

## Ecological site F115XA003IL Wet Silty Upland

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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): 115X–Central Mississippi Valley Wooded Slopes

This MLRA is characterized by deeply dissected, loess-covered hills bordering well defined valleys of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers and their tributaries. It is used to produce cash crops and livestock. About one-third of the area is forested, mostly on the steeper slopes. This area is in Illinois (50 percent), Missouri (36 percent), Indiana (13 percent), and Iowa (1 percent) in two separate areas. It makes up about 25,084 square miles (64,967 square kilometers).

Most of this area is in the Till Plains section and the Dissected Till Plains section of the Central Lowland province of the Interior Plains. The Springfield-Salem plateaus section of the Ozarks Plateaus province of the Interior Highlands occurs along the Missouri River and the Mississippi River south of the confluence with the Missouri River. The nearly level to very steep uplands are dissected by both large and small tributaries of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers. The Ohio River flows along the southernmost boundary of this area in Indiana. 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 undulating. Karst topography is common in some parts along the Missouri and Mississippi Rivers and their tributaries. Well-developed karst areas have hundreds of sinkholes, caves, springs, and losing streams. In the St. Louis area, many of the karst features have been obliterated by urban development.

Elevation ranges from 90 feet (20 meters) on the southernmost flood plains to 1,030 feet (320 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 150 feet (15 to 45 meters) in the steep, deeply dissected hills bordering rivers and streams. The bluffs along the major rivers are generally 200 to 350 feet (60 to 105 meters) above the valley floor.

The uplands in this MLRA are covered almost entirely with Peoria Loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. In Illinois, the loess is underlain mostly by Illinoian-age till that commonly contains a paleosol. Pre-Illinoian-age till is in parts of this MLRA in Iowa and Missouri and to a minor extent in the western part of Illinois. Wisconsin-age outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries. The loess and glacial deposits are underlain by several bedrock systems. Pennsylvanian and Mississippian bedrock are the most extensive. To a lesser extent are Silurian, Devonian, Cretaceous, and Ordovician bedrock. Karst areas have formed where limestone is near the surface, mostly in the southern part of the MLRA along the Mississippi River and some of its major tributaries. Bedrock outcrops are common on the bluffs along the Mississippi, Ohio, and Wabash Rivers and their major tributaries and at the base of some steep slopes along minor streams and drainageways.

The annual precipitation ranges from 35 to 49 inches (880 to 1,250 millimeters) with a mean of 41 inches (1,050 millimeters). The annual temperature ranges from 48 to 58 degrees F (8.6 to 14.3 degrees C) with a mean of 54 degrees F (12.3 degrees C). The freeze-free period ranges from 150 to 220 days with a mean of 195 days.

Soils The dominant soil orders are Alfisols and, to a lesser extent, Entisols and Mollisols. 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 shallow to very deep, excessively drained to poorly drained, and loamy, silty, or clayey.

The soils on uplands in this area support natural hardwoods. Oak, hickory, and sugar maple are the dominant species. Big bluestem, little bluestem, and scattered oak and eastern redcedar grow on some sites. The soils on flood plains support mixed forest vegetation, mainly American elm, eastern cottonwood, river birch, green ash, silver maple, sweetgum, American sycamore, pin oak, pecan, and willow. Sedge and grass meadows and scattered trees are on some low-lying sites. (United States Department of Agriculture, Natural Resources Conservation Service, 2022)

## LRU notes

Most of this LRU (Land Resource Unit) is in the glaciated Till Plains Section of the Central Lowland Province of the Interior Plains. The southeast corner is in the Highland Rim Section (locally known as the Shawnee Hills Section) of the Interior Low Plateaus Province of the Interior Plains. The nearly level to very steep uplands in this LRU are dissected by both large and small tributaries of the Wabash and Ohio Rivers. 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.

This area is covered almost entirely with Wisconsin loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. The loess throughout the area is underlain dominantly by glacial till. Wisconsin outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries in the area. The loess and glacial drift are underlain by Pennsylvanian-age bedrock. Bedrock outcrops are common in the walls of the valleys along the Wabash and Ohio Rivers and at the base of some steep slopes along minor streams and drainageways.

The dominant soil orders in this LRU are Alfisols, Entisols, Inceptisols, and Mollisols. The soils in the area have a mesic soil temperature regime, a udic or aquic soil moisture regime, and dominantly mixed or smectitic mineralogy. The soils are very deep, poorly drained to excessively drained, and loamy, silty, or clayey. Nearly level Endoaqualfs (Iva series) and Argiaquolls (Ragsdale series) formed in loess on broad upland summits and flats. Nearly level to steep Hapludalfs (Alford, Iona, Muren, Stoy, and Sylvan series) and Fragiudalfs (Hosmer series) formed in loess on uplands. Hapludalfs (Alvin, Bloomfield, and Princeton series) and Argiudolls (Ade series) formed in sandy eolian material in areas of dunes on uplands and stream terraces. Steep and very steep Hapludalfs (Hickory series) formed in Illinoian till along the major streams and dissected upland drainageways. Hapludalfs (Wellston series) formed in siltstone or sandstone residuum on strongly sloping to steep side slopes underlain by bedrock.

The soils in the major stream valleys include Hapludolls (Carmi series), Argiudolls (Elston series), and Hapludalfs (Skelton series), all of which formed in outwash on nearly level to moderately sloping stream terraces and outwash plains. Endoaquolls (Montgomery series), Endoaquepts (Zipp series), Epiaqualfs (McGary series), and Hapludalfs (Shircliff and Markland series) formed in clayey lacustrine sediments on nearly level to strongly sloping lacustrine terraces or lake plains. Endoaquepts (Evansville series), Endoaquolls (Patton series), and Hapludalfs (Henshaw and Uniontown series) formed in silty sediments on terraces and lake plains.

LRU notes (excerpts from Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296, 2006)

## Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2022):  
115X–Central Mississippi Valley Wooded Slopes

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 Code: 222G, 222D

These PES sites are similar to other established ecological classifications. Field verification is needed to confirm this association.

#### International Vegetation Classification Hierarchy

Class: 1. Forest & Woodland

Subclass: 1.B. Temperate & Boreal Forest & Woodland

Formation: 1.B.3. Temperate Flooded & Swamp Forest

Division: 1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

Macrogroup: M503. Central Hardwood Swamp Forest

Group: G918. Central Appalachian-Northeast Alkaline Swamp

Alliance: A4474. *Quercus palustris* - *Quercus bicolor* Central Interior Swamp Forest Alliance

### Ecological site concept

The reference community is a mature deciduous forest with a substantial oak component. Soils are somewhat poorly drained to poorly drained and sites range in slope from 0-5%. Even subtle differences in slope and drainage will be reflected in corresponding subtle differences in the species distribution. These sites will exhibit a continuum of wet, wet-mesic, and mesic species depending on drainage, microtopography, adjacent communities, and disturbances. Landscape topography creates a pattern of slightly higher, wet-mesic raised areas, and wet depressions. Accordingly, there is a continuum of variation in plant community composition.

Canopy species include multiple oak species such as swamp white oak (*Quercus bicolor*), northern red oak (*Quercus rubra*), pin oak (*Quercus palustris*), and/or bur oak (*Quercus macrocarpa*). Other trees on site include blackgum (*Nyssa sylvatica*), sweetgum (*Liquidambar styraciflua*), and silver maple (*Acer saccharinum*). Red maple (*Acer rubrum*) is often dominant in the subcanopy. Other subcanopy trees and shrubs include pawpaw (*Asimina triloba*), elderberry (*Sambucus nigra*), Virginia creeper (*Parthenocissus quinquefolia*), hawthorn (*Crataegus* spp.), and/or spicebush (*Lindera benzoin*).

Understory plant composition varies and may include numerous sedges (*Carex* spp.), bittercress (*Cardamine* spp.), wildrye (*Elymus* spp.), eastern poison ivy (*Toxicodendron radicans*), sensitive fern (*Onoclea sensibilis*), sweet woodreed (*Cinna arundinacea*), and jewelweed (*Impatiens capensis*).

These sites were historically influenced by natural disturbances that included fire, drought, wind damage, ice storms, and grazing. (LANDFIRE). Today, many sites have undergone repeated disturbances including clearing, selective harvest (oak removal), hydrological modifications, unmanaged grazing, and introduction of non-native species. A mix of deciduous tree species such as sweetgum, red maple, green ash, silver maple, and tulip poplar are now very common on many wooded sites.

### Associated sites

F115XA001IL	<b>Silty Upland</b> Silty Upland. These sites are on loess uplands but are moderately well drained or well drained.
F115XA004IL	<b>Fragic Upland</b> Fragic Upland. These sites are on soils that have a clay layer that influences water movement and plant growth.

### Similar sites

F115XA007IL	<b>Wet Clayey Terrace</b> Wet Clay Terrace. These sites are located on terraces and are somewhat poorly drained.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus bicolor</i> (2) <i>Nyssa sylvatica</i>
Shrub	(1) <i>Cornus</i> (2) <i>Sambucus nigra</i>

Herbaceous	(1) <i>Carex</i> (2) <i>Cardamine</i>
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## Physiographic features

These sites are located on various landforms including lakeplains, flats, loess hills, and till plains. Elevation of these sites are between 328' to 1250'. Parent material kind and origin is loess and loess over loamy till. Wet layer depth ranges from 6" to 24". Runoff class is negligible to medium. These ecological sites do not flood but some sites may seasonally pond. (NASIS, 2020)

**Table 2. Representative physiographic features**

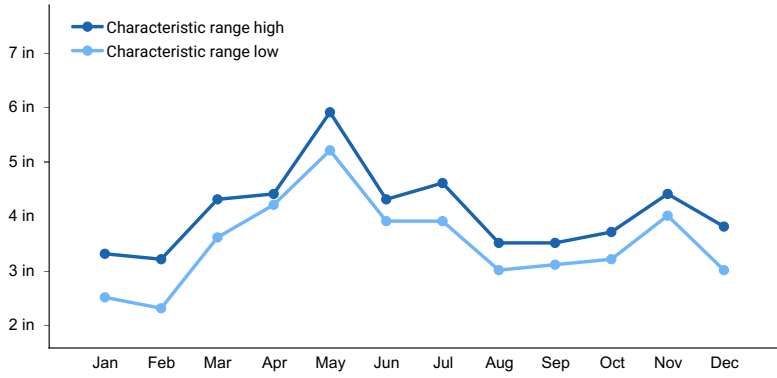
Landforms	(1) Upland > Till plain (2) Upland > Lake plain (3) Plateau > Loess hill (4) River valley > Stream terrace
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None to occasional
Elevation	328–1,250 ft
Slope	0–5%
Ponding depth	0–6 in
Water table depth	6–24 in
Aspect	Aspect is not a significant factor

## Climatic features

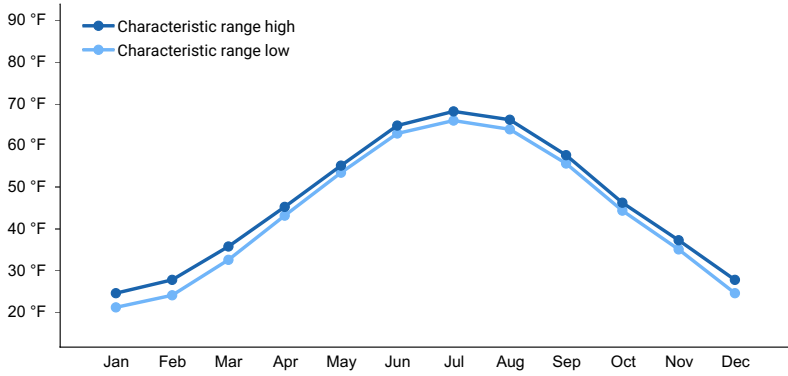
About 60 percent of the precipitation in LRU 115XA falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter.

**Table 3. Representative climatic features**

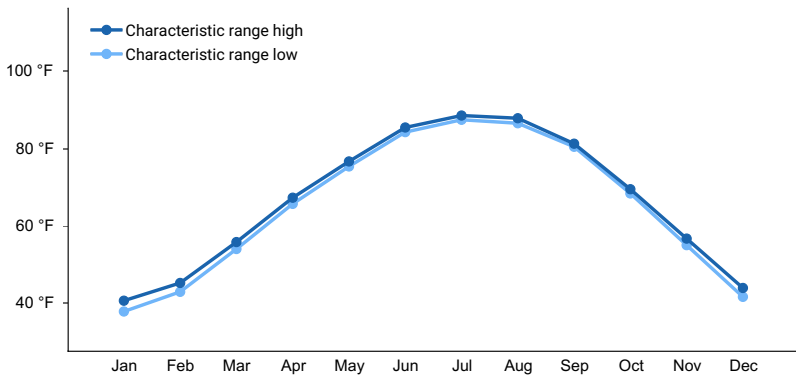
Frost-free period (characteristic range)	171-179 days
Freeze-free period (characteristic range)	192-199 days
Precipitation total (characteristic range)	44-47 in
Frost-free period (actual range)	166-180 days
Freeze-free period (actual range)	190-204 days
Precipitation total (actual range)	40-48 in
Frost-free period (average)	175 days
Freeze-free period (average)	196 days
Precipitation total (average)	45 in



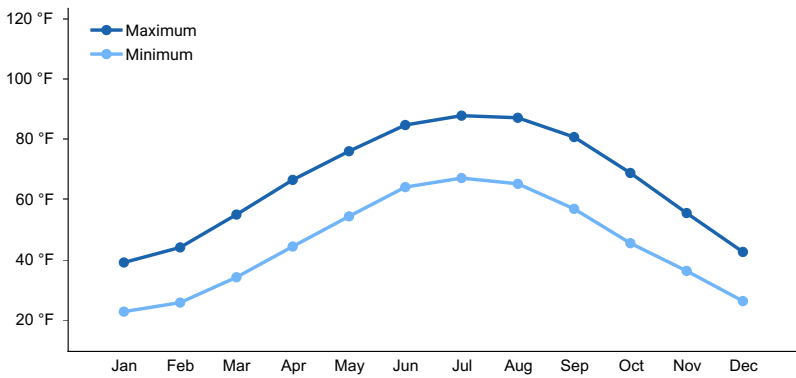
**Figure 1. Monthly precipitation range**



**Figure 2. Monthly minimum temperature range**



**Figure 3. Monthly maximum temperature range**



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

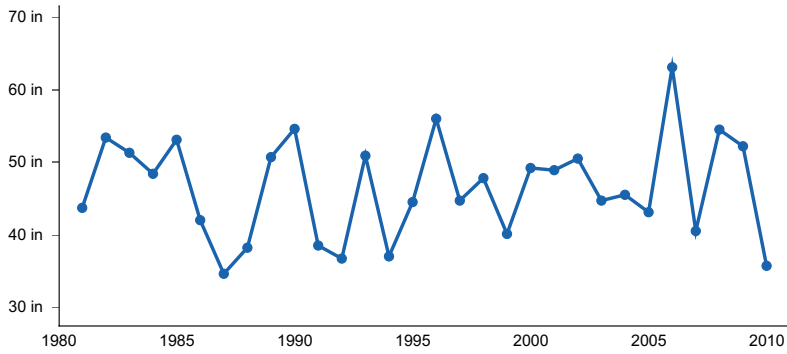


Figure 5. Annual precipitation pattern

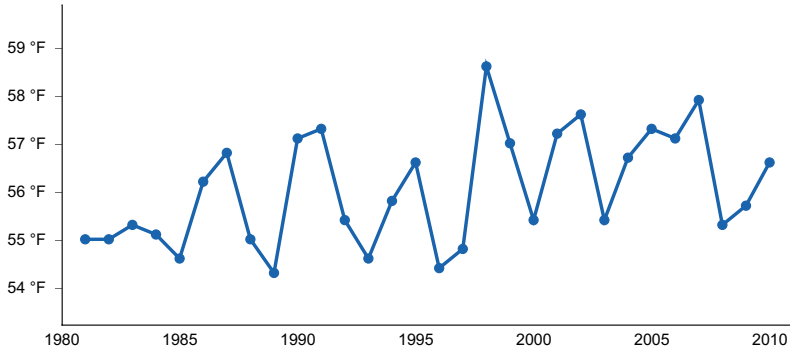


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) MT VERNON [USC00126001], Uniontown, IN
- (2) PRINCETON 1 W [USC00127125], Princeton, IN
- (3) TERRE HAUTE CAA AP [USW00093823], Terre Haute, IN
- (4) VINCENNES 5 NE [USC00129113], Vincennes, IN
- (5) EVANSVILLE REGIONAL AP [USW00093817], Evansville, IN

### Influencing water features

Wet Silty Upland sites are not influenced by wetland or riparian water features. Precipitation is the main source of water for vegetation. Representative permeability is negligible to slow. Many sites have a seasonal high water table is present at a depth of 6"- 24" below the surface. Some sites may have seasonal ponding with a depth usually below 1 foot.

### Soil features

These soils are very deep, poorly drained to somewhat poorly, with an argillic horizon between 24 and 60 inches. Soils are formed in loess and loess over loamy till. (NASIS 2020)  
 Soil series associated with this site include Iva, Reesville, Weir, and Whitson. All soils in this group have a sodium adsorption ratio of zero. Soils of this ecological site are classified as fine and fine-silty, mesic Alfisols. (NASIS, 2020)

Official Soil Series Description (OSD) Taxonomic Classes:

Iva: Fine-silty, mixed, superactive, mesic Aeric Endoaqualfs

Reesville: Fine-silty, mixed, superactive, mesic Aquic Hapludalfs

Weir: Fine, smectitic, mesic Typic Endoaqualfs

Whitson: Fine-silty, mixed, superactive, mesic Typic Endoaqualfs

Table 4. Representative soil features

Parent material	(1) Loess
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Surface texture	(1) Silt loam (2) Silt
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to slow
Depth to restrictive layer	60–80 in
Soil depth	60–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	7–8 in
Calcium carbonate equivalent (Depth not specified)	0–40%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

Wet Silty Upland ecological sites are found on somewhat poorly drained to poorly drained soils that are formed in loess and situated on slopes ranging from 0-5%. These sites have a seasonal highwater table. These sites will exhibit a continuum of species depending on drainage, microtopography, adjacent communities, and disturbances. The topography is often a landscape mosaic of slightly higher, wet-mesic raised areas, and wet depressions. Accordingly, there is a continuum of variation in plant community composition. Historically, sites had a substantial oak component of multiple species including swamp white oak, pin oak, northern red oak, and/or bur oak. Other common tree species included blackgum, sweetgum, red maple, silver maple, dogwoods, and green ash.

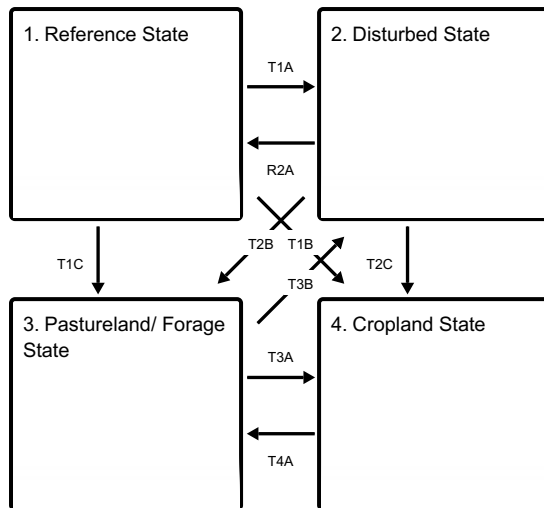
Natural impacts such as drought, wind damage, ice storms and wildfires influenced these communities over centuries. Periodic fire was one of the disturbances that helped to maintain the oak dominance. Often these fires were of low-severity and helped to clear the litter from the forest floor and encourage oak regeneration. Lightning was the usual ignition source; although native Americans did use fire to reduce understory brush or increase forage. Long-term periods of drought did occur and would have influenced the species composition, shrub density, plant mortality, and tree growth rates.

Many of the lower slope sites have now been converted to agriculture – either cropland or hayland production. Cleared sites on higher slopes are often grazed; however, management is limited by slope. Landowner should be aware of potential overgrazing impacts such as soil erosion, soil compaction, water quality impacts, and noxious weeds. Invasive non-native vegetation is a serious concern in many remaining wooded areas as honeysuckle, euonymus, privet, Nepalese brown-top and other non-native plants have been introduced and are increasing without management controls.

Long-term fire suppression has resulted in some sites transitioning to forest with a dense understory and an increase in red maple. In Indiana, tulip poplar, red maple and green ash is becoming common on sites. Without management inputs such as prescribed fire or timber stand improvement work, oak regeneration may be limited.

## State and transition model

## Ecosystem states



**T1A** - Large scale disturbance

**T1C** - Clearing of site; agricultural production - forage

**T1B** - Clearing of site; agricultural production - row crops.

**R2A** - Restoration inputs such as planting, brush control, prescribed fire, and timber stand improvement.

**T2B** - Clearing; agricultural production - forage

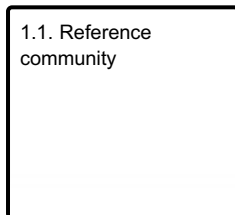
**T2C** - Clearing; agricultural production - row crops

**T3B** - Abandonment of agricultural practices

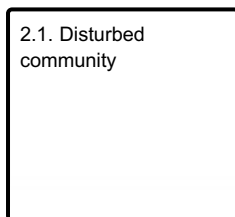
**T3A** - Site preparation and tillage, seeding, weed control, cropland management

**T4A** - Transition site to forage production; seeding; weed/brush control; pasture management

## State 1 submodel, plant communities



## State 2 submodel, plant communities



## State 3 submodel, plant communities





## State 4 submodel, plant communities

4.1. Cropland  
community

### State 1 Reference State

The reference state is a mixed deciduous forest with an overstory that has substantial oak species including pin oak, swamp white oak, and northern red oak (*Quercus rubra*). Also on site is blackgum (*Nyssa sylvatica*), sweetgum (*Liquidambar styraciflua*) and green ash (*Fraxinus pensylvanica*). Red maple (*Acer rubrum*) is common in the understory canopy. Reoccurring fires, especially during periods of drought, would have maintained an oak-dominated forest along with an open understory.

#### Dominant plant species

- swamp white oak (*Quercus bicolor*), tree
- pin oak (*Quercus palustris*), tree
- northern red oak (*Quercus rubra*), tree
- blackgum (*Nyssa sylvatica*), tree
- dogwood (*Cornus*), shrub
- black elderberry (*Sambucus nigra*), shrub
- sedge (*Carex*), grass
- bittercress (*Cardamine*), other herbaceous

### Community 1.1 Reference community

These sites will exhibit a continuum of species depending on drainage and microtopography. There is often a landscape mosaic of slightly higher, wet-mesic raised areas, and wet depressions. Accordingly, there is a continuum of variation in plant community composition. Historically, sites had a substantial oak component of multiple species including swamp white oak, pin oak, northern red oak, and/or bur oak. Other common tree species included blackgum, sweetgum, red maple, silver maple, dogwoods, and green ash.

#### Dominant plant species

- swamp white oak (*Quercus bicolor*), tree
- pin oak (*Quercus palustris*), tree
- northern red oak (*Quercus rubra*), tree
- blackgum (*Nyssa sylvatica*), tree
- dogwood (*Cornus*), shrub
- black elderberry (*Sambucus nigra*), shrub
- sedge (*Carex*), grass
- bittercress (*Cardamine*), other herbaceous

### State 2 Disturbed State

Most remaining Wet Silty Upland sites have been altered due to a long-term absence of fire, grazing, selective harvest (oak removal) and/or invasive species. Trees on site, will depending on the type, length and severity of disturbances. However, sites that have had a long-term absence of fire will display the following characteristics: an increase in fire-intolerant species, an increase in shrub density, an increase in leaf-litter buildup, and an increase in shade-tolerant understory species. Sites will exhibit a more mixed deciduous forest composition of red maple, silver maple, tulip poplar, green ash, hickory, and sweetgum.

### **Dominant plant species**

- red maple (*Acer rubrum*), tree
- silver maple (*Acer saccharinum*), tree
- sweetgum (*Liquidambar styraciflua*), tree

## **Community 2.1**

### **Disturbed community**

This is a disturbed, successional community that includes a variety of fast-growing trees such as maples and ashes. Other species may include maple, ash, sweetgum and poplar. Shrub and understory species will depend on the type, severity and length of disturbances, available seed sources, and management inputs, if present.

### **Dominant plant species**

- red maple (*Acer rubrum*), tree
- silver maple (*Acer saccharinum*), tree
- sweetgum (*Liquidambar styraciflua*), tree

## **State 3**

### **Pastureland/ Forage State**

A portion of these sites have been converted to pastureland or forage production. Species selection will depend upon the objectives and goals of the landowner; however, commonly planted grasses include tall fescue (*Schedonorus arundinaceus*), brome (*Bromus* spp.), white clover (*Trifolium repens*) and red clover (*Trifolium pratense*). Species health and productivity are determined by the management and long-term overgrazing on some sites has caused soil erosion and compaction.

### **Dominant plant species**

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

## **Community 3.1**

### **Pastureland/Forage community**

These sites are managed for forage production and often include tall fescue (*Schedonorus arundinaceus*), brome (*Bromus* spp.), white clover (*Trifolium repens*) and red clover (*Trifolium pratense*). Selection of species will depend on the landowner's objectives.

### **Dominant plant species**

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

## **State 4**

### **Cropland State**

Hydrological modifications such as ditching and tiling are often used on these sites to increase crop production. Common crops include corn (*Zea mays*), soybeans (*Glycine max*), and occasionally winter wheat (*Triticum aestivum*). Some landowners choose to convert sites to cool season grasses for a period before resuming cropland production. A return to the historical Reference State from State 4 is unlikely, if not impossible.

### **Dominant plant species**

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

## **Community 4.1**

### **Cropland community**

This community is characterized by the management and production of row crop agriculture. Common species include corn, soybean and wheat. Many other crops are suitable for these sites, and species selection will depend upon the landowners goals and objectives.

### **Dominant plant species**

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

## **Transition T1A**

### **State 1 to 2**

Severe disturbances, such as clearing or selective harvesting (oak/hickory removal) , will transition this site to State 2.

## **Transition T1C**

### **State 1 to 3**

Site is transitioned to an agricultural site focused on forage production. Management inputs would include clearing, site preparation, seeding and weed/brush control.

## **Transition T1B**

### **State 1 to 4**

Site is transitioned to an agricultural site focused on row crop production. Management inputs would include clearing, site preparation, seeding and weed control. Hydrological modifications are often installed to aid in drainage.

## **Restoration pathway R2A**

### **State 2 to 1**

Restoration would require long-term management inputs including planting of desired species, weed control, brush control, timber stand improvement, and prescribed fire.

## **Transition T2B**

### **State 2 to 3**

Site is cleared and forage/pasture production is initiated. Management inputs would include tree/shrub removal, site preparation, seeding, and weed/brush control.

## **Transition T2C**

### **State 2 to 4**

Site is cleared and row crop production is initiated. Management inputs would include tree/shrub removal, site preparation, seeding, and weed control.

## **Transition T3B**

### **State 3 to 2**

Site is abandoned and slowly would transition to a wooded state dominated by deciduous trees. Species on site would depend on the severity and length of disturbance and available seed sources.

### **Transition T3A**

#### **State 3 to 4**

Management inputs that transition a site from pasture or forage production to a site that is utilized for row crop production.

### **Transition T4A**

#### **State 4 to 3**

Management inputs to transition a site from cropland production to a state of pasture/forage production.

## **Additional community tables**

### **Inventory data references**

A Provisional Ecological Site Description (PESD) describes ecological potential and ecosystem dynamics of land areas and their potential management. Ecological sites are linked to soil survey map unit components, which allows for mapping of ecological sites. A PESD with a provisional status represents the lowest tier of documentation that is releasable to the public. No field level data have been collected as part of this PESD. It is expected that a PESD will continue to be refined through field verification and field sampling.

Reference and alternative state concepts, including the state-and-transition model and vegetative communities are not yet well-documented and will require field sampling for verification.

This document is provisional.

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## **Approval**

Suzanne Mayne-Kinney, 12/30/2024

## **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	01/05/2025
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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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):**
- 

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:**
-