

Ecological site R116AY005MO

Wet Footslope Savanna

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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.

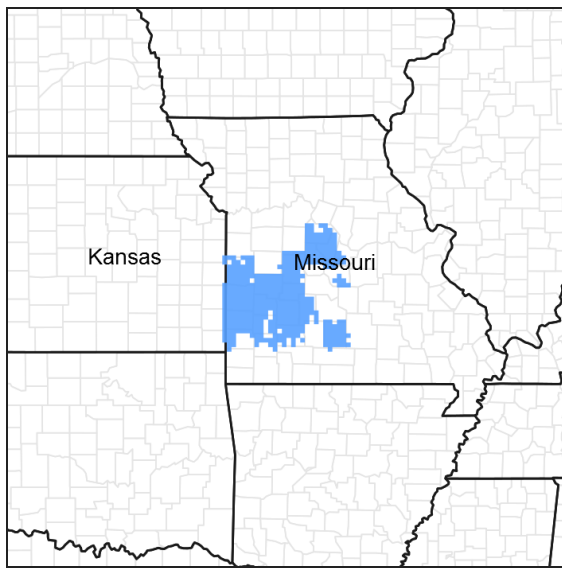


Figure 1. Mapped extent

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): 116A–Ozark Highland

The Ozark Highland constitutes the Salem Plateau of the Ozark Uplift. Elevation ranges from about 300 feet on the southeast edge of the Ozark escarpment, to about 1,600 feet in the west, adjacent to the Burlington Escarpment of the Springfield Plateau. The underlying bedrock is mainly horizontally bedded Ordovician-aged dolomites and sandstones that dip gently away from the uplift apex in southeast Missouri. Cambrian dolomites are exposed on deeply dissected hillslopes. In some places, Pennsylvanian and Mississippian sediments overlie the plateau. Relief varies, from the gently rolling central plateau areas to deeply dissected hillslopes associated with drainageways such as the Buffalo, Current, Eleven Point and White Rivers.

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 *Quercus macrocarpa* - *Quercus palustris* - *Quercus bicolor* / *Calamagrostis canadensis* Wooded Herbaceous Vegetation (CEGL005120).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
 This ecological site occurs primarily in the Prairie Ozark Border Subsection, and in western areas of the Central Plateau Subsection.

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 Footslope Savannas occur primarily in the northwest part of the Ozark Highland. Soils are very deep, with clayey subsoils and seasonal high water tables. The reference plant community is savanna with scattered bur oak, pin oak, shellbark hickory and willow, and a ground flora dominated by wet-tolerant grasses, sedges and forbs.

Associated sites

F116AY037MO	Gravelly/Loamy Upland Drainageway Forest Gravelly/Loamy Upland Drainageway Forests are downslope.
R116AY006MO	Loamy Upland Prairie Loamy Upland Prairies are upslope, on convex summits, shoulders and upper backslopes.

Similar sites

F116AY033MO	Wet Footslope Forest Wet Footslope Forest ecological sites are on similar landform positions but have higher tree densities.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus palustris</i> (2) <i>Quercus macrocarpa</i>
Shrub	(1) <i>Salix humilis</i>
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Andropogon gerardii</i>

Physiographic features

This site is on footslopes and toe slopes along drainageways with slopes of 0 to 5 percent. The site generates some runoff to adjacent lower terrace and floodplain sites, and receives some runoff from adjacent uplands. This site does not flood.

The following figure (adapted from Wolf, 2004) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “3” on the figure. Wet Footslope Savanna sites are typically downslope from Loamy Upland Prairie sites, labeled “2”.

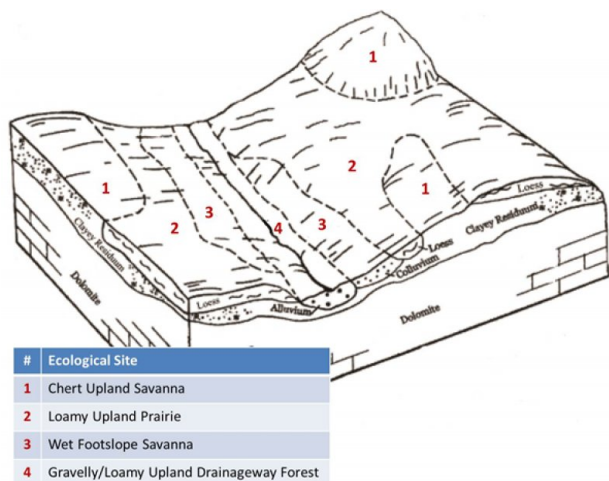


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hillslope (2) Toe
Flooding frequency	None
Ponding frequency	None
Slope	0–5%
Water table depth	15–76 cm
Aspect	Aspect is not a significant factor

Climatic features

The Ozark Highland 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 Ozark Highland experiences regional differences in climates, but these differences do not have obvious geographic boundaries. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line crossing the MLRA from northwest to southeast.

The average annual precipitation in almost all of this area is 38 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 53 to 60 degrees F. The lower temperatures occur at the higher elevations in the western part of the MLRA. Mean January minimum temperature follows a stronger north-to-south gradient. However, mean July maximum temperature shows hardly any geographic variation in the MLRA. Mean July maximum temperatures have a range of only two or three degrees across the area.

Mean annual precipitation varies along a northwest to southeast 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)	148-162 days
Freeze-free period (characteristic range)	166-187 days
Precipitation total (characteristic range)	1,118-1,143 mm
Frost-free period (actual range)	145-167 days
Freeze-free period (actual range)	163-195 days
Precipitation total (actual range)	1,118-1,143 mm
Frost-free period (average)	155 days
Freeze-free period (average)	177 days
Precipitation total (average)	1,143 mm

Climate stations used

- (1) CALIFORNIA [USC00231189], California, MO
- (2) MANSFIELD [USC00235227], Mansfield, MO
- (3) BUFFALO 2N [USC00231087], Buffalo, MO

Influencing water features

This ecological site is influenced by a seasonal high water table from high groundwater levels, as well as slow hydraulic conductivity, which impedes throughflow from precipitation and flood events. The water table is typically near the surface in late fall through spring, receding in the summer. This ecological site is on footslopes and toe slopes along drainageways . They are not adjacent to the current stream channel.

Footslopes, and stream terraces not subject to flooding, are in the MINERAL SOIL FLAT wetlands of the Hydrogeomorphic (HGM) classification system class (Brinson, 1993). Sites on stream terraces subject to flooding are in the RIVERINE wetlands class. Both footslope and stream terrace sites are Emergent Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils have no rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is colluvium. They have silt loam or 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 Sacville and Willowfork.

The accompanying picture of the Sacville series shows a dark silty clay loam surface horizon over dark gray silty clay subsoil. The dull gray colors indicate seasonal wetness, which affects the species composition of the reference community and the ecological dynamics of the site. Scale is in centimeters. Picture courtesy of John Preston.

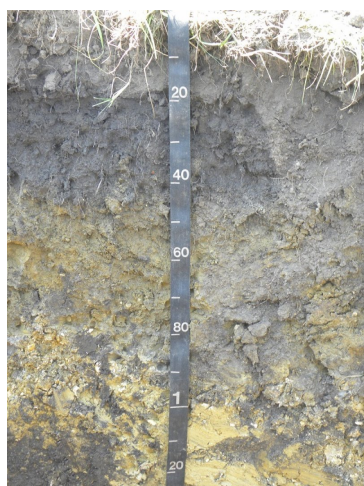


Figure 9. Sacville series

Table 4. Representative soil features

Parent material	(1) Colluvium
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.24–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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 Foothlope Savannas are a component of shallow draws in the high flat prairie plain of the region. Wet Foothlope Savannas exist because of their association with wet, seasonal high water tables. These conditions along with periodic fire, likely occurring at least once every 3 years, had a strong influence on limiting trees. Fire during dry periods removed the dense mat of leaf litter creating opportunities for plants less aggressive than the grasses and sedges.

These ecological sites 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 throughout the grass-dominated landscape.

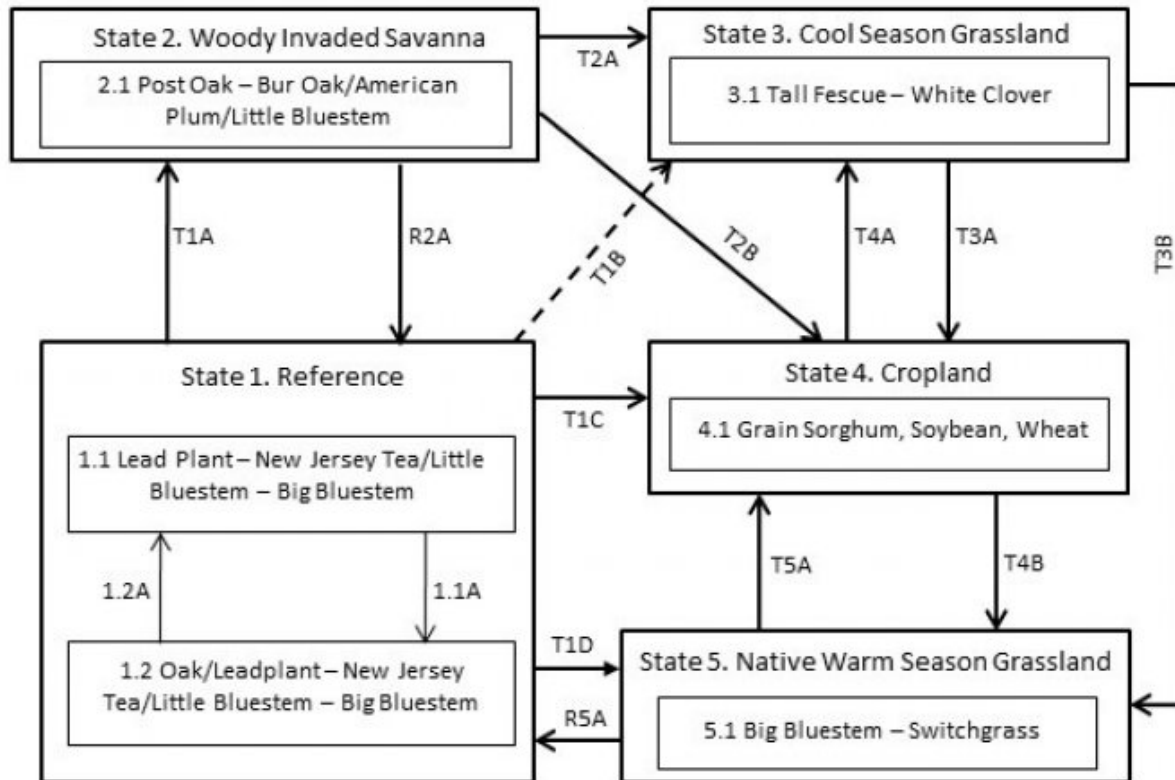
Wet Foothlope Savannas were also subjected to grazing by native large herbivores, such as bison, elk and white-tailed deer. Grazing by native herbivores would have effectively kept understory conditions open, creating conditions more favorable to ground flora species and minimizing woody trees and shrubs.

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

Loamy Upland Prairie, R116AY006MO



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

Figure 10. State and transition diagram for this ecological site

State 1

Reference

The historical reference state for this ecological site was an oak savanna. The savanna was dominated by pin oak and bur oak. Periodic disturbances from flooding, fire, wind or ice as well as grazing by native large herbivores maintained the savanna structure and diverse ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are very rare today. Fire suppression and altered drainage have resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Most reference states are currently altered because of clearing and conversion to grassland or cropland.

Community 1.1

Pin Oak – Bur Oak/Prairie Willow/Prairie Cordgrass – Big Bluestem

Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency.

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 Understory 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.

Community 1.2

Pin Oak – Bur Oak/Shellbark Hickory – Prairie Willow/Prairie Cordgrass – Big Bluestem

Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency.

Pathway P1.1A

Community 1.1 to 1.2

Lack of disturbance events - 10 plus years,

Pathway P1.2A

Community 1.2 to 1.1

Disturbance events 2-5 years

State 2

Low Disturbance/ Logged Woodland

Composition is altered from the reference state through long term, low disturbance which allows woody species to increase in density and size. This state will slowly increase with shellbark hickory, pin oak and bur oak species. Without periodic canopy disturbance, stem density and fire intolerant species, like hackberry and elm, will also increase in abundance. Some periodic grazing may be occurring.

Community 2.1

2.1 Bur Oak – Elm – Hackberry /Possumhaw/Sedge

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. Occasionally, these pastures will have scattered oak. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may be impossible, requiring a very long term series of management options and transitions.

Community 3.1 Tall Fescue – White Clover

State 4 Cropland

This is a common state that exists currently with intensive cropping of corn, soybeans and wheat. Some conversion to cool season hay land occurs, but when commodity prices are high, these states transition back to cropland.

Community 4.1 Corn, Soybean, Wheat

Transition T1A State 1 to 2

Lack of disturbance events greater than 20 years ; repeated timber harvests.

Transition T1B State 1 to 3

Woody removal; tillage; vegetative seeding; grassland management.

Transition T1C State 1 to 4

Woody removal; tillage; conservation cropping system.

Restoration pathway R2A State 2 to 1

Thinning; bush Management; prescribed fire 3-10 years

Transition T2A State 2 to 3

Woody removal; tillage; vegetative seeding; grassland management.

Transition T2B State 2 to 4

Woody removal; tillage; conservation cropping system.

Transition T3A State 3 to 4

Tillage; conservation cropping system.

Restoration pathway T4A State 4 to 3

Vegetative seeding; grassland management.

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
shellbark hickory	CALA21	<i>Carya laciniosa</i>	Native	–	0–10	–	–
bur oak	QUMA2	<i>Quercus macrocarpa</i>	Native	–	0–10	–	–
pin oak	QUPA2	<i>Quercus palustris</i>	Native	–	0–10	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	–	–
switchgrass	PAVI2	<i>Panicum virgatum</i>	Native	–	–
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	–	–
eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	Native	–	–
Heller's rosette grass	DIOL	<i>Dichantherium oligosanthes</i>	Native	–	–
Canada wildrye	ELCA4	<i>Elymus canadensis</i>	Native	–	–
tapered rosette grass	DIAC2	<i>Dichantherium acuminatum</i>	Native	–	–
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	–	–
prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	Native	–	–
prairie cordgrass	SPPE	<i>Spartina pectinata</i>	Native	–	–
bluejoint	CACA4	<i>Calamagrostis canadensis</i>	Native	–	–
fescue sedge	CAFE3	<i>Carex festucacea</i>	Native	–	–
ravenfoot sedge	CACR8	<i>Carex crus-corvi</i>	Native	–	–
awlfruit sedge	CAST5	<i>Carex stipata</i>	Native	–	–
Forb/Herb					
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	–	–
Texas goldentop	EUGY	<i>Euthamia gymnospermoides</i>	Native	–	–
narrowleaf false dragonhead	PHAN6	<i>Physostegia angustifolia</i>	Native	–	–
narrowleaf mountainmint	PYTE	<i>Pycnanthemum tenuifolium</i>	Native	–	–
pinnate prairie coneflower	RAPI	<i>Ratibida pinnata</i>	Native	–	–
pale purple coneflower	ECPA	<i>Echinacea pallida</i>	Native	–	–
New England aster	SYNO2	<i>Symphotrichum novae-angliae</i>	Native	–	–
sawtooth sunflower	HEGR4	<i>Helianthus grosseserratus</i>	Native	–	–
smooth small-leaf ticktrefoil	DEMA2	<i>Desmodium marilandicum</i>	Native	–	–
stiff ticktrefoil	DEOB5	<i>Desmodium obtusum</i>	Native	–	–
sessileleaf ticktrefoil	DESE	<i>Desmodium sessilifolium</i>	Native	–	–
white wild indigo	BAAL	<i>Baptisia alba</i>	Native	–	–
partridge pea	CHFA2	<i>Chamaecrista fasciculata</i>	Native	–	–
white prairie clover	DACA7	<i>Dalea candida</i>	Native	–	–
Illinois ticktrefoil	DEIL2	<i>Desmodium illinoense</i>	Native	–	–
largeflower tickseed	COGR5	<i>Coreopsis grandiflora</i>	Native	–	–
compassplant	SILA3	<i>Silphium laciniatum</i>	Native	–	–
prairie blazing star	LIPY	<i>Liatis pycnostachya</i>	Native	–	–

prairie milkweed	ASSU3	<i>Asclepias sullivantii</i>	Native	–	–
Virginia bunchflower	VEVI5	<i>Veratrum virginicum</i>	Native	–	–
lanceleaf loosestrife	LYLA	<i>Lysimachia lanceolata</i>	Native	–	–
bluejacket	TROH	<i>Tradescantia ohiensis</i>	Native	–	–
foxtail beardtongue	PEDI	<i>Penstemon digitalis</i>	Native	–	–
bearded beggarticks	BIAR	<i>Bidens aristosa</i>	Native	–	–
prairie ironweed	VEFA2	<i>Vernonia fasciculata</i>	Native	–	–
sweet coneflower	RUSU	<i>Rudbeckia subtomentosa</i>	Native	–	–
spotted water hemlock	CIMA2	<i>Cicuta maculata</i>	Native	–	–
common sneezeweed	HEAU	<i>Helenium autumnale</i>	Native	–	–
seedbox	LUAL2	<i>Ludwigia alternifolia</i>	Native	–	–
common boneset	EUPE3	<i>Eupatorium perfoliatum</i>	Native	–	–
obedient plant	PHVI8	<i>Physostegia virginiana</i>	Native	–	–
swamp milkweed	ASIN	<i>Asclepias incarnata</i>	Native	–	–
sawtooth sunflower	HEGR4	<i>Helianthus grosseserratus</i>	Native	–	–
winged lythrum	LYAL4	<i>Lythrum alatum</i>	Native	–	–
golden zizia	ZIAU	<i>Zizia aurea</i>	Native	–	–
fourflower yellow loosestrife	LYQU	<i>Lysimachia quadriflora</i>	Native	–	–
purple meadow-rue	THDA	<i>Thalictrum dasycarpum</i>	Native	–	–
Shrub/Subshrub					
northern dewberry	RUFL	<i>Rubus flagellaris</i>	Native	–	–
winged sumac	RHCO	<i>Rhus copallinum</i>	Native	–	–
Carolina rose	ROCA4	<i>Rosa carolina</i>	Native	–	–
spotted St. Johnswort	HYPV	<i>Hypericum punctatum</i>	Native	–	–
prairie willow	SAHU2	<i>Salix humilis</i>	Native	–	–
dwarf St. Johnswort	HYMU	<i>Hypericum mutilum</i>	Native	–	–
false indigo bush	AMFR	<i>Amorpha fruticosa</i>	Native	–	–
Tree					
common persimmon	DIVI5	<i>Diospyros virginiana</i>	Native	–	–

Animal community

Wildlife*

Prairie Phase

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 and Virginia Rail

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, 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*), and Midland Brown Snake (*Storeria dekayi wrightourm*).

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 that may 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*).

Savanna Phase

Both snags and live cavity or den trees provide important food and cover for vertebrate wildlife. Snags are also very important to invertebrate species. Wood Duck and Red-headed Woodpecker utilize snags and den trees for foraging, nesting or shelter. "Wolf" trees are a particularly valuable type of live cavity tree. These large diameter, often open-grown, old-ages, hollow trees provide both cavities for wildlife and usually hard or soft mast food sources. Large diameter snags and den trees are particularly important wildlife habitat features to retain.

Extremely little is known about this phase of this ecological site. It is assumed that many of the animal species described under the prairie phase of this ecological site are found in the savanna phase. Additional species that might be expected in the savanna phase: Red-headed Woodpecker, Wood Duck, Yellow Warbler, and Fox Squirrel.
Wildlife

*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 biofuels.

Inventory data references

Potential Reference Sites: Wet Footslope Savanna

Plot LAPECA01 - Sacville soil

Located in La Petite Gemme Prairie, Missouri Prairie Foundation, Dade County, MO

Latitude: 37.564085

Longitude: -93.412184

Plot HILOCA02 - Sacville soil

Located in Hi-Lonesome Prairie CA, Benton County, MO

Latitude: 38.478411

Longitude: -93.224475

Plot HIPRCA04 – Willowfork soil
Located in Hite Prairie CA, Morgan County, MO
Latitude: 38.423818
Longitude: -92.861785

Other references

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Approval

Nels Barrett, 9/24/2020

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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	04/20/2024
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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

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

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

17. **Perennial plant reproductive capability:**
