Ecological site R115XA106IL
Marsh

Last updated: 12/30/2024
Accessed: 04/08/2026

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 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, also known as 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. 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)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

The reference community of this ecological site is similar to:
Terrestrial Ecological System: North-Central Interior Wet Meadow-Shrub Swamp, Unique Identifier: CES202.701 (National Vegetation Classification System).
Future field verification is needed to confirm this relationship.

Ecological site concept

The historic reference site is a wet marsh meadow on marly, herbaceous soils. These sites were a graminoid-dominated meadow with many species of native grasses, sedges,

and forbs. These sites had a diverse array of native species including big bluestem (*Andropogon gerardii*), tussock sedge (Carex stricta), indiangrass (*Sorghastrum nutans*), prairie cordgrass (*Spartina pectinata*), fringed sedge (Carex crinite), meadowsweet (Spirea alba), spotted joe-pye weed (*Eutrochium maculatum*), queen of the prairie (*Filipendula rubra*), swamp lousewort (*Pedicularis lanceolata*), purple meadowrue (*Thalictrum dasycarpum*), and fringed loosestrife (*Lysimachia ciliata*). Shrubs included stiff dogwood (Cornus foemina), red osier dogwood (Cornus sericea), black willow (Salix nigra), and pussy willow (Salix discolor).

The majority of these sites in MLRA 115X are now in agricultural production. Any remaining wooded sites in MLRA 115X have been disturbed and commonly exhibit a variety of species including silver maple, red maple, green ash, American elm, willows, and dogwoods.

Associated sites

F115XA001IL	**Silty Upland** Silty Upland. These sites are located on uplands and are well drained.
F115XA003IL	**Wet Silty Upland** Wet Silty Upland. These sites are located on uplands and are somewhat poorly drained to poorly drained.
F115XA007IL	**Wet Clayey Terrace** Wet Clayey Terrace. These sites are somewhat poorly drained to poorly drained and on clayey soils.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cornus* (2) *Salix*
Herbaceous	(1) *Spartina pectinata* (2) *Carex*

Physiographic features

Marsh ecological sites are located on depressions and flats on outwash platins, lake plains and ground moraines. Elevations in LRU 115XA range from 341’ – 600’. Sites have seasonal ponding and a wet layer at the surface. Permeability is very slow, and runoff class is negligible. These ecological sites do not flood and occasionally pond. (NASIS 2020). The soil is Edwards variant and it is currently mapped in Knox County, Indiana within LRU 115XA.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Flat
Runoff class	Negligible
Flooding frequency	None
Ponding frequency	None to occasional
Elevation	104–183 m
Slope	0–1%
Ponding depth	0–30 cm
Water table depth	0–30 cm
Aspect	Aspect is not a significant factor

Climatic features

About 60 percent of the precipitation falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter. The frost-free period generally ranges from171-179 days and the freeze-free period generally ranges from 192-199 days.

The following information is based on data taken from weather stations within MLRA 115X as calculated in EDIT.

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)	1,118-1,194 mm
Frost-free period (actual range)	166-180 days
Freeze-free period (actual range)	190-204 days
Precipitation total (actual range)	1,016-1,219 mm
Frost-free period (average)	175 days
Freeze-free period (average)	196 days
Precipitation total (average)	1,143 mm

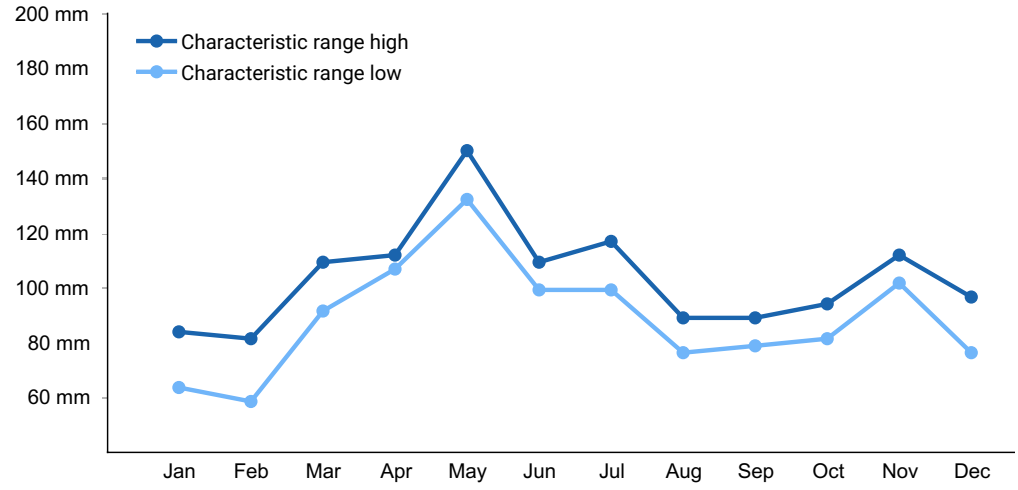


Figure 1. Monthly precipitation range

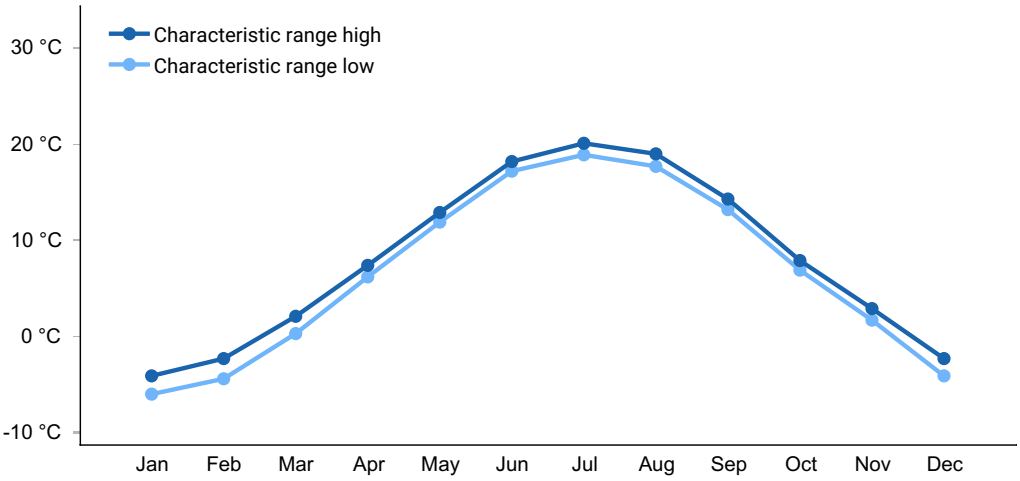


Figure 2. Monthly minimum temperature range

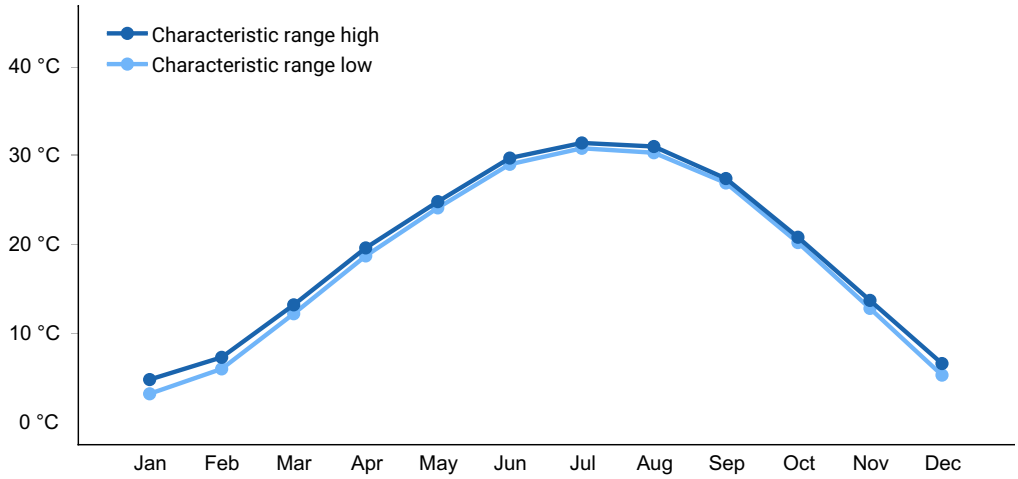


Figure 3. Monthly maximum temperature range

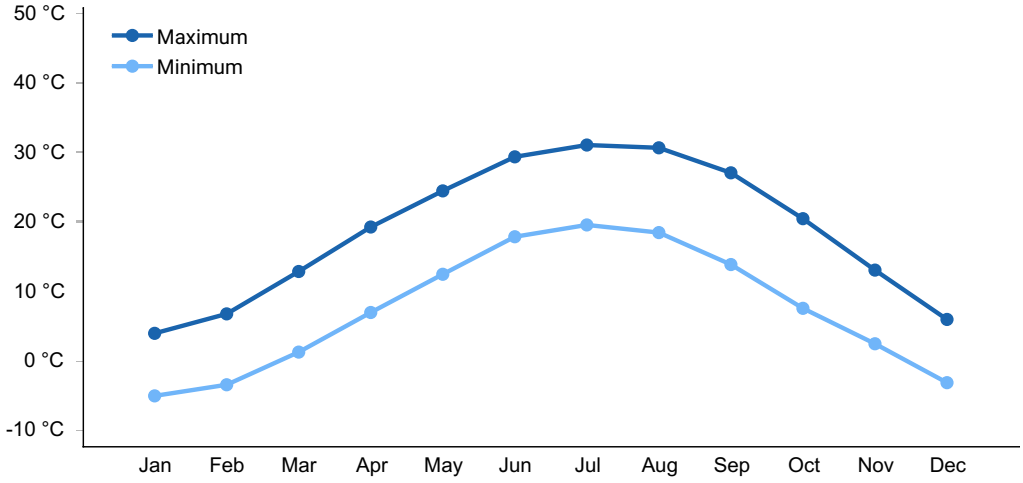


Figure 4. Monthly average minimum and maximum temperature

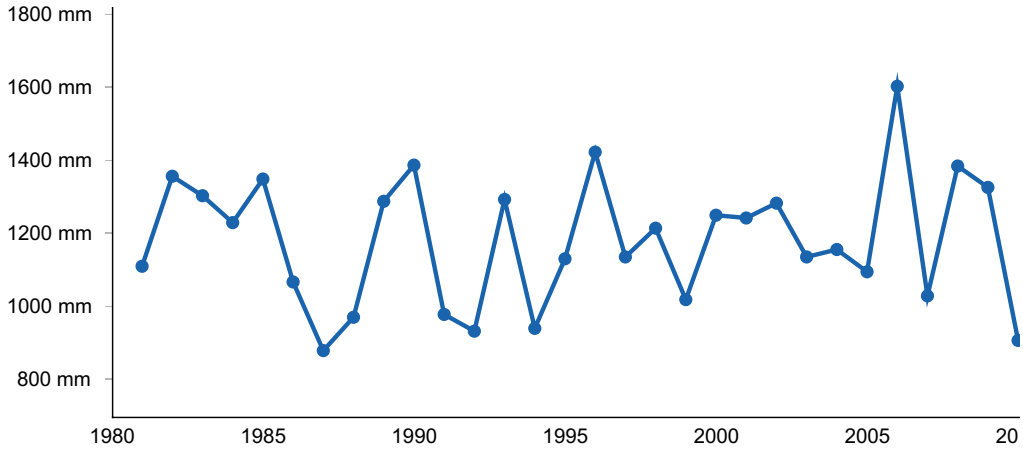


Figure 5. Annual precipitation pattern

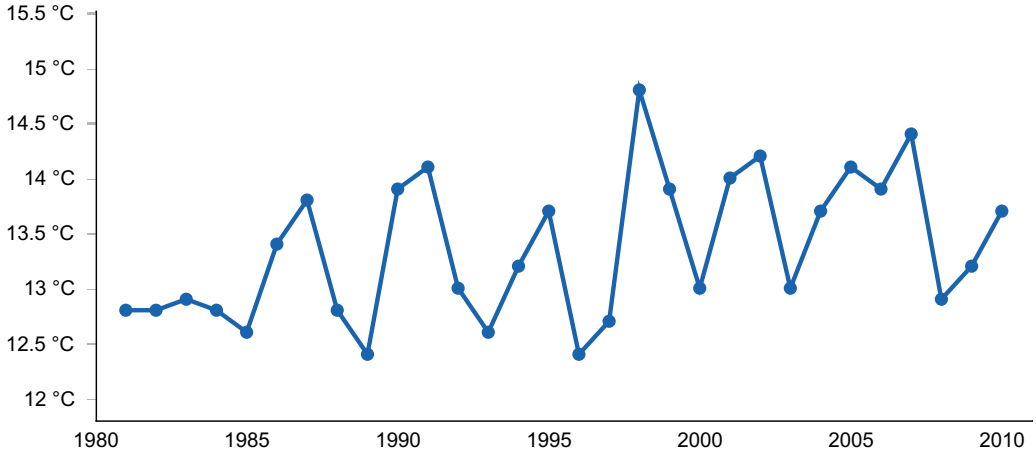


Figure 6. Annual average temperature pattern

Climate stations used

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

- (5) MT VERNON [USC00126001], Uniontown, IN

Influencing water features

These wet systems are groundwater dependent. As water levels fluctuate seasonally, ponding can occur, generally to a depth of 0-12” above the surface. Seasonal ground water levels generally range from the surface to 12” below surface.

The hydrogeographical model classification for these sites is DEPRESSION: Muck, Ground Water Influenced; coprogenic /herbaceous. Sites have a Cowardin Classification of PEM1Eg: it is a palustrine system with persistent, emergent vegetation that is seasonally flooded or saturated.

Soil features

The soil series associated with this site is Edwards variant. It is mapped only in Knox County, Indiana within MLRA 115X. These soils are very deep, very poorly drained, and have very slow permeability. Edwards variant soils are formed in herbaceous organic material over marl and over sandy outwash. (NASIS 2020)

Table 4. Representative soil features

Parent material	(1) Marl (2) Herbaceous organic material (3) Organic material
Surface texture	(1) Marl (2) Muck (3) Partially decomposed organic matter
Drainage class	Very poorly drained
Permeability class	Very slow
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	22.86 cm
Calcium carbonate equivalent (Depth not specified)	0–90%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0

Soil reaction (1:1 water) (Depth not specified)	5.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Historically, the reference site (State 1) was a dense graminoid-dominated community with diverse mix of native grasses, sedges, and forbs. These sites were maintained by natural fires during the dry periods. Fire every 10 or so years was required to kill tree saplings and shrubs thereby keeping the community an open grass marsh. Tree and shrub mortality were also impacted by natural beaver activity and associated long-term flooding. Longer fire free intervals will allow for shrubs and trees to invade the site and eventually gain dominance.

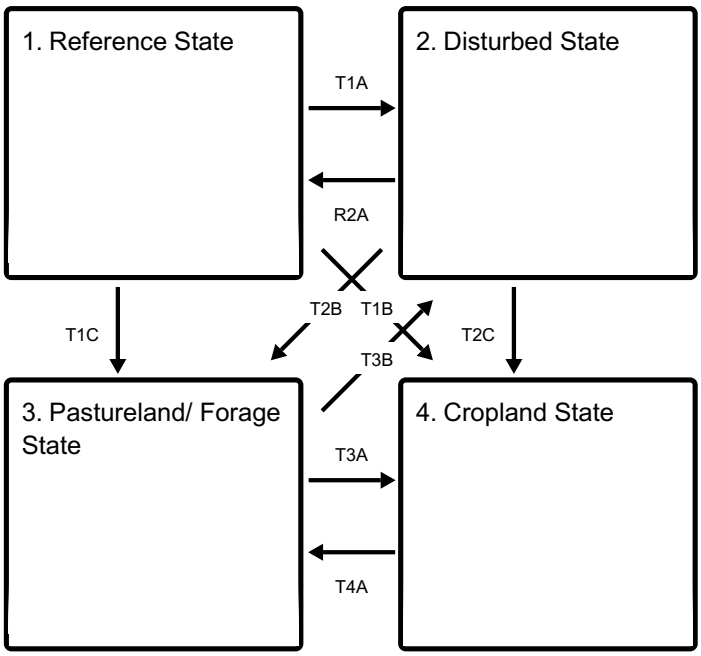
Today, most sites have been converted to agricultural uses including row crops and forage production. These sites usually have hydrological modification such as levees, ditching, and/or tiling to control ponding and improve drainage. Corn and soybeans are a common row crop while cool-season grasses, such as tall fescue and brome are grown for pasture or hay.

Remaining wooded sites now lack a natural fire regime, beaver activity, and are usually impacted by changes in hydrology throughout the watershed if not directly on site. Therefore, numerous tree species and a variety of understory plants depending on drainage and disturbances may be present. Invasive non-native vegetation is a concern in many remaining areas as phragmites, reed canarygrass, euonymus, honeysuckles, and other non-native plants are a potential management issue.

A provisional state and transition diagram (STM) is shown in Figure 2. The model is based on provisional draft and it is expected to change or be modified as field verification occurs.

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

1.1. Reference community

State 2 submodel, plant communities

2.1. Disturbed community

State 3 submodel, plant communities

3.1. Pastureland/Forage community

State 4 submodel, plant communities

4.1. Cropland community

State 1
Reference State

Historically these sites were a dense and graminoid dominated meadow with many species of grasses, sedges and forbs. Common species included sedges (Carex spp.), prairie cordgrass (*Spartina pectinata*), big bluestem (*Andropogon gerardii*), indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). Native herbaceous species included meadowsweet (Spirea alba), spotted joe-pye weed (*Eutrochium maculatum*), queen of the prairie (*Filipendula rubra*), swamp lousewort (*Pedicularis lanceolata*), purple meadowrue (*Thalictrum dasycarpum*), and fringed loosestrife (*Lysimachia ciliata*). Shrubs were scattered and included dogwoods (Cornus spp.), willow (Salix spp.) and common buttonbush (*Cephalanthus occidentalis*). Fire, during summer months or during periods of drought, maintained these sites. Other natural influencers included long-term flooding from beaver activity and grazing of large mammals. Reoccurring fire was a key influencer that helped to maintain these sites as a grass dominated plant community. Sites without a natural fire regime are often a mixed deciduous woodland.

Dominant plant species

- willow (*Salix*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- dogwood (*Cornus*), shrub
- hairy sedge (*Carex lacustris*), grass
- upright sedge (*Carex stricta*), grass
- prairie cordgrass (*Spartina pectinata*), grass
- fringed sedge (*Carex crinita*), grass
- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass

- spotted joe pye weed (*Eutrochium maculatum*), other herbaceous
- swamp lousewort (*Pedicularis lanceolata*), other herbaceous
- purple meadow-rue (*Thalictrum dasycarpum*), other herbaceous
- queen of the prairie (*Filipendula rubra*), other herbaceous
- white meadowsweet (*Spiraea alba*), other herbaceous
- fringed loosestrife (*Lysimachia ciliata*), other herbaceous

Community 1.1
Reference community

This community is a oak woodland with numerous native grasses, sedges and herbaceous species in the understory. A natural fire regime reduces shrub density and reduces fire intolerant species.

Dominant plant species

- upright sedge (*Carex stricta*), grass
- prairie cordgrass (*Spartina pectinata*), grass
- hairy sedge (*Carex lacustris*), grass
- fringed sedge (*Carex crinita*), grass
- purple meadow-rue (*Thalictrum dasycarpum*), other herbaceous
- swamp lousewort (*Pedicularis lanceolata*), other herbaceous
- queen of the prairie (*Filipendula rubra*), other herbaceous
- spotted joe pye weed (*Eutrochium maculatum*), other herbaceous

State 2
Disturbed State

Today, sites that are not in agricultural production have still been altered due to a long-term absence of fire, eradication of beavers, hydrological modifications, and other anthropogenic disturbances. Trees on site, will depending on the type, length and severity of disturbances and the current hydrology. Common species include red maple, silver maple, elm, and green ash. Sites that have had a long-term absence of fire will display the following characteristics: an increase in tree and shrub density, an increase in leaf-litter buildup, and an increase in shade-tolerant understory species. Diversity of species may also be reduced, especially if there has been an introduction of non-native species.

Dominant plant species

- red maple (*Acer rubrum*), tree
- silver maple (*Acer saccharinum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- elm (*Ulmus*), tree
- willow (*Salix*), shrub
- dogwood (*Cornus*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub

- sedge (*Carex*), grass

Community 2.1
Disturbed community

This community is a disturbed woodland with a mix of wet-tolerant deciduous trees. Common species include maple, ash and elm. Species composition and density will depend on the type and severity of disturbances and the available seed sources.

Dominant plant species

- green ash (*Fraxinus pennsylvanica*), tree
- silver maple (*Acer saccharinum*), tree
- red maple (*Acer rubrum*), tree
- elm (*Ulmus*), tree
- sedge (*Carex*), grass

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

Common crops include corn (*Zea mays*), soybeans (*Glycine max*), and occasionally common 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 max*), other herbaceous
- common wheat (*Triticum aestivum*), 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
- common wheat (*Triticum aestivum*), other herbaceous

Transition T1A
State 1 to 2

Long-term fire suppression and hydrological changes will transition this state to a more mixed deciduous forest community.

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. Sites may be ditched or tiled to improve drainage. Landowners should insure compliance with any applicable wetland regulations.

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. Sites are usually ditched or tiled to improve drainage. Landowners should insure compliance with any applicable wetland regulations.

Restoration pathway R2A
State 2 to 1

Restoration would require long-term management inputs including hydrological restoration, 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. Sites may be ditched or tiled to improve drainage. Landowners should insure compliance with any applicable wetland regulations.

Transition T2C
State 2 to 4

Site is cleared and row crop production is initiated. Management inputs would include tree/shrub removal, site preparation, tillage, seeding, and weed control. Sites are usually ditched or tiled to improve drainage. Landowners should insure compliance with any applicable wetland regulations.

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. Sites are usually ditched or tiled to improve drainage. Landowners should insure compliance with any applicable wetland regulations.

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.

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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	04/08/2026
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):

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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:

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:**