USDA Natural Resources Conservation Service

# Ecological site F113XY912IL
# Wet Clayey Till Backslope Woodland

Last updated: 5/17/2024
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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 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

This woodland community type is found in south-central Illinois in the northern half of the Central Claypan Areas MLRA. Wet Clayey Till Backslope Woodland ecological sites are found along transitional areas between summit ecological sites and steeper hillslope ecological sites.

The historic reference plant community was a woodland dominated by a wide variety of deciduous hardwood tree species, tolerant of seasonally wet conditions including bur oak (Quercus macrocarpa Michx.)*, Shumard oak, swamp white oak (Quercus bicolor Willd.), American elm (Ulmus americana L.), pin oak (Quercus palustris Münchh.) and common hackberry (Celtis occidentalis L.) (White, 1978; NatureServe, 2017). Increased light from an open canopy caused a diversity of woodland ground flora species to flourish, especially prairie grasses. The

claypan soil subsoil perched water in the spring and affects rooting depth of this ecological site affecting he growth of trees and supporting an abundance of native grasses and forbs in the understory. Seasonal wetness allows an abundance of sedges (Carex spp.) and wild ryes (Elymus spp.) to occur in the understory.

Woodlands were distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species (White, 1994). Fire was the primary disturbance factor that maintained this ecological site, while drought, windthrow, and grazing were secondary factors (LANDFIRE 2009)

* 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

| | |
|---|---|
| F113XY911IL | **Loamy Till Backslope Forest**<br>Forest ecological site on similar slopes that are mapped as a complex with Wet Clayey Till Backslope Woodlands. |
| R113XY904IL | **Upland Prairie**<br>Prairie ecological site is often upslope but on dark colored soils associated with nearly level till plains. |
| F113XY913IL | **Clayey Till Backslope Woodland**<br>Woodland ecological sites on similar slopes that are mapped as a complex with Wet Clayey Till Backslope Woodlands. |

## Similar sites

| | |
|---|---|
| F113XY913IL | **Clayey Till Backslope Woodland**<br>Clayey Till Backslope Woodland ecological sites also support an oak-hickory community, but better drainage results in a drier growth environment that is somewhat more productive. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Quercus bicolor*<br>(2) *Quercus macrocarpa* |
| Shrub | (1) *Ilex decidua* |
| Herbaceous | (1) *Chasmanthium latifolium* |

## Physiographic features

This site is at the upper ends of incised drainageways and on convex backslopes and shoulder slopes on till plains with slopes of 5 to 18 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Slope shape across | (1) Convex |
| Hillslope profile | (1) Backslope |
| Landforms | (1) Till plain > Ground moraine |
| Runoff class | Very high |
| Elevation | 328–836 ft |
| Slope | 5–18% |
| Water table depth | 9–18 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) | 155-168 days |
| Freeze-free period (characteristic range) | 187-193 days |
| Precipitation total (characteristic range) | 43-44 in |
| Frost-free period (actual range) | 153-173 days |
| Freeze-free period (actual range) | 185-201 days |
| Precipitation total (actual range) | 41-44 in |
| Frost-free period (average) | 162 days |
| Freeze-free period (average) | 191 days |
| Precipitation total (average) | 43 in |

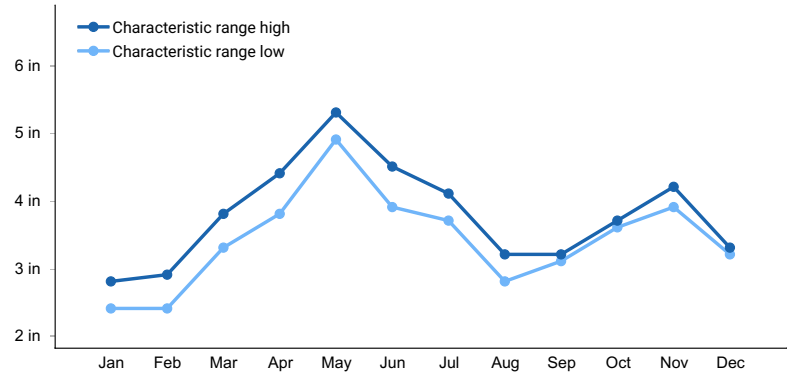



**Figure 1. Monthly precipitation range**

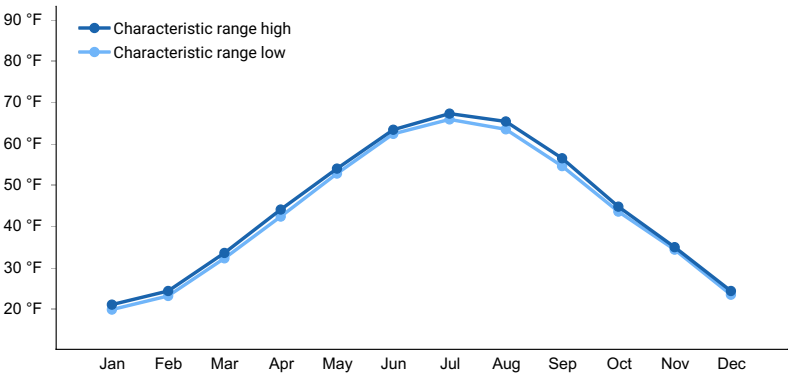



**Figure 2. Monthly minimum temperature range**

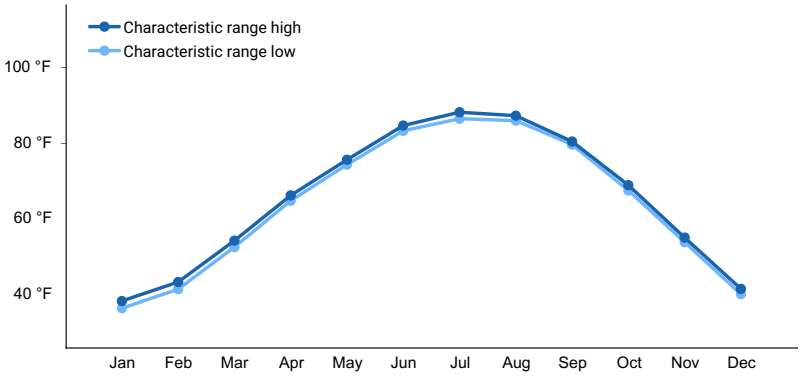



**Figure 3. Monthly maximum temperature range**

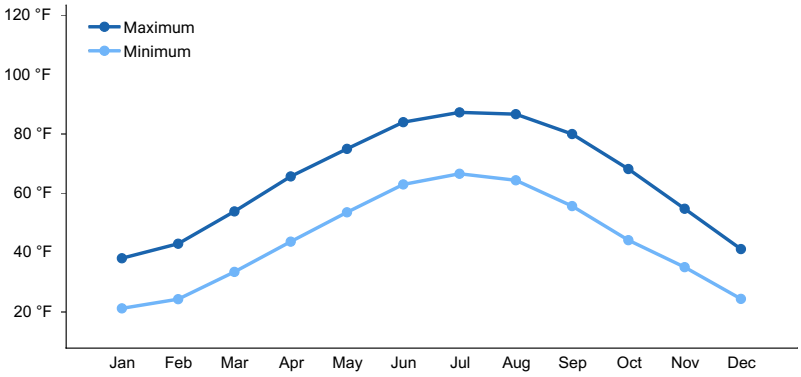



**Figure 4. Monthly average minimum and maximum temperature**

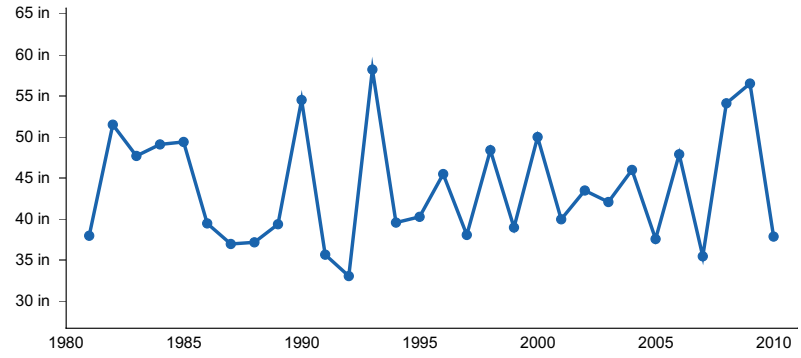



**Figure 5. Annual precipitation pattern**

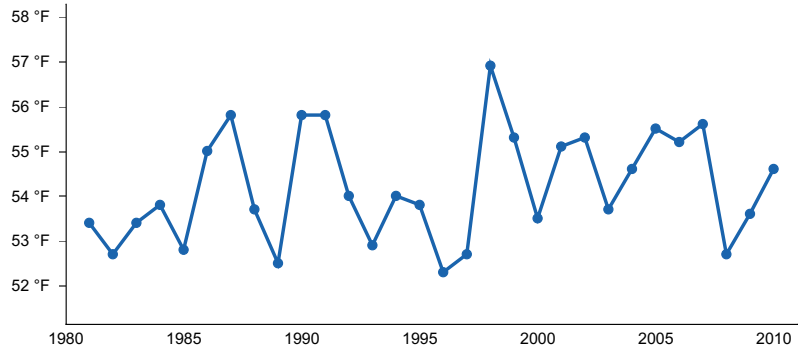



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) BENTON 2 N [USC00110608], Benton, IL
- (2) SALEM [USC00117636], Salem, IL
- (3) MT VERNON 3 NE [USC00115943], Mount Vernon, IL

- (4) RAMSEY [USC00117126], Ramsey, IL
- (5) ROBINSON [USC00117345], Robinson, IL
- (6) EFFINGHAM 3SW [USW00093816], Effingham, IL

## Influencing water features

This ecological site is influenced by a seasonal high water table from high groundwater levels, as well as slow hydraulic conductivity, which impedes through flow from precipitation. The water table is typically near the surface in late fall through spring, receding in the summer. Infiltration is very slow (Hydrologic Group D), and surface runoff is very high (SSS NRCS WSS, 2018). Surface runoff contributes water to downslope ecological sites. These areas have a claypan or clay layer at or near the surface, with a slow rate of water transmission. (SSS NRCS OSD, 2018).

## Soil features

This soil is very deep, somewhat poorly drained and seasonally wet and seepy. It formed in loess or silty sediments overlying Illinoian till that contains a strongly developed Sangamon paleosol. A seasonal high water table 0.5 foot to 1.5 feet below the surface is present in the spring. Soils of this ecological site are in the Alfisol order, further classified as fine, smectitic, mesic Aeric Chromic Vertic Epiaqualfs. Soil series associated with this site include Atlas (NCSS, 2018; SSS NRCS OSD, 2018)

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Till |
| Surface texture | (1) Silt loam<br>(2) Silty clay loam |
| Family particle size | (1) Fine |
| Drainage class | Somewhat poorly drained |
| Permeability class | Very slow |
| Soil depth | 60–80 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (Depth not specified) | 5–6 in |
| Calcium carbonate equivalent (Depth not specified) | 0–25% |
| Electrical conductivity (Depth not specified) | 0–2 mmhos/cm |
| Sodium adsorption ratio (Depth not specified) | 0–5 |
| Soil reaction (1:1 water) (Depth not specified) | 4.5–7.8 |
| Subsurface fragment volume <=3" (Depth not specified) | 0–4% |
| Subsurface fragment volume >3" (Depth not specified) | 0% |

## 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. Wet Clayey Till Backslope Woodlands form an aspect of this vegetative continuum. This ecological site occurs on convex slopes along drainageways in dissected uplands with slopes of 5 to 18 percent on deep, somewhat poorly drained, seasonally wet and seepy soils. Species characteristic

of this ecological site consist of an open canopy of oaks with a continuous understory of herbaceous vegetation.

Fire is a critical factor that maintains Wet Clayey Till Backslope Woodlands. Fire typically consisted of low- to moderate-severity surface fires every 2 to 5 years ((Anderson, 1975; Brugam et.al., 2016; LANDFIRE 2009). Ignition sources included summertime lightning strikes from convective storms and bimodal, human ignitions during the spring and fall seasons. Native Americans regularly set fires to improve sight lines for hunting, drive large game, improve grazing and browsing habitat, agricultural clearing, and enhance vital ethnobotanical plants (Barrett 1980; LANDFIRE 2009).

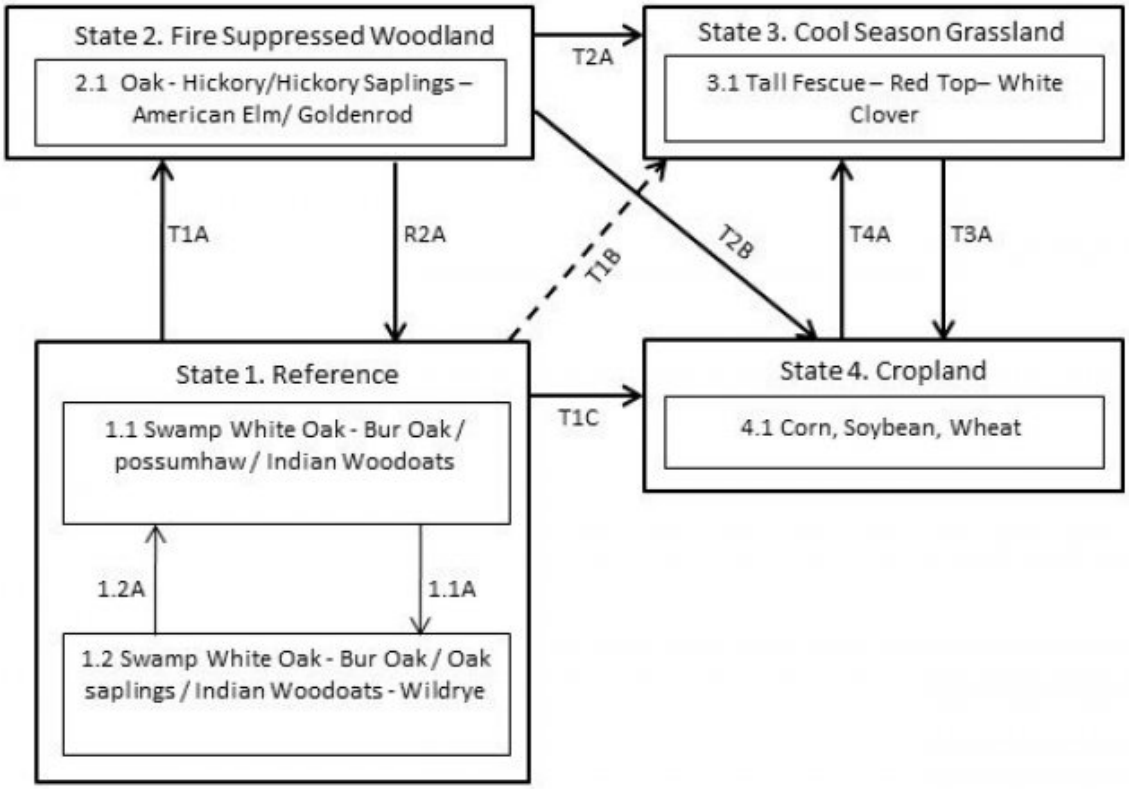
Drought, grazing, and windthrow have also played a role in shaping this ecological site. Wet Clayey Till Backslope Woodland ecological sites were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison (Bos bison), prairie elk (Cervus elaphus), and white-tailed deer (Odocoileus virginianus). Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by large native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and woodland ground flora species (Anderson, 1982; Irland 2000; Peterson 2000). When coupled with fire, periods of drought, herbivory, and high wind events can greatly delay the establishment and maturation of woody vegetation (Pyne et al. 1996).

Extensive conversion for agriculture has fragmented this system. These ecological sites are moderately productive. Today, many of these ecological sites have been cleared, drained and converted to pasture and cropland or has been maintained in woody cover with increased stand density. Uncontrolled domestic grazing has impacted these remaining wooded 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. In addition, soil compaction and soil erosion can be a problem and lower productivity. In the long term absence of fire, woody species, especially hickory (Carya spp.) and hophornbeam (*Ostrya virginiana* (Mill.) encroach into these woodlands (IDNR, 2018). Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora (Dey and Kabrick, 2015). Remaining woodland ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices.

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

# Wet Clayey Till Backslope Woodland, F113XY912IL
*(Provisional)*




| Code | Event/Activity/Process |
|---|---|
| T1A | Fire suppression > 20 years; woody invasion; repeated timber harvests; domestic grazing |
| T1C, T3A | Tillage; conservation cropping system; water management |
| T1B, 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 10+ years |
| 1.2A | Fire interval 3-5 years |
| R2A | Forest stand improvement; livestock access control; prescribed fire, 3-5 years; long term stand rotation |

**State 1**
**Reference**

These woodland communities were strongly influenced by fire and seasonal soil wetness. Herbivory by native (now expatriated) ungulates also played a role. Consequently, fire-tolerant oaks over a ground flora of native prairie grasses, sedges and wildflowers made up the Wet Clayey Till Backslope Woodland ecological site. There are two phases associated with this reference state.

**Dominant plant species**

- swamp white oak (*Quercus bicolor*), tree
- bur oak (*Quercus macrocarpa*), tree
- possumhaw (*Ilex decidua*), grass
- Indian woodoats (*Chasmanthium latifolium*), other herbaceous

### Community 1.1
### Swamp White Oak – Bur Oak/ Possumhaw / Indian Woodoats

The overstory in this phase is dominated by swamp white oak and bur oak, with scattered elms and other oaks. This open woodland community likely had a two-tiered structure. The abundant herbaceous layer is dominated by Indian woodloats, wildryes, sedges and wide variety of forbs. Fire frequency was probably every 2 to 5 years. This continued fire and natural native grazing would have maintained the more open canopy and profusion of ground flora species.

**Dominant plant species**

- swamp white oak (*Quercus bicolor*), tree
- bur oak (*Quercus macrocarpa*), tree
- possumhaw (*Ilex decidua*), shrub
- Indian woodoats (*Chasmanthium latifolium*), grass

### Community 1.2
### Swamp White Oak – Bur Oak/ Oak saplings / Indian Woodoats - Wildrye

This woodland community phase likely had a three-tiered structure. It is characterized by a thick understory of saplings and shrubs. The herbaceous layer is dominated by grasses and sedges. Fire-free intervals ranged from 5 to 20 years.

**Dominant plant species**

- swamp white oak (*Quercus bicolor*), tree
- bur oak (*Quercus macrocarpa*), tree
- oak (*Quercus*), shrub
- Indian woodoats (*Chasmanthium latifolium*), grass
- wildrye (*Elymus*), grass

### Pathway 1.1A
### Community 1.1 to 1.2

Fire-free interval 10+ years

### Pathway 1.2A
### Community 1.2 to 1.1

Fire interval 3-5 years

### State 2
### Fire Suppressed Woodland

Most current areas of Wet Clayey Till Backslope Woodlands 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 Oak - Hickory/Hickory

Saplings – American Elm/ Goldenrod woodland. Hickory and midstory species such as American elm may also increase. Herbaceous cover and diversity greatly diminishes, leaf litter builds up, and more shade-tolerant woodland species persist. The understory also changes with oak and hickory saplings along with persimmon (*Diospyros virginiana* L.) and black cherry (*Prunus serotina* Ehrh.). Transition to cool season grasslands (State 3) or intensive cropland (State 4) is common, especially on slopes less than 10 percent.

**Dominant plant species**

- oak (*Quercus*), tree
- hybrid hickory (*Carya*), tree
- elm (*Ulmus*), tree
- 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.), red top (*Agrostis stolonifera* L.) and white clover (*Trifolium repens* L.) has been common in the Illinois Central Claypan area. 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
- creeping bentgrass (*Agrostis stolonifera*), grass
- white clover (*Trifolium repens*), other herbaceous

## State 4
## Cropland

This is an occasional 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. Water management activities are needed to maximize yields. 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 > 20 years; woody invasion; repeated timber harvests; domestic grazing

## Transition T1B
## State 1 to 3

Woody removal; tillage; vegetative seeding; grassland management

## Transition T1C
## State 1 to 4

Woody removal; tillage; conservation cropping system; water management

## Restoration pathway R2A

### State 2 to 1

Forest stand improvement; livestock access control; prescribed fire, 3-5 years; 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; 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: 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 the following NVC Association: Quercus bicolor - (Quercus macrocarpa, Quercus stellata) Woodland (CEGL005181)

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

## Contributors

Douglas Wallace
Ralph Tucker
Zach Weber

## Approval

Suzanne Mayne-Kinney, 5/17/2024

## Acknowledgments

Contact information for primary authors: Ralph Tucker (ralph.tucker@mo.usda.gov), Soil Scientist, United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS), Union, MO; Zach Weber (zach.weber@il.usda.gov), Soil Scientist, USDA-NRCS, Olney, IL; Douglas Wallace (doug.wallace@mo.usda.gov), Ecologist, USDA-NRCS, Columbia, MO.

## 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 | 05/11/2025 |
| 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:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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):**

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:**