USDA Natural Resources Conservation Service

Ecological site F113XY924IL
Clayey Floodplain Forest

Last updated: 5/17/2024
Accessed: 05/20/2024

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): 113X–Central Claypan Areas

The eastern Illinois portion of the Central Claypan Areas MLRA is in the Till Plains Section of the Central Lowland Province of the Interior Plains (USDA-NRCS, 2006) and includes the Southern Till Plain Natural Division of the natural divisions of Illinois (Schwegman, 1973; 1997; IDNR, 2018) in south-central Illinois. South-central Illinois is a dissected Illinoisan till plain south of the terminal Wisconsin moraine. This region consists of nearly level to gently sloping, old till plains. Stream valleys are shallow and generally are narrow. Elevation is about 660 feet (200 meters), increasing gradually from south to north. Local relief is generally low on the broad, flat till plains and flood plains and high on the dissected hills bordering rivers or drainage systems. The Kaskaskia, Little Muddy, Little Wabash, Embarras, and Skillet Fork rivers are part of this area. This region is covered with loess, which overlies old glacial drift (Illinoisan till) that has a high content of clay. Fragipans are also present. Pennsylvanian limestone and shale bedrock underlay the glacial till. The dominant soil orders in this region are Alfisol and Mollisol. The soils in the area predominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They generally are very deep, well drained to poorly drained, and loamy or clayey. (USDA-NRCS, 2006).

Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2006):
113 – Central Claypan Areas, Eastern Part
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
Section: Central Till Plains, Oak-Hickory Section
Section Code: 222G

Ecological site concept

The historic pre-European settlement vegetation on this site was dominated by a continuous canopy of deciduous trees with an understory of shade-tolerant shrubs and ground flora (LANDFIRE 2009). Clayey Floodplain Forests occur in floodplains on backwater areas away from the channel. Soils are poorly drained and very deep formed from clayey alluvium that are seasonally inundated or saturated for one or two months during the growing season resulting in a plant community with hydrophytic woody and herbaceous vegetation (Nelson 2010; White 1978).

Clayey Floodplain Forests resemble Loamy Floodplain Forests, except they lack species of oak (Quercus spp.) and black walnut (Juglans nigra L.)* that do not tolerate extended periods of wetness that can occur in these units. In addition, the ground flora may be barren because of frequent flooding and occasional ponding. Common hackberry (Celtis occidentalis L.) is one of the dominant and diagnostic trees in this ecological site, while green ash (Fraxinus

pennsylvanica Marshall) and American elm (Ulmus americana L.) are also important canopy components along with occasional pecans (Carya illinoinensis (Wangenh.) K. Koch). The shrub layer is generally sparse but may contain possumhaw (Ilex decidua Walter) and hawthorn (Crataegus spp.) species. Herbaceous species typical of an undisturbed plant community associated with this ecological site include bedstraws (Galium spp.), violets (Viola spp), sedges (Carex spp.), rice cutgrass (Leersia oryzoides (L.) Sw.), smallspike false nettle (Boehmeria cylindrica (L.) Sw.), Canadian woodnettle (Laportea canadensis (L.) Weddell), Canadian clearweed (Pilea pumila (L.) A. Gray), and touch-me-not (Impatiens spp.). Vines most often encountered include eastern poison ivy (Toxicodendron radicans (L.) Kuntze), trumpet creeper (Campsis radicans (L.) Seem. ex Bureau), and Virginia creeper (Parthenocissus quinquefolia (L.) Planch.). (Nelson 2010; Ladd and Thomas 2015). Historically, seasonal flooding was the primary disturbance factor, while windthrow events and beaver alterations were secondary factors (LANDFIRE 2009; Nelson 2010; NatureServe 2018; Voigt and Mohlenbrock 1964).

* All plant common and scientific names in this document were obtained from the U.S. Department of Agriculture – Natural Resources Conservation Service National PLANTS Database (USDA NRCS, 2018).

Associated sites

F113XY919IL	**Wet Silty Floodplain Forest** This ecological site is located in floodplains adjacent to and along stream river courses.

Similar sites

F113XY919IL	**Wet Silty Floodplain Forest** This ecological site is located adjacent to and along stream river courses and experiences more disturbance from flooding being nearer to the river course than Clayey Floodplain Forests.

Table 1. Dominant plant species

Tree	(1) *Celtis occidentalis* (2) *Fraxinus pennsylvanica*
Shrub	(1) *Ilex decidua*
Herbaceous	(1) *Leersia oryzoides*

Physiographic features

This site is on clayey slackwater sediments on low lying flood plains with slopes of less than 2 percent. Areas not protected by levees are subject to frequent flooding.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	344–492 ft
Slope	0–2%
Ponding depth	0–6 in
Water table depth	24–48 in
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 113 is classified as mesic, where the mean annual soil temperature is between 47 and 59°F. Temperature and precipitation occur along a north-south gradient, where temperature and precipitation increase the further south you travel (USDA-NRCS 2006). The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	159-169 days
Freeze-free period (characteristic range)	185-196 days
Precipitation total (characteristic range)	44-47 in
Frost-free period (actual range)	158-173 days
Freeze-free period (actual range)	185-201 days
Precipitation total (actual range)	44-48 in
Frost-free period (average)	164 days
Freeze-free period (average)	191 days
Precipitation total (average)	46 in

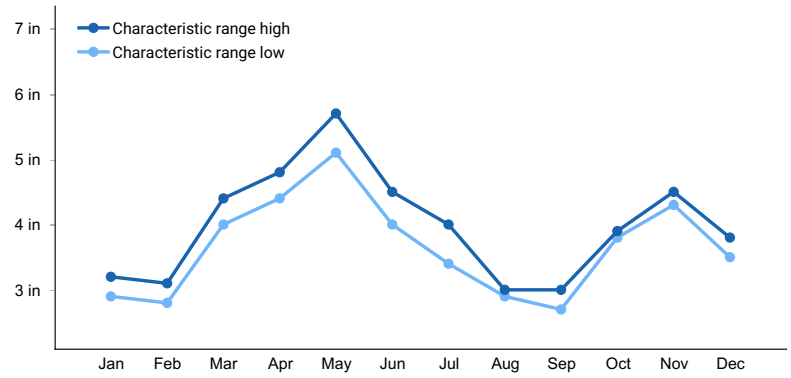


Figure 1. Monthly precipitation range

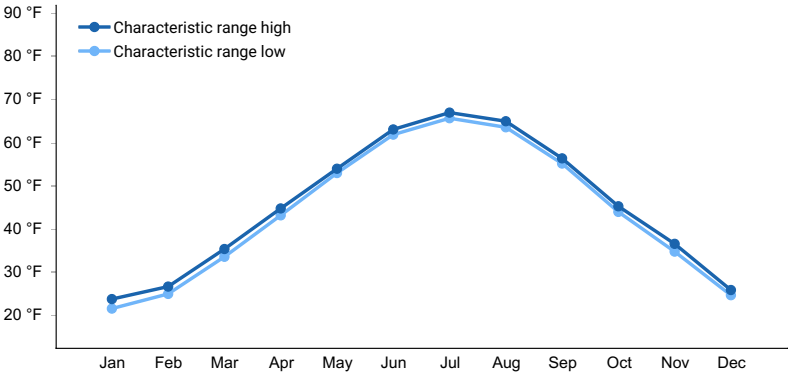


Figure 2. Monthly minimum temperature range

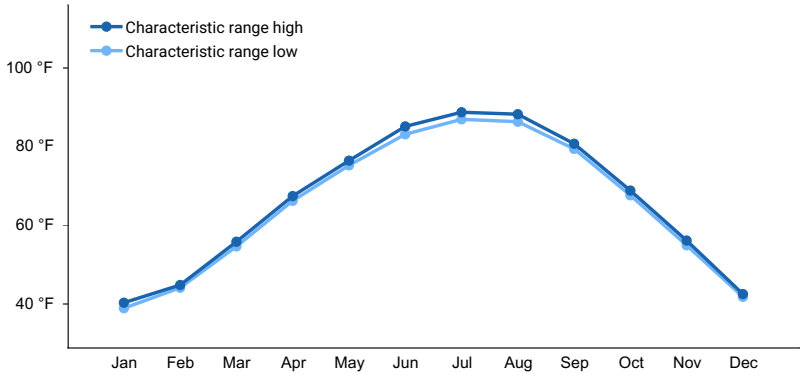


Figure 3. Monthly maximum temperature range

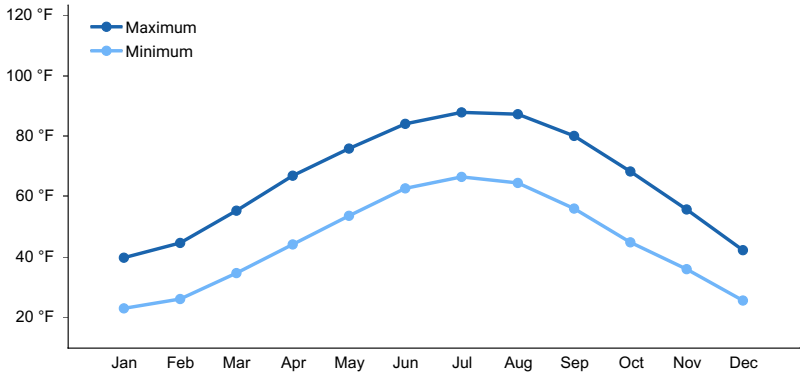


Figure 4. Monthly average minimum and maximum temperature

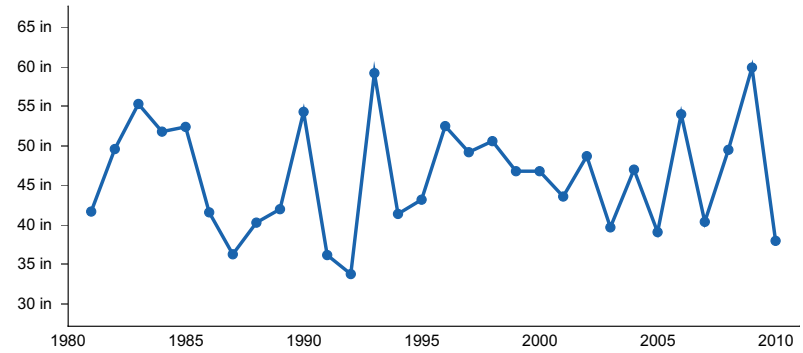


Figure 5. Annual precipitation pattern

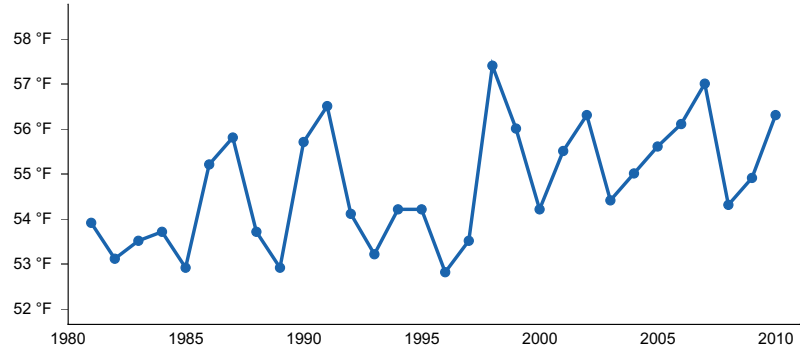


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MARION 4 NNE [USC00115342], Marion, IL
- (2) BENTON 2 N [USC00110608], Benton, IL
- (3) FAIRFIELD RADIO WFIW [USC00112931], Fairfield, IL

Influencing water features

This ecological site is in floodplains of perennial streams. They are influenced by a seasonal high water table, due to high groundwater levels in these topographically low positions and flooding. The water table may be near the surface in late fall through spring, receding in the summer. Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Medium- to long-duration flooding is common in many areas, particularly during spring and early summer storm events. (SSS NRCS WSS, 2018). (SSS NRCS OSD, 2018).

Wetland description

This site is in the RIVERINE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993), and are Forested Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils are very deep, with seasonal high water tables. They were formed under a mixture of herbaceous wetland and woodland vegetation. Organic matter content is variable. Parent material is alluvium. They have silty clay loam surface horizons, with silty clay subsurface layers. Soils of this ecological site are in the Inceptisols order, further classified as fine, smectitic, acid, mesic Vertic Endoaquepts. Soil series associated with this site include Cape (NCSS, 2018; SSS NRCS OSD, 2018)

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Sandy clay loam
Family particle size	(1) Fine
Drainage class	Poorly drained
Permeability class	Very slow
Soil depth	72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	6 in
Calcium carbonate equivalent (Depth not specified)	0%
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	4.5–7.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The MLRA lies within the transition zone between the eastern deciduous forests and the central tallgrass prairies. The heterogeneous topography of the area results in variable microclimates and fuel matrices that in turn are able to support prairies, savannas, woodlands, and forests. Clayey Floodplain Forests form an aspect of this vegetative continuum. This ecological site occurs on low lying flood plains. Species characteristic of this ecological site consist of broadleaf deciduous floodplain forest species which exhibits high canopy diversity. (Anderson, 1975; White, 1978).

Historically, the floodplains were a very dynamic system with frequent flooding and ponding. Gravelly, sandy, loamy, and clayey deposits of sediment sorted themselves out on the floodplain depending on the speed, volume and duration of the waters carrying them. Clayey deposits occurred in areas of slower moving water, such as in isolated, concave meander scars or backwater areas between the natural levees formed nearer the channel. Current management of the river has drastically altered this dynamic process although the clayey soil texture and seasonally high water table still influences the development of these floodplain forest communities.

Historic flooding of Clayey Floodplain Forest occurred annually in this region or at least once every three years. Flooding occurs during the winter and spring and often extends into the growing season. Although this community can be early-successional, occurring on river fronts and other recently disturbed areas, this is a generally long-lived type. Succession in Clayey Floodplain Forests appears to be similar to that of the Loamy Floodplain Forests, except that periods of inundation and ponding exclude later successional hardwood species. Hackberry, elm, green ash, eastern cottonwood (*Populus deltoides* W. Bartram ex Marshall) and American sycamore (*Platanus occidentalis* L.) form a tall canopy (80 to 100 feet) that is uneven and has frequent holes.

Catastrophic floods will often partially or completely knock down trees; consequently, this ecological site is often made up of a mosaic of early to late successional floodplain forests. Species variability within and among occurrences of this community can be great and directly related to the level of saturation of the substrate, seasonal flooding and local topography. Alluvial deposition varies and slight ridges may favor hackberry, while depressions will favor green ash. (NatureServe 2018)

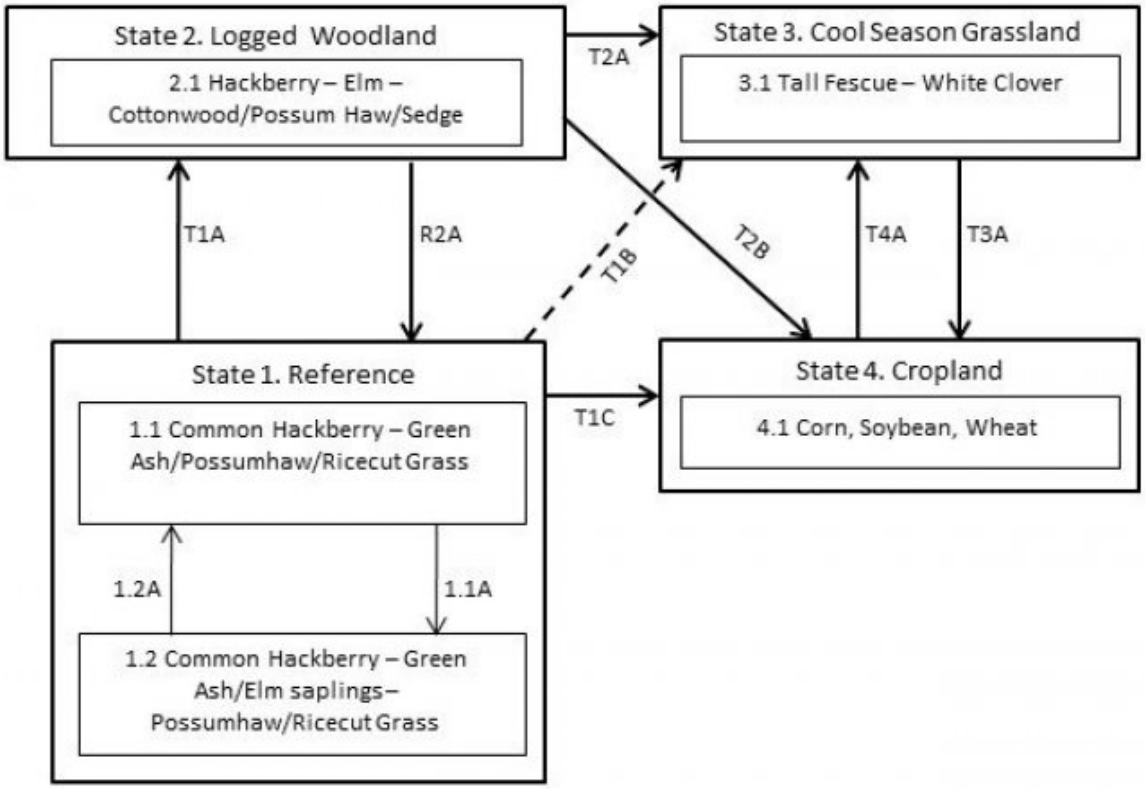
Today many of these ecological sites have been cleared and converted to intensive agriculture. While some cleared fields have retained a narrow strip of forest along the stream, many of these ecological sites are often cleared right up to the bank. In such cases, severe flooding may cause stream bank erosion and complete loss of this ecological site. The remaining remnants that still exist play an important role as a source of food and shelter for migrating birds. In addition, large floodplain trees that extend above the canopy are important nesting sites for bald eagles (Haliaeetus leucocephalus) and herons (Ardea spp.). (Guyon et. al. 2016)

Carefully planned timber harvests can be tolerated in this system, but high grading of the timber will eventually degrade the ecological site. Re-establishment of these riparian forests is important for stream quality and health, as well as for migratory birds. Planting of appropriate species has proven to be quite successful.

A provisional state and transition diagram is depicted in Figure 2. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It may change as knowledge increases.

State and transition model

Clayey Floodplain Forest, F113XY924IL



Code	Event/Activity/Process
T1A	Lack of natural disturbance events > 20 years; repeated timber harvests
T3A	Tillage; conservation cropping system; water managment
T1B,T2A	Woody removal; vegetative seeding; grassland management
T1C, T2B	Woody removal; tillage; conservation cropping system; water management
T4A	Vegetative seeding ; grassland management
1.1A	Lack of natural disturbance events 10+ years
1.2A	Natural disturbance events 1-3 years
R2A	Forest stand improvement

State 1
Reference State

The historical reference state for this ecological site was old growth riverine forest. The forest was dominated by hackberry, green ash and elms. Maximum tree age was likely 150 to 300 years. Periodic disturbances from flooding, wind or ice maintained the open, uneven structure and ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are very rare today. Altered drainage has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Most reference states are currently altered because of timber harvesting, clearing and conversion to grassland or cropland.

Dominant plant species

- common hackberry (*Celtis occidentalis*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- possumhaw (*Ilex decidua*), shrub
- rice cutgrass (*Leersia oryzoides*), grass

Community 1.1
Common Hackberry - Green Ash/Possumhaw/Ricecut Grass

This community is characterized by common hackberry, green ash, possumhaw and rice cutgrass.

Dominant plant species

- common hackberry (*Celtis occidentalis*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- possumhaw (*Ilex decidua*), shrub
- rice cutgrass (*Leersia oryzoides*), grass

Community 1.2
Common Hackberry - Green Ash/Elm saplings - Possumhaw/Ricecut Grass

This community exhibits an increase in tree saplings due to a longer period between disturbances.

Dominant plant species

- common hackberry (*Celtis occidentalis*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- possumhaw (*Ilex decidua*), shrub
- rice cutgrass (*Leersia oryzoides*), grass

Pathway 1.1.A
Community 1.1 to 1.2

Lack of natural disturbance events for over 10 years.

Pathway 1.2.A
Community 1.2 to 1.1

Natural disturbance events 1-3 years.

State 2
Logged Woodland

Composition is altered from the reference state depending on tree selection during harvest. This state will slowly increase in more shade tolerant species with selective harvesting techniques. Without periodic canopy disturbance, stem densities and more shade tolerant species will increase in abundance. Some periodic uncontrolled grazing may be occurring.

Dominant plant species

- common hackberry (*Celtis occidentalis*), tree
- elm (*Ulmus*), tree
- eastern cottonwood (*Populus deltoides*), tree
- possumhaw (*Ilex decidua*), shrub
- sedge (*Carex*), grass

Community 2.1
Hackberry - Elm - Cottonwood/Possum Haw/Sedge

Species composition is altered from the reference state due to disturbances.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- elm (*Ulmus*), tree
- eastern cottonwood (*Populus deltoides*), tree
- possumhaw (*Ilex decidua*), shrub
- sedge (*Carex*), grass

State 3
Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue (*Schedonorus arundinaceus* (Schreb.) Dumort., nom. cons.), red top (Agrostis alba auct. non L.) and white clover (*Trifolium repens* L.) has been common. Occasionally, these pastures will have scattered pecans. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may be impossible, requiring a very long term series of management options and transitions.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- bentgrass (*Agrostis*), grass
- white clover (*Trifolium repens*), other herbaceous

Community 3.1
Tall Fescue - White Clover

A community dominated by seeded cool season grasses and legumes.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- white clover (*Trifolium repens*), other herbaceous

State 4
Cropland

This is a state that exists currently with intensive cropping of corn (*Zea mays* L), soybeans (*Glycine max* (L.) Merr.), and wheat (*Triticum aestivum* L.). Some conversion to cool season hay land occurs, but when commodity prices are high, these states transition back to cropland.

Dominant plant species

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

Community 4.1
Corn, Soybeans, Wheat

Agricultural state with crops such as corn, beans, and winter wheat.

Dominant plant species

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

Transition T1A
State 1 to 2

Lack of natural disturbance events for 20 years or more. Repeated timber harvesting may have occurred.

Transition T1B
State 1 to 3

Woody removal; vegetative seeding; grassland management

Transition T1C
State 1 to 4

Woody removal and tillage of the site. Conservation cropping system and water management often occurs.

Restoration pathway R2A
State 2 to 1

Forest stand improvement

Transition T2A
State 2 to 3

Woody removal; vegetative seeding; grassland management

Transition T2B
State 2 to 4

Woody removal; tillage; conservation cropping system; water management

Transition T3A
State 3 to 4

Tillage; conservation cropping system; water management

Transition T4A
State 4 to 3

Vegetative seeding; grassland management

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 based on the sources identified in ecological site description.

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Other references

Relationship to other established ecological classifications:
Biophysical Setting (LANDFIRE, 2009); the reference community of this ecological site is most similar to: South-Central Interior Large Floodplain (CES202.705)

National Vegetation Classification System (NatureServe, 2018): the reference community of this ecological site is most similar to: Fraxinus pennsylvanica - Ulmus americana - Celtis laevigata / Ilex decidua Floodplain Forest (CEGL00 2427)

Illinois Natural Areas Survey (INAS) (White, 1978); the reference community of this ecological site is most similar to: INAS Community Class – Floodplain Forest; Natural community – Wet-mesic Floodplain Forest

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Approval

Suzanne Mayne-Kinney, 5/17/2024

Acknowledgments

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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.

Author(s)/participant(s)	
Contact for lead author	
Date	05/20/2024
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:**

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):**

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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:**
