

# Ecological site R116BY037MO Wet Upland Drainageway Prairie

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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.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## MLRA notes

Major Land Resource Area (MLRA): 116B–Springfield Plain

The Springfield Plain is in the western part of the Ozark Uplift. It is primarily a smooth plateau with some dissection along streams. Elevation is about 1,000 feet in the north to over 1,700 feet in the east along the Burlington Escarpment adjacent to the Ozark Highlands. The underlying bedrock is mainly Mississippian-aged limestone, with areas of shale on lower slopes and structural benches, and intermittent Pennsylvanian-aged sandstone deposits on the plateau surface.

## Classification relationships

Terrestrial Natural Community Type in Missouri (Nelson, 2010):

The reference state for this ecological site is most similar to a Wet-Mesic Bottomland Prairie.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):

The reference state for this ecological site is most similar to *Andropogon gerardii* - *Panicum virgatum* - *Helianthus grosseserratus* Herbaceous Vegetation (CEGL002024).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):

This ecological site occurs primarily within the Lockwood Smooth Prairie Plain Land Type Association.

## Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. After additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Wet Upland Drainageway Prairies occur in narrow upland drainageways. Soils are clayey and wet, and are subject to flooding. The reference plant community is prairie dominated by a dense cover of wetland species, including prairie cordgrass, sedges, and wet-tolerant forbs.

## Associated sites

R116BY021MO	<b>Chert Upland Prairie</b> Chert Upland Prairies are upslope.
R116BY022MO	<b>Loamy Upland Prairie</b> Loamy Upland Prairies are upslope.

## Similar sites

R116BY037MO	<b>Wet Upland Drainageway Prairie</b> There are no similar Wet Upland Drainageway Prairies ecological sites in this MLRA.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix humilis</i>
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Andropogon gerardii</i>

## Physiographic features

This site is on upland drainageways with slopes of 0 to 3 percent. The site receives some runoff from upland sites, and is subject to flooding.

The following figure shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “5” on the figure. The dashed lines within the area indicate the various soils included in this ecological site. Claypan Summit Prairie sites, labeled “1”, are upslope in areas where summits are nearly level. Chert Upland Prairie sites, labeled “3”, are also often upslope.

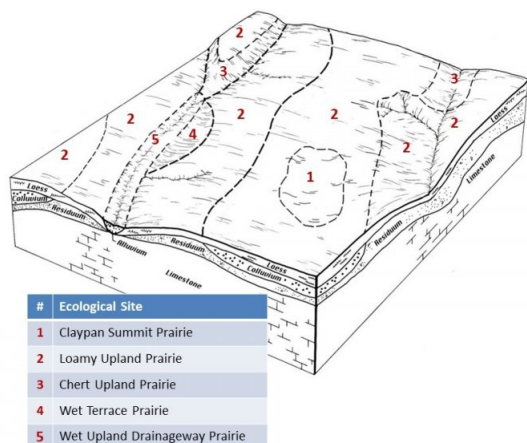


Figure 2. Landscape relationships for this ecological site.

**Table 2. Representative physiographic features**

Landforms	(1) Drainageway
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Frequent
Ponding frequency	None
Slope	0–3%
Water table depth	12–24 in
Aspect	Aspect is not a significant factor

## Climatic features

The Springfield Plain has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of Mexico and can produce abundant amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over the region, creating extended droughty periods. Spring and fall are transitional seasons when abrupt changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses.

The Springfield Plain experiences few regional differences in climates. The average annual precipitation in this area is 41 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 55 to 58 degrees F. The lower temperatures occur at the higher elevations. Mean July maximum temperatures have a range of only one or two degrees across the area.

Mean annual precipitation varies along a west to east gradient. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer.

During years when precipitation comes in a fairly normal manner, moisture is stored in the top layers of the soil during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Drought directly affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Deep sinkholes often have a microclimate significantly cooler, moister, and shadier than surrounding surfaces, a phenomenon that may result in a strikingly different ecology. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

Source: University of Missouri Climate Center - <http://climate.missouri.edu/climate.php>; Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, United States Department of Agriculture Handbook 296 - <http://soils.usda.gov/survey/geography/mlra/>

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	152-168 days
Freeze-free period (characteristic range)	185-194 days
Precipitation total (characteristic range)	46-47 in

Frost-free period (actual range)	145-170 days
Freeze-free period (actual range)	181-196 days
Precipitation total (actual range)	46-48 in
Frost-free period (average)	160 days
Freeze-free period (average)	189 days
Precipitation total (average)	47 in

### Climate stations used

- (1) LOCKWOOD [USC00235027], Lockwood, MO
- (2) MT VERNON M U SW CTR [USC00235862], Mount Vernon, MO
- (3) JOPLIN REGIONAL AIRPORT [USW00013987], Webb City, MO

### Influencing water features

This ecological site is influenced by a seasonal high water table, which is typically near the surface in late fall through spring, receding in the summer.

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

This ecological site contains first- and second-order streams, which originate from headslope positions at the upper reaches of the units, and are fed from smaller headslopes in the adjacent uplands. These streams are ephemeral in most years, with flow in the late fall, winter, and spring months, generally disappearing in the summer, or reduced to isolated pools in the lower reaches. Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Short-duration flooding is common in many areas. Streambeds are typically incised into the surrounding floodplain by as much as 10 feet.

### Soil features

These soils have no rooting restriction. They were formed under a mixture of prairie and woodland vegetation. Parent material is alluvium. They have silty clay loam surface horizons and clayey subsoils. They are affected by a seasonal high water table during the spring months. Soil series associated with this site include Humansville.

**Table 4. Representative soil features**

Parent material	(1) Alluvium
Surface texture	(1) Silty clay loam (2) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow to slow
Soil depth	72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm

Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–10%

## Ecological dynamics

Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Wet Upland Drainageway Prairie ecological sites exist because of their association with wet, poorly drained conditions and fire. They are found in narrow, low order, upland drainages that were subject to flooding. These conditions along with periodic fire had a strong influence on excluding trees. Wet Upland Drainageway Prairies are dominated by a dense cover of wet tolerant grasses and forbs. On slightly higher areas within or at the edge of the prairie matrix scattered bur oak, pin oak, shellbark hickory and willow occurred amid the grass-dominated landscape.

These sites are on upland drainageway positions that experience short but frequent flooding. In addition to site wetness, periodic fire, likely occurring at least once every 3 years, also played a role in keeping woody species from exploiting the site. Fire during dry periods removed the dense mat of leaf litter creating opportunities for forbs less aggressive than the grasses and sedges and killed or damaged woody species that were developing on the site.

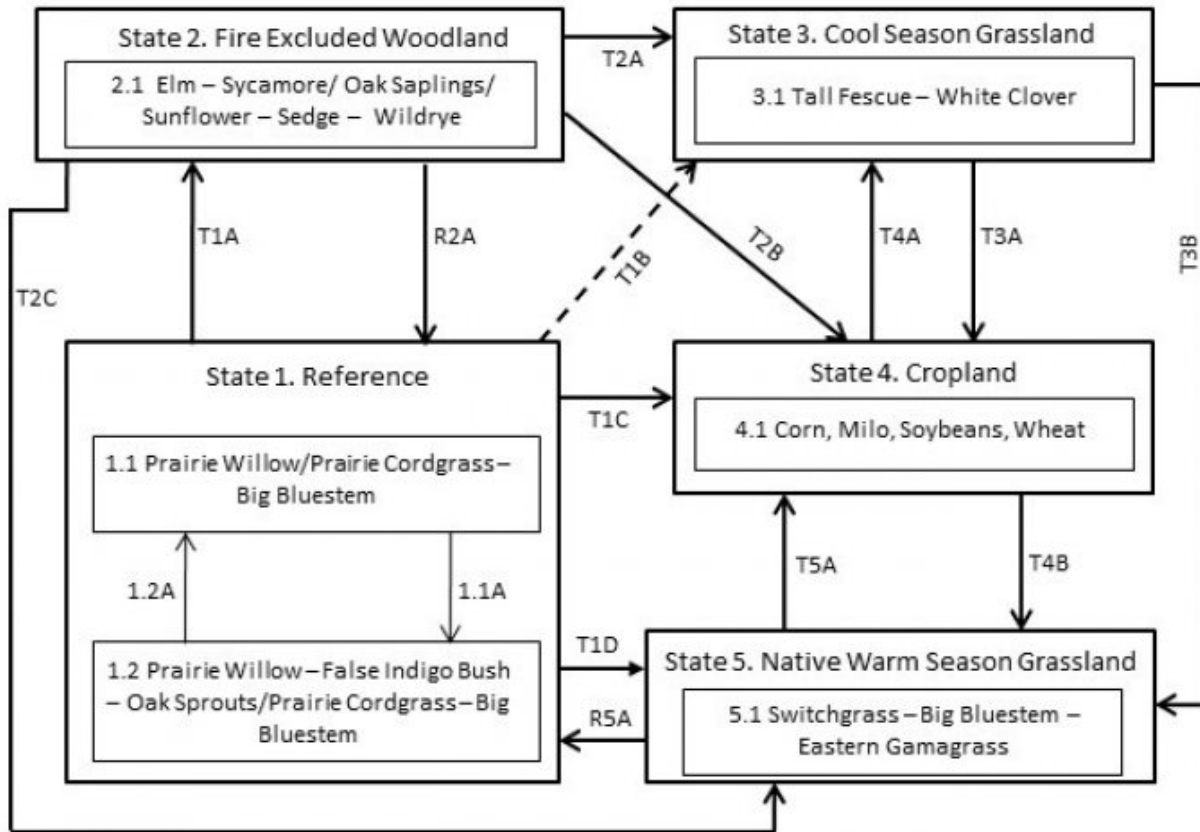
Wet Upland Drainageway Prairies were also subjected to grazing by native large herbivores. Grazing by large native herbivores, such as bison, elk, and white-tail deer, would have effectively kept understory conditions open, creating conditions more favorable to ground flora species and minimizing woody trees and shrubs.

Today most of these ecological sites have been drained and farmed. Only a few quality remnants exist. However, during wet years, they do act as ephemeral farmed wetlands in the agricultural landscape. While their flood regime usually has been altered, their position and soil properties still make them good candidates for wet prairie and savanna development management.

A State and Transition Diagram follows. 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 is likely to change as knowledge increases.

## State and transition model

## Wet Upland Drainageway Prairie, R116BY037MO



Code	Event/Activity/Process
T1A	Fire suppression > 20 years; woody invasion
T1B	Tillage; vegetative seeding; grassland management
T3A, T5A	Tillage; conservation cropping system
T1D	Prescribed grazing; prescribed fire
T2A	Woody removal; tillage; vegetative seeding; grassland management
T2B, T1C	Woody removal; tillage; conservation cropping system
T2C	Woody removal; grassland management; prescribed fire
T4A	Vegetative seeding; grassland management
T3B, T4B	Vegetative seeding; prescribed fire; grassland management
1.1A	Fire-free interval 5-10 years
1.2A	Fire interval 1-3 years
R2A	Woody removal; prescribed fire 1-3 years
R5A	Vegetative seeding; prescribed fire 1-3 years; limited grazing

Figure 9. State and transition diagram for this ecological site

### State 1

## Reference

This State is native prairie dominated by prairie cordgrass, big bluestem, sedges, and forbs, along with numerous shrubs and occasional, widely scattered trees such as pin oak and bur oak. Two phases can occur that will transition back and forth depending on fire frequencies. Longer fire free intervals will allow woody species to increase such as pin oak and bur oak. When fire intervals shorten these woody species will decrease. This undisturbed state is probably extinct. Most sites have been converted to cool season grasslands, cropland, or degraded by domestic grazing.

### Community 1.1

#### Prairie Willow/Prairie Cordgrass – Big Bluestem

**Forest overstory.** The Overstory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

**Forest understory.** The following Understory species list is based on reconnaissance-level plots, inventory plots, as well as commonly occurring species listed in Nelson (2010). Names and symbols are from USDA PLANTS database.

### Community 1.2

#### Prairie Willow – False Indigo Bush – Oak Sprouts/Prairie Cordgrass – Big Bluestem

#### Pathway P1.1A

##### Community 1.1 to 1.2

Fire-free interval 5-10 years

#### Pathway P1.2A

##### Community 1.2 to 1.1

Fire interval 1-3 years

## State 2

### Fire Excluded Woodland

Reference states that have experienced fire suppression for 20 or more years will transition to this state. With fire suppression, woody species such as elm, sycamore, pin oak and bur oak will begin to increase transitioning this state from a prairie to a degraded woody invaded state. Native ground cover will also decrease. Transition to cool season grasslands (State 3) or cropland (State 4) is very common. Transition back to a reference state may be difficult if fire suppression and other disturbances have been long term. It may be easier to move to a re-established native warm season grassland and then over time move back to a reference state.

#### Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

### Community 2.1

#### Elm – Sycamore/ Oak Saplings/ Sunflower – Sedges – Wildrye

## State 3

### Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue and white clover has been common in this area. Occasionally, these pastures will have a few scattered bur oaks. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may require a very long

series of management options.

#### **Dominant resource concerns**

- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

### **Community 3.1**

#### **Tall Fescue – White Clover**

#### **State 4**

##### **Cropland**

This is a common state that currently exists in the region with corn, soybeans, milo, wheat, and hay land production occurring. Some conversion to cool season grassland occurs for a limited period of time before transitioning back to cropland. Limited acres are sometimes converted to native warm season grassland.

#### **Dominant resource concerns**

- Sheet and rill erosion
- Ephemeral gully erosion
- Seasonal high water table
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

### **Community 4.1**

#### **Corn, Milo, Soybeans, Wheat**

#### **State 5**

##### **Native Warm Season Grassland**

Conversion from Cool Season Grassland (State 3) or the Cropland (State 4) to this state is increasing due to renewed interest in warm season grasses as a supplement to cool season grazing systems or as a native restoration activity. This state, once established, can be transformed back to a reference state. Substantial restoration time and management inputs will still be needed.

#### **Dominant resource concerns**

- Plant structure and composition
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

### **Community 5.1**

#### **Switch Grass – Big Bluestem – Eastern Gamagrass**

#### **Transition T1A**

##### **State 1 to 2**

Fire suppression > 20 years; woody invasion

#### **Transition T1B**

##### **State 1 to 3**

Tillage; vegetative seeding; grassland management

#### **Transition T1C**

##### **State 1 to 4**



Tillage; conservation cropping system; woody removal

**Transition T1D**

**State 1 to 5**

Prescribed grazing; prescribed fire

**Transition T2B**

**State 2 to 4**

Woody removal; tillage; conservation cropping system

**Transition T2C**

**State 2 to 5**

Woody removal; grassland management; prescribed fire

**Transition T3A**

**State 3 to 4**

Tillage; conservation cropping system

**Transition T3B**

**State 3 to 5**

Vegetative seeding; prescribed fire; grassland management

**Transition T4A**

**State 4 to 3**

Vegetative seeding ; grassland management

**Transition T4B**

**State 4 to 5**

Vegetative seeding; prescribed fire; grassland management

**Restoration pathway R5A**

**State 5 to 1**

Vegetative seeding; prescribed fire 1-3 years; limited grazing

**Transition T5A**

**State 5 to 4**

Tillage; conservation cropping system

**Additional community tables**

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
<b>Tree</b>							
pin oak	QUPA2	<i>Quercus palustris</i>	Native	–	0–5	–	–
bur oak	QUMA2	<i>Quercus macrocarpa</i>	Native	–	0–5	–	–
shellbark hickory	CALA21	<i>Carya laciniosa</i>	Native	–	0–5	–	–

**Table 6. Community 1.1 forest understory composition**

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
<b>Grass/grass-like (Graminoids)</b>					
switchgrass	PAVI2	<i>Panicum virgatum</i>	Native	–	–
prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	Native	–	–
prairie cordgrass	SPPE	<i>Spartina pectinata</i>	Native	–	–
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	–	–
big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	–	–
awlfruit sedge	CAST5	<i>Carex stipata</i>	Native	–	–
Oklahoma sedge	CAOK	<i>Carex oklahomensis</i>	Native	–	–
ravenfoot sedge	CACR8	<i>Carex crus-corvi</i>	Native	–	–
eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	Native	–	–
bluejoint	CACA4	<i>Calamagrostis canadensis</i>	Native	–	–
<b>Forb/Herb</b>					
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	–	–
prairie milkweed	ASSU3	<i>Asclepias sullivantii</i>	Native	–	–
slender lespedeza	LEVI7	<i>Lespedeza virginica</i>	Native	–	–
Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	Native	–	–
blackeyed Susan	RUHI2	<i>Rudbeckia hirta</i>	Native	–	–
white wild indigo	BAAL	<i>Baptisia alba</i>	Native	–	–
white prairie clover	DACA7	<i>Dalea candida</i>	Native	–	–
prairie blazing star	LIPY	<i>Liatris pycnostachya</i>	Native	–	–
bluejacket	TROH	<i>Tradescantia ohiensis</i>	Native	–	–
narrowleaf mountainmint	PYTE	<i>Pycnanthemum tenuifolium</i>	Native	–	–
skyblue aster	SYOO	<i>Symphotrichum oolentangiense</i>	Native	–	–
Virginia bunchflower	VEVI5	<i>Veratrum virginicum</i>	Native	–	–
button eryngo	ERYU	<i>Eryngium yuccifolium</i>	Native	–	–
Culver's root	VEVI4	<i>Veronicastrum virginicum</i>	Native	–	–
common boneset	EUPE3	<i>Eupatorium perfoliatum</i>	Native	–	–
obedient plant	PHVI8	<i>Physostegia virginiana</i>	Native	–	–
golden zizia	ZIAU	<i>Zizia aurea</i>	Native	–	–
purple meadow-rue	THDA	<i>Thalictrum dasycarpum</i>	Native	–	–
sawtooth sunflower	HEGR4	<i>Helianthus grosseserratus</i>	Native	–	–
prairie ironweed	VEFA2	<i>Vernonia fasciculata</i>	Native	–	–
<b>Shrub/Subshrub</b>					
winged lythrum	LYAL4	<i>Lythrum alatum</i>	Native	–	–
Canadian lousewort	PECA	<i>Pedicularis canadensis</i>	Native	–	–
prairie willow	SAHU2	<i>Salix humilis</i>	Native	–	–
false indigo bush	AMFR	<i>Amorpha fruticosa</i>	Native	–	–

## Animal community

### Wildlife

Game species that utilize this ecological site include: White-tailed Deer will utilize this ecological site for browse (plant leaves in the growing season, seeds and soft mast in the fall/winter). This site type also can provide escape cover.

Migratory Waterbirds: Sora, Common Snipe

Furbearers: Muskrat, Beaver, and Mink.

Bird species associated with this ecological site's reference state condition:

Breeding birds: Red-Winged Blackbird, Least Bittern, and Common Yellowthroat.

Migratory birds: Sora, Sedge Wren, Least Bittern, Yellow Rail and Common Snipe.

Amphibian and reptile species associated with this ecological site's reference state condition: Western Chorus Frog (*Pseudacris triseriata triseriata*), Southern Leopard Frog (*Rana sphenoccephala*), Midland Brown Snake (*Storeria dekayi wrightourm*), and prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circulosa*).

Small mammals associated with this ecological site's reference state condition: Muskrat (*Ondatra zibethicus*), Southern Bog Lemming (*Synaptomys cooperi*), and Mink (*Mustela vison*).

Many native insect species are likely associated with this ecological site, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids. However information on these groups is often lacking enough resolution to assign them to individual ecological sites.

Insect species known to be associated with this ecological site's reference state condition: Swamp Milkweed Leaf Beetle (*Labidomera clivicollis*), Cordgrass Planthopper (*Prokelisia crocea*), Dion Skipper butterfly (*Euphyes dion*), Duke's Skipper butterfly (*Euphyes dukesi*), native bees (*Lasioglossum hartii*, *Hesperapis carinata*, *Svastra atripes* and *Cemolobus ipomoeae*), Bullate Meadow katydid (*Orchelimum bullatum*) and Sedge Grasshopper (*Stethophyma celatum*).

Other invertebrates: Grassland Crayfish (*Procambarus gracilis*)

(This section prepared by Mike Leahy, Natural Areas Coordinator, Missouri Department of Conservation, 2013.

References for this section: Fitzgerald and Pashley 2000b; Heitzman and Heitzman 1996; Jacobs 2001; Johnson 2000; Pitts and McGuire 2000; Schwartz and others 2001)

## **Other information**

### **Forestry**

Management: This ecological site is not recommended for traditional timber management activity. Historically this site was dominated by a ground cover of native prairie grasses and forbs. Some scattered open grown trees may have also been present. Altered sites may be suitable for non-traditional forestry uses such as windbreaks, environmental plantings, alley cropping (a method of planting, in which rows of trees or shrubs are interspersed with rows of crops) or woody bio-fuels.

## **Inventory data references**

Potential Reference Sites: Gravelly/Loamy Upland Drainageway Woodland

No quality reference sites are known to exist.

## **Other references**

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## **Contributors**

Doug Wallace  
Fred Young

## **Approval**

Nels Barrett, 10/07/2020

## Acknowledgments

Missouri Department of Conservation and Missouri Department of Natural Resources personnel provided significant and helpful field and technical support in the development of this ecological site.

## 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	10/06/2020
Approved by	Nels Barrett
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):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**

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