

Ecological site F113XY911IL

Loamy Till Backslope Forest

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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 Illinoian 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 (Illinoian 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 or reference plant community was an oak-hickory forest with a shade-tolerant herbaceous understory. These communities were common throughout the Central Claypan Areas MLRA (Figure 1; green areas). Loamy Till Backslope Forest ecological sites occurred on convex, gently sloping to moderately steep slopes of dissected till plains on soils that formed in loess over glacial till. This reference ecological site had a somewhat closed tree canopy dominated by white oak (*Quercus alba* L.)*, shagbark hickory (*Carya ovata* (Mill.) K. Koch), mockernut hickory (*Carya tomentosa* (Lam.) Nutt.), and black oak (*Quercus velutina* L.), with an understory of flowering dogwood (*Cornus florida* L.), ironwood (*Ostrya virginiana* (Mill.) K. Koch) and blackhaw (*Viburnum prunifolium* L.) (White, 1978).

This ecological site was once widespread in the north-central United States. Stands occurred primarily on glaciated, rolling topography on a wide variety of soils that had a dry-mesic moisture condition. The canopy was variable but typically closed (>80%). White oak (northern red oak, *Quercus rubra* L., was present on protected slopes) was the leading dominant, but on exposed slopes black oak and shagbark hickory could also be codominant with white oak. Typical associates included mockernut hickory and pignut hickory (*Carya glabra* (Mill.) Sweet). The subcanopy contained ironwood, black cherry (*Prunus serotina* Ehrh.), sassafras (*Sassafras albidum* (Nutt.) Nees), and with cessation of disturbances, increasingly red maple (*Acer rubrum* L.) or sugar maple (*Acer saccharum* Marshall). The shrub layer was quite variable but could include flowering dogwood, stiff dogwood (*Cornus foemina* Mill.), and common pricklyash (*Zanthoxylum americanum* Mill.). The herbaceous layer could include American hogpeanut (*Amphicarpaea bracteata* (L.) Fernald), tall thimbleweed (*Anemone virginiana* L.), common blue wood aster (*Symphotrichum cordifolium* (L.) G.L. Nesom), rattlesnake fern (*Botrychium virginianum* (L.) Sw.), pointedleaf ticktrefoil (*Desmodium glutinosum* (Muhl. ex Willd.) Alph. Wood), spotted geranium (*Geranium maculatum* L.), Clayton's sweet root (*Osmorhiza claytonia* (Michx.) C.B. Clarke), clustered blacksnakeroot (*Sanicula odorata* (Raf.) K.M. Pryer & L.R. Phillippe), and feathery false lily of the valley (*Maianthemum racemosum* (L.) Link). Disturbances such as fire, grazing and wind played a significant role in the maintenance of these systems. (NatureServe 2018).

* 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

R113XY904IL	Upland Prairie Prairie ecological sites are upslope but on dark colored soils associated with nearly level till plains.
F113XY907IL	Fragic Till Plain Woodland Fragic Till Plain Woodlands have a fragipan and are on gentle slopes typically upslope.
F113XY919IL	Wet Silty Floodplain Forest Wet Silty Floodplain Woodlands are downslope in valley floodplains.

Similar sites

F113XY913IL	Clayey Till Backslope Woodland Clayey Till Backslope Woodland ecological sites also support an oak-hickory community, but poorer drainage results in a wetter environment that is less productive with more moisture tolerant species present.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Carya ovata</i>
Shrub	(1) <i>Cornus florida</i>
Herbaceous	(1) <i>Symphotrichum cordifolium</i>

Physiographic features

These sites are on convex, gently sloping to moderately steep slopes of dissected Illinoian till plains. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

Table 2. Representative physiographic features

Slope shape across	(1) Convex
Landforms	(1) Till plain > Ground moraine (2) Till plain > Hillslope (3) Till plain > Structural bench
Runoff class	Medium to high
Elevation	328–1,200 ft

Slope	2–35%
Water table depth	18–72 in
Aspect	W, NW, N, NE, E, SE, S, SW

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)	153-167 days
Freeze-free period (characteristic range)	183-197 days
Precipitation total (characteristic range)	41-45 in
Frost-free period (actual range)	143-172 days
Freeze-free period (actual range)	179-202 days
Precipitation total (actual range)	40-48 in
Frost-free period (average)	159 days
Freeze-free period (average)	190 days
Precipitation total (average)	43 in

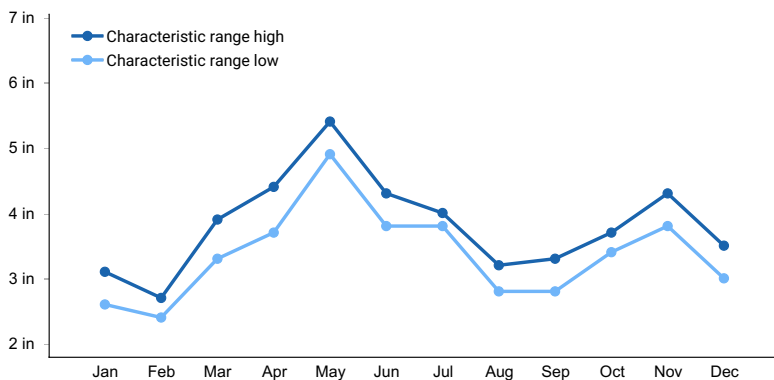


Figure 1. Monthly precipitation range

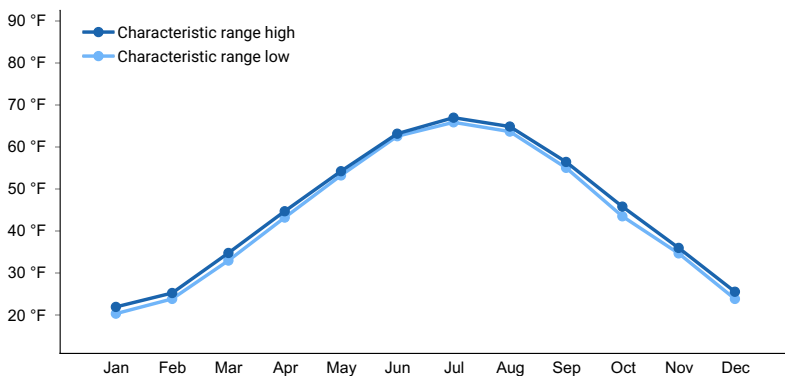


Figure 2. Monthly minimum temperature range

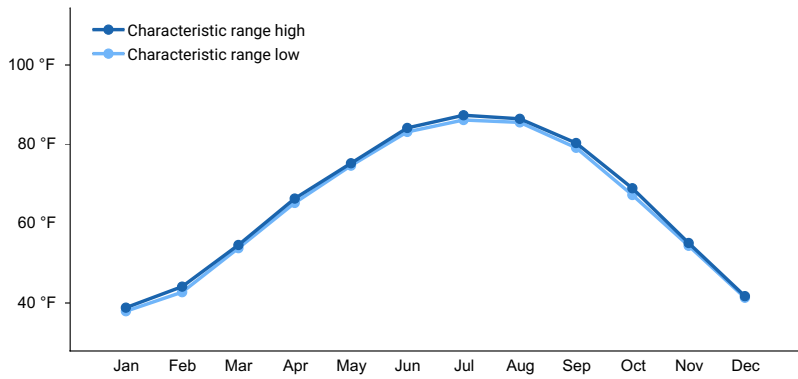


Figure 3. Monthly maximum temperature range

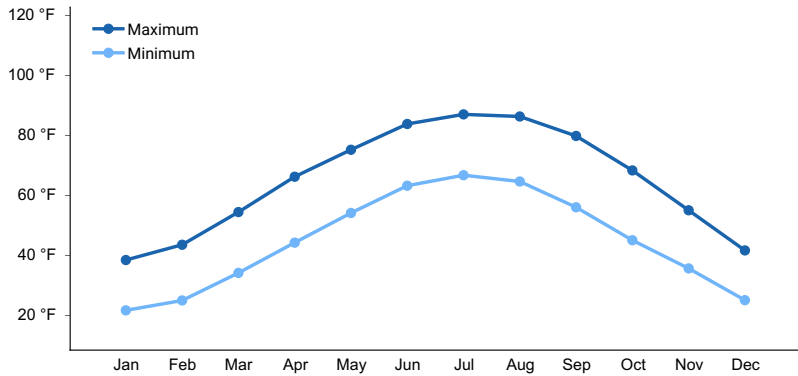


Figure 4. Monthly average minimum and maximum temperature

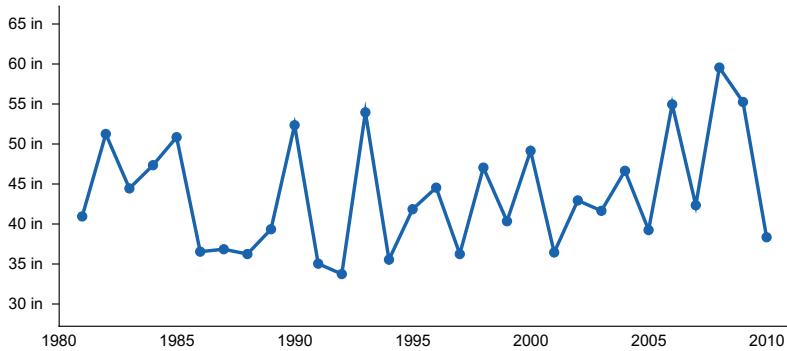


Figure 5. Annual precipitation pattern

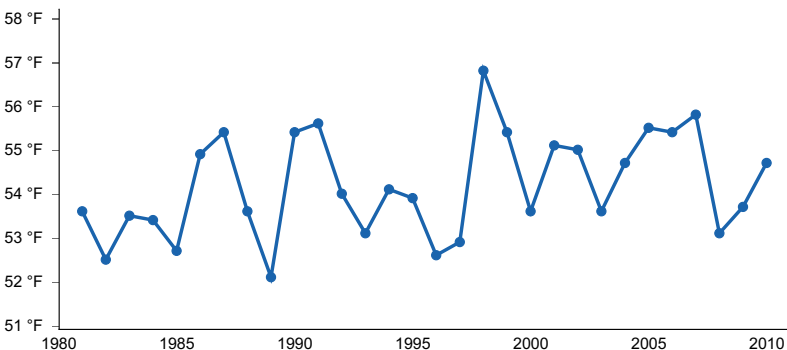


Figure 6. Annual average temperature pattern

Climate stations used

- (1) FLORA 5 NW [USC00113109], Flora, IL
- (2) VANDALIA [USC00118781], Vandalia, IL
- (3) MARION 4 NNE [USC00115342], Marion, IL

- (4) NASHVILLE 1 E [USC00116011], Nashville, IL
- (5) ROBINSON [USC00117345], Robinson, IL

Influencing water features

Loamy Till Backslope Forest are not influenced by wetland or riparian water features. Precipitation is the main source of water for this ecological site. Infiltration is moderately slow to slow and surface runoff is medium to high. Many sites have an intermittent apparent seasonal high water table is present at a depth of 1 to 2 feet below the surface (SSS NRCS WSS, 2018). Surface runoff contributes some water to downslope ecological sites. Water seeps from the loess up slope and runs onto these soils at the interface of materials at the surface of the till (SSS NRCS OSD, 2018).

Soil features

These soils are very deep, somewhat poorly to well drained, with moderately slow to very slow permeability. They generally formed in loess over glacial till. Some soils formed in silty, water-worked sediments that lie in a stratigraphic position between the Wisconsinan age Peoria loess and the Illinoian till that contains a strongly developed paleosol. (NCSS, 2018; SSS NRCS OSD, 2018).

Soil series associated with this site (Table 5) include Blair, Hickory, Grantfork, Passport, and Rend. Blair, Passport, and Rend soils have an intermittent apparent seasonal high water table within 2 feet below the surface. Grantfork soils have 10 to 15 percent exchangeable sodium in the subsoil. Soils of this ecological site are in the Alfisol order, further classified as fine-silty, mixed, superactive, mesic Aquic Hapludalfs; fine-loamy, mixed, active, mesic Typic Hapludalfs; fine-loamy, mixed, superactive, mesic Aeric Epiaqualfs; fine-loamy, mixed, active, mesic Aquic Hapludalfs; or fine-silty, mixed, active, mesic Fragic Oxyaquic Hapludalfs (NCSS, 2018; SSS NRCS OSD, 2018).

Table 4. Representative soil features

Parent material	(1) Loess (2) Till
Surface texture	(1) Silt loam (2) Clay loam (3) Silty clay loam
Family particle size	(1) Fine-loamy (2) Fine-silty
Drainage class	Somewhat poorly drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	5–8 in
Calcium carbonate equivalent (Depth not specified)	0–5%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–15
Soil reaction (1:1 water) (Depth not specified)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–7%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The MLRA lies within the transition zone between the eastern deciduous forests and the 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. Loamy Till Backslope Forests form an aspect of this vegetative continuum. This ecological site occurs on mid to lower upland hillslopes and high stream terraces. Species characteristic of this ecological site consist of a somewhat closed oak-hickory canopy with shade-tolerant herbaceous vegetation.

Fire was a one of the factors that helped maintain Loamy Till Backslope Forests. Fire typically consisted of infrequent low-severity surface fires. Ignition sources included summertime lightning strikes from convective storms and human ignitions during the spring and/or fall seasons. Human ignitions by Native Americans regularly set fires to improve sight lines for hunting, drive large game, improve grazing and browsing habitat, develop agricultural clearings, and enhance vital ethnobotanical plants (Barrett 1980; LANDFIRE 2009). During fire free intervals, woody understory species increased and the herbaceous understory diminished. (Anderson, 1975; Brugam et.al., 2016). (Anderson, 1975; Brugam et.al., 2016; Coates, 1992; Edgin, 1996, 2002, 2003; Anderson et.al., 2007; Taft et.al., 1994; Edgin and Ebinger. 1997; White, 1978).

Drought, wind and ice storm damage, and grazing by native large herbivores also played a role in shaping this ecological site. The periodic episodes of reduced soil moisture favored the proliferation of plant species tolerant of such conditions. Drought can also slow the growth of plants and result in dieback of certain species. Damage to trees from storms can vary from minor, patchy effects of individual trees to stand effects that temporarily affect community structure and species richness and diversity (Irland 2000; Peterson 2000). When coupled with fire, periods of drought and catastrophic storm damage can greatly delay the establishment and maturation of woody vegetation (Pyne et al. 1996). Finally, grazing by large native herbivores such as bison (*Bos bison*), prairie elk (*Cervus elaphus*), and white-tailed deer (*Odocoileus virginianus*) would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and ground flora species (Anderson, 1982).

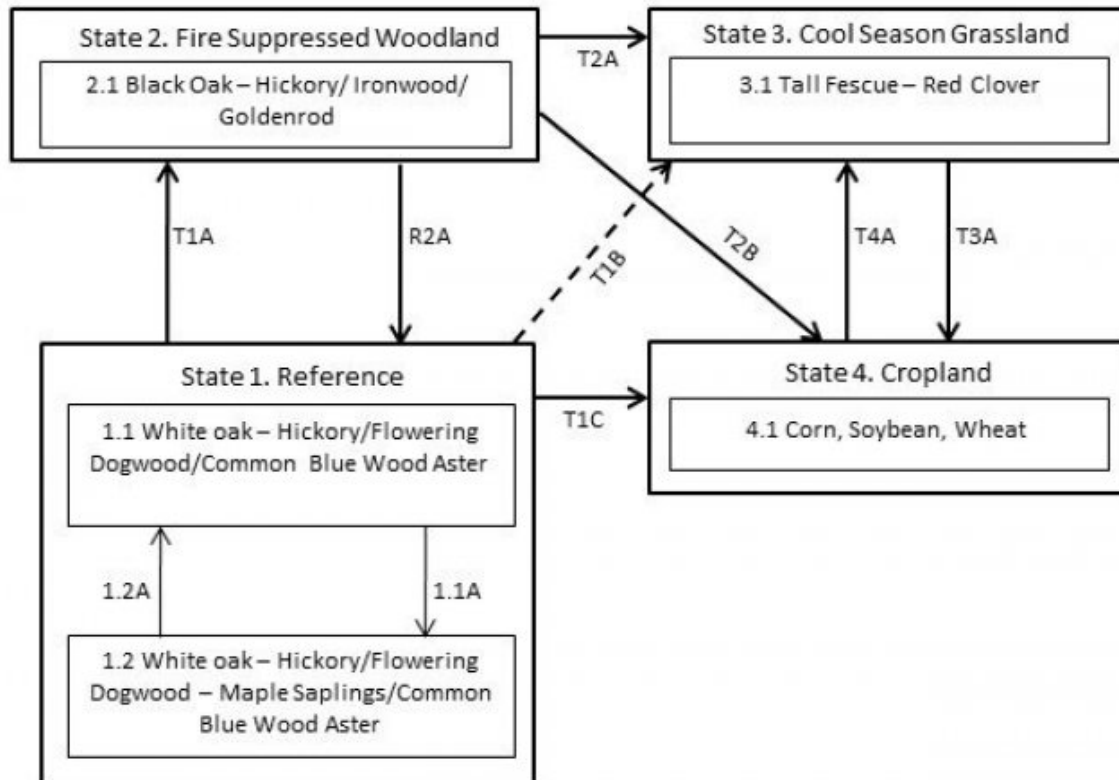
Extensive conversion for agriculture has fragmented this system. Today, many of these ecological sites have been cleared and converted to pasture and some cropland (on gentler slopes). The remaining forested ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices and lack of fire. Uncontrolled domestic grazing has also impacted the existing forested communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as coralberry (*Symphoricarpos orbiculatus* Moench), gooseberry (*Ribes* spp.), and Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch.). Grazed sites also have a more open understory along with increased soil compaction and soil erosion further lowering productivity.

In the long term absence of fire, woody species, especially hickory (*Carya* spp.), maple (*Acer* spp.) and ironwood encroach or increase into these ecological sites. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Oak regeneration is typically problematic. Maintenance of the oak component will require disturbances that will encourage more sun adapted species and reduce shading effects. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means (Dey and Kabrick, 2015).

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

Loamy Till Backslope Forest, F113XY911IL (Provisional)



Code	Event/Activity/Process
T1A	Fire suppression > 30 years; woody invasion; repeated timber harvests; domestic uncontrolled grazing
T1B	Tillage; vegetative seeding; grassland management
T1C, T3A	Tillage; conservation cropping system; water management
T2A	Woody removal; tillage; vegetative seeding; grassland management
T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding ; grassland management
1.1A	Fire-free interval >30 years
1.2A	Fire interval 15-25 years
R2A	Forest stand improvement; access control; prescribed fire; long term stand rotation

These forested communities were influenced by fire, drought, and wind. Herbivory by native (now expatriated) ungulates also played a role. There are two phases associated with this reference state.

Dominant plant species

- white oak (*Quercus alba*), tree
- hybrid hickory (*Carya*), tree
- flowering dogwood (*Cornus florida*), shrub
- common blue wood aster (*Symphotrichum cordifolium*), other herbaceous

Community 1.1

White oak – Hickory/Flowering Dogwood/Common Blue Wood Aster

The overstory in this phase is dominated by white oak and hickory, with scattered other oaks. This forested community typically has a three-tiered structure. Fire frequency was probably every 15 to 25 years. Fire, drought and natural native grazing would have maintained a more open canopy and abundant ground flora species.

Community 1.2

White oak – Hickory/Flowering Dogwood – Maple Saplings/Common Blue Wood Aster

This forested community typically also has a three-tiered structure, but with 80 to 100 percent closure. It is characterized by an understory of maple saplings (*Acer* spp.) and shrubs. The herbaceous layer is diminished. Fire-free intervals probably exceeded 30 years.

Pathway 1.1A

Community 1.1 to 1.2

Fire free interval greater than 30 years

Pathway 1.2A

Community 1.2 to 1.1

Fire interval 15-25 years.

State 2

Fire Suppressed Woodland

Most current areas of Loamy Till Backslope Forests have experienced fire exclusion for decades along with periodic domestic livestock grazing. In the absence of fire, ongoing recruitment of trees into the canopy develops a closed canopy, shading out the herbaceous ground flora. This results in the formation of Black Oak – Hickory/ Ironwood/ Goldenrod woodland. Black oak, hickory and midstory species increase. Herbaceous cover and diversity greatly diminishes, leaf litter builds up, and more shade-tolerant species persist, such as elmleaf goldenrod (*Solidago ulmifolia* Muhl. ex Willd.) panic grass (*Dichanthelium dichotomum* (L.) Gould) and late purple aster (*Symphotrichum patens* (Aiton) G.L. Nesom). The understory also changes with sassafras (*Sassafras albidum* (Nutt.) Nees) and black cherry (*Prunus serotina* Ehrh.) saplings. Transition to cool season grasslands (State 3) or intensive cropland (State 4) is common, especially on slopes less than 10 percent.

Dominant plant species

- black oak (*Quercus velutina*), tree
- hybrid hickory (*Carya*), tree
- hophornbeam (*Ostrya virginiana*), shrub
- goldenrod (*Solidago*), other herbaceous

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.) and red clover (*Trifolium pratense* L.) has been common in the Illinois Central Claypan area. Occasionally, these pastures may have scattered bur and pin oaks. 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.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), other herbaceous

State 4 Cropland

This is a state that exists currently on slopes less than 10 percent with intensive cropping of corn (*Zea mays* L.), soybeans (*Glycine max* (L.) Merr.), and winter wheat (*Triticum aestivum* L.) occurring. Some conversion to cool season grassland occurs for a limited period of time before transitioning back to cropland.

Dominant plant species

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

Transition T1A State 1 to 2

Fire suppression > 30 years; woody invasion; repeated timber harvests; uncontrolled livestock grazing

Transition T1B State 1 to 3

Clearing/woody removal; tillage; vegetative seeding; grassland management

Transition T1C State 1 to 4

Clearing/woody removal; tillage; conservation cropping system; water management

Restoration pathway R2A State 2 to 1

Forest stand improvement; access control; prescribed fire; long term stand rotation

Transition T2A State 2 to 3

Woody removal; tillage; vegetative seeding; grassland management

Transition T2B State 2 to 4

Woody removal; tillage; conservation cropping system

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: North-Central Interior Dry-Mesic Oak Forest and Woodland (CES202.046)

National Vegetation Classification System (NatureServe, 2018): the reference community of this ecological site is most similar to: *Quercus alba* - *Quercus rubra* - *Carya ovata* Glaciated Forest (CEGL002068)

Illinois Natural Areas Survey (INAS) (White, 1978); the reference community of this ecological site is most similar to: INAS Community Class – Forest; Natural community –Dry-Mesic Upland 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):**
-
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:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
-
14. **Average percent litter cover (%) and depth (in):**
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
-
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:**
-
17. **Perennial plant reproductive capability:**
-

