (actual range)	174-195 days
Precipitation total (actual range)	41-47 in
Frost-free period (average)	155 days
Freeze-free period (average)	185 days
Precipitation total (average)	44 in

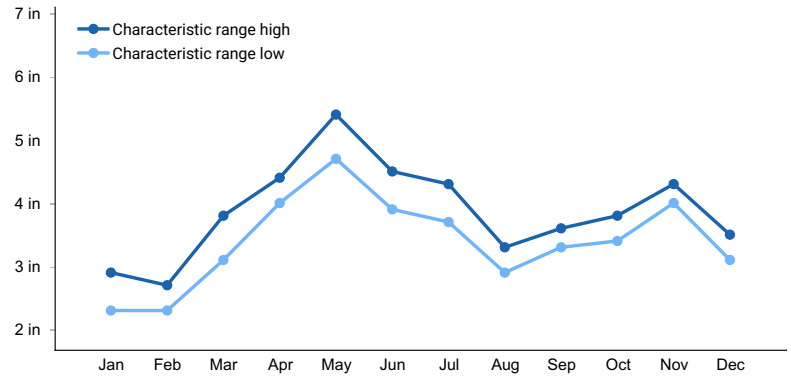


Figure 1. Monthly precipitation range

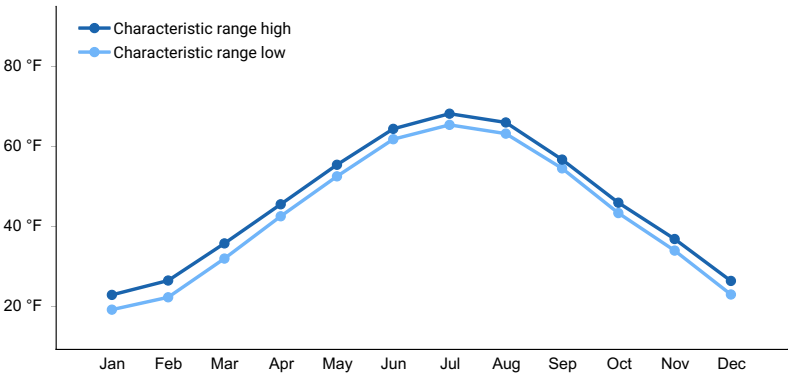


Figure 2. Monthly minimum temperature range

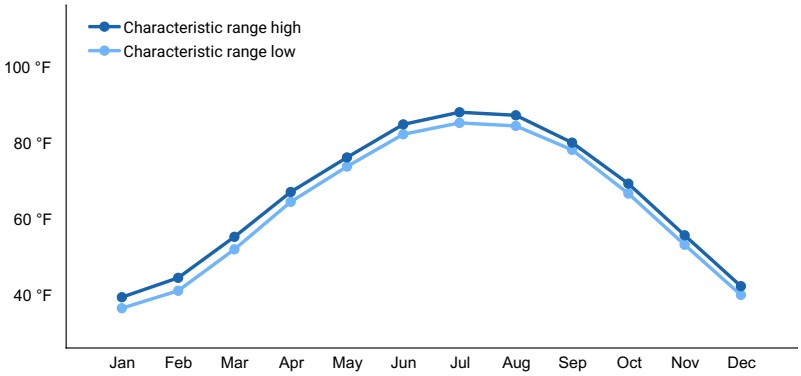


Figure 3. Monthly maximum temperature range

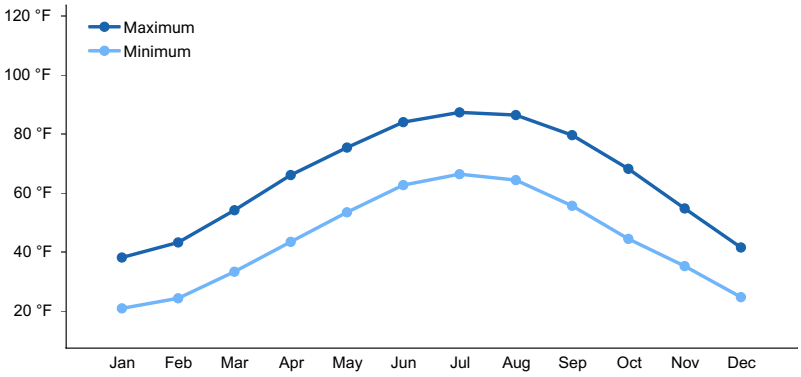


Figure 4. Monthly average minimum and maximum temperature

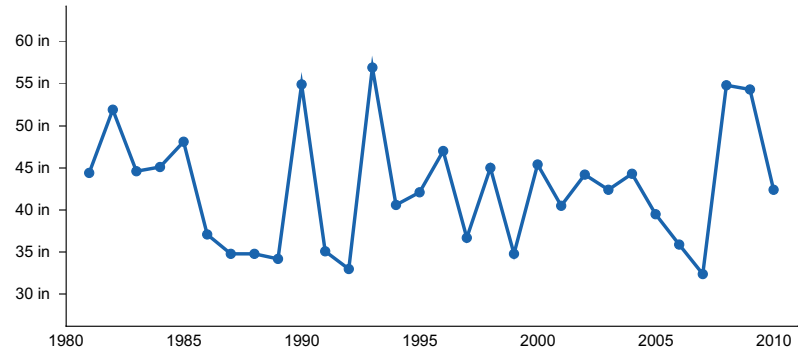


Figure 5. Annual precipitation pattern

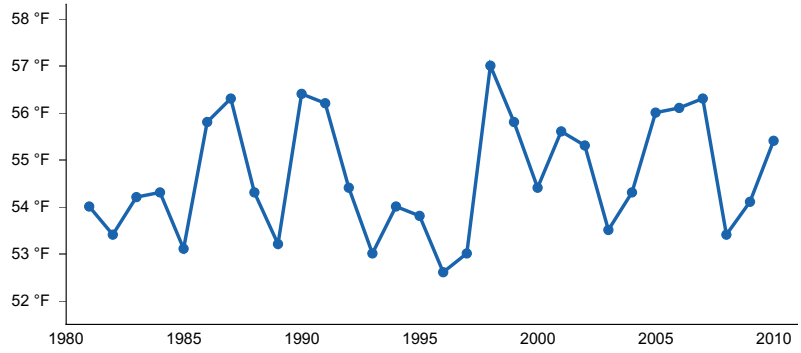


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SPENCER [USC00128290], Spencer, IN
- (2) SPARTA 1 W [USC00118147], Sparta, IL
- (3) HILLSBORO [USC00114108], Hillsboro, IL

- (4) CARBONDALE SOUTHERN IL AP [USW00093810], De Soto, IL
- (5) SHAKAMAK SP [USC00127959], Jasonville, IN
- (6) PANA 3E [USC00116579], Pana, IL
- (7) WATERLOO [USC00119002], Waterloo, IL
- (8) JERSEYVILLE 2 SW [USC00114489], Jerseyville, IL

Influencing water features

This site has a water table from 6 to 24 inches and may pond briefly for up to 7 days.

Wetland description

Soils in this group may contain wetlands which fit into the MINERAL FLAT class in the hydrogeomorphic (HGM) system. Today, most sites are being used for agricultural production and the wetland hydrology has been modified through ditching and tiling.

Soil features

Soils are very deep, somewhat poorly to poorly drained and formed in loess.
Soils included in this initial group are Bethalto, Herrick, Keller, and Virden. Sites have seasonal high water tables.

Table 4. Representative soil features

Parent material	(1) Loess (2) Pedisediment
Surface texture	(1) Silt loam
Family particle size	(1) Fine (2) Fine-silty
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to moderate
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5.8–8.8 in
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	5.1–7.8
Subsurface fragment volume <=3" (0-40in)	0–5%
Subsurface fragment volume >3" (0-40in)	0–2%

Ecological dynamics

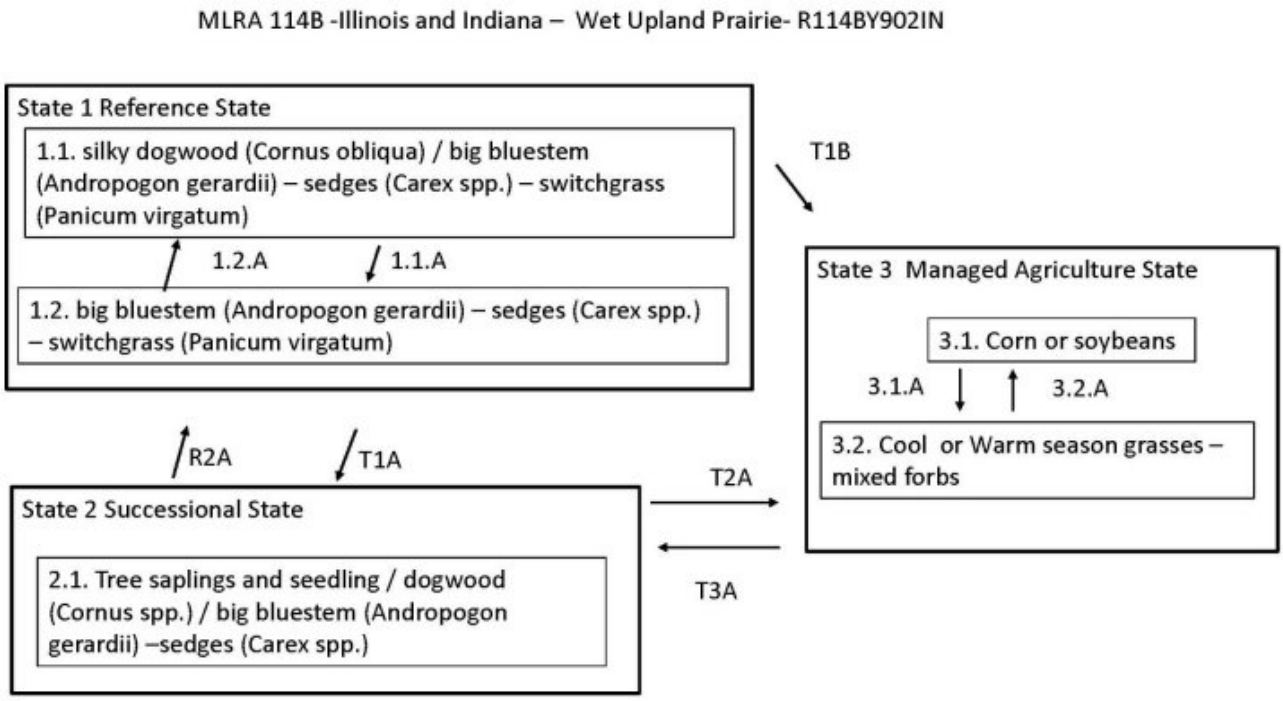
Fire, drought, and grazing are the primary natural dynamics that influence the Wet Upland Prairie sites and determine the plant community composition. These disturbances resulted in the maintenance of a grassland by preventing woody species from invading. These sites are part of a landscape formed by a mosaic of differing ecological systems that result from heterogeneous topography, variations in soil characteristics, and a long history of fire and grazing disturbance regimes. Soils in the groups are somewhat poorly drained to poorly drained, so vegetation communities will range between mesic and hydrophytic.

Plant community structure is influenced by disturbances, microtopography, soil drainage, depth of ponding, depth to water table, and permeability. During the spring growing season, sites may have ponded water and shallow depressions will allow for a numerous hydrophytic species. However, during period of heat and drought, the soils can become dry resulting in the presence of more mesic species.

Fire was a main influence on these sites as native Americans regularly burned to encourage vegetative regrown which attracted large game. By extending the fire return interval, woody species will increase, and herbaceous community dominance will be reduced.

Few high-quality, old-growth communities remain. Agriculture is the largest use of these soils in MLRA 114X.

State and transition model



State 1
Reference State

This state is a diverse native shrub-grassland with numerous grass and herbaceous species. Historically, these sites were extremely diverse . Tallgrass species such as *Andropogon gerardii*, *Sorghastrum nutans*, and *Panicum virgatum* were dominant with a diverse variety of herbaceous native species present on sites. Disturbances (fire, grazing, drought) controlled the community composition.

Dominant plant species

- silky dogwood (*Cornus obliqua*), shrub
- big bluestem (*Andropogon gerardii*), grass

- switchgrass (*Panicum virgatum*), grass
- sedge (*Carex*), grass
- prairie cordgrass (*Spartina pectinata*), grass

Community 1.1
Reference Community

These sites have a shrub component with an understory of native grasses, sedges and a diversity of herbaceous species. Fire, drought, and grazing will influence species composition. These sites are diverse and many species are present.

Dominant plant species

- silky dogwood (*Cornus obliqua*), shrub
- big bluestem (*Andropogon gerardii*), grass
- sedge (*Carex*), grass
- switchgrass (*Panicum virgatum*), grass
- prairie cordgrass (*Spartina pectinata*), grass

Community 1.2
Wet Tallgrass Prairie

A shorter fire return interval will reduce shrub and tree species and increase the dominance of grasses.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- sedge (*Carex*), grass
- switchgrass (*Panicum virgatum*), grass

Pathway 1.1.A
Community 1.1 to 1.2

Increase in fire return interval

Pathway 1.2.A
Community 1.2 to 1.1

Decrease in fire return interval

State 2
Successional State

This state has tree saplings and shrubs encroaching upon the grass dominated prairie system. Species will vary depending upon seed sources and disturbance regimes, but often include oaks, cottonwood, ashes, and maples. Species will depend on seed sources. A lack of fire and grazing will result in a continual increase in shrub and tree species.

Dominant plant species

- hybrid hickory (*Carya*), tree
- oak (*Quercus*), tree
- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- dogwood (*Cornus*), shrub
- blackberry (*Rubus*), shrub
- rose (*Rosa*), shrub
- sedge (*Carex*), grass

Community 2.1
Successional Community

This state has water tolerant tree saplings and shrubs encroaching upon the grass dominated prairie system. Species will vary depending upon seed sources and disturbances, but often include oaks, cottonwood, ashes, and maples. Lack of disturbances such as fire and grazing will eventually transition this community to a woodland.

Dominant plant species

- hybrid hickory (*Carya*), tree
- oak (*Quercus*), tree
- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- dogwood (*Cornus*), shrub
- rose (*Rosa*), shrub
- blackberry (*Rubus*), shrub
- sedge (*Carex*), grass

State 3
Agricultural State

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. Many different plant species are feasible for these sites depending on the landowner management objectives.

Dominant plant species

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

Community 3.1
Agriculture Community -Cropland

This state is characterized by the conversion of the site to agricultural use. Most common practice is row cropping. Common land use is a corn and soybean rotation. Numerous plant species can be utilized on these sites depending on the landowner goals. Ditching and tiling is often utilized on these sites.

Dominant plant species

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

Community 3.2
Agriculture Community - Forage/Pasture

This phase is characterized by forage or grazing agriculture. Different mixes of, generally, cool or warm season grasses and forbs, largely clovers, are grown. Numerous species are possible on these sites depending on landowner objectives and goals.

Dominant plant species

- fescue (*Festuca*), grass
- brome (*Bromus*), grass
- sedge (*Carex*), 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 pasture/forage species and management to maintain them. Numerous species are feasible for these sites depending on landowner objectives.

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. Numerous species are possible.

Transition T1A
State 1 to 2

Lack of fire will transition this community to a woodland.

Transition T1B
State 1 to 3

Conversion of site to agricultural production. Landowners should be aware of any potential wetland issues prior to conversion.

Restoration pathway R2A
State 2 to 1

Long term restoration efforts would include hydrological restoration, planting of native grasses and forbs, weed control, and utilization of fire or manual removal to remove trees. Historically, these sites were species rich and very diverse, so numerous plant species are possible for these sites.

Transition T2A
State 2 to 3

Transition from mixed grassland/woodland to agricultural state. Activities and species selection would be determined by the landowner’s production objectives. Landowners should be aware of any potential wetland issues prior to conversion.

Transition T3A
State 3 to 2

Cropland or pastureland that is abandoned will slowly transition to a mixed woodland usually dominated by tree species that have wind-blown seeds and are fast growing such as tuliptree, cottonwood, maples, elms, etc. Species will depend upon presence or absence of disturbances (grazing, fire, etc.) and seed source availability. Warm season native grasses will be present if the site was previously utilized as pasture and contained these species.

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.

Other references

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Approval

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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.

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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):**

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:

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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:**
