

Ecological site R113XY002MO Loess Upland 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.

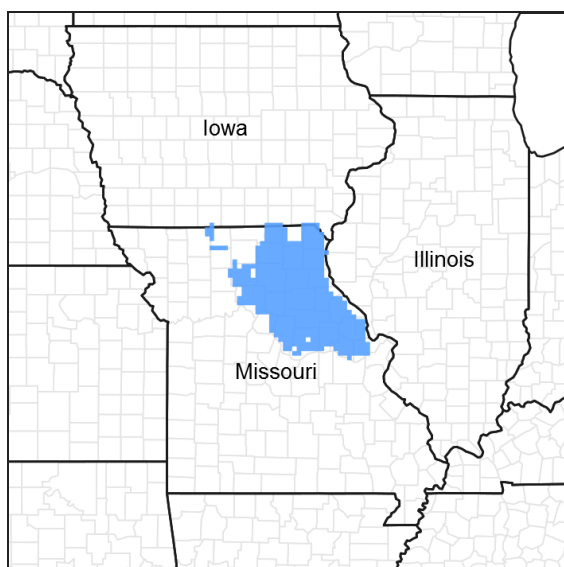


Figure 1. Mapped extent

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): 113X–Central Claypan Areas

The western, Missouri portion of the Central Claypan is a weakly dissected till plain. Elevation ranges from about 1,000 feet in the north along the divide between the Missouri and Mississippi River watersheds to about 625 feet where the North Fork of the Salt River flows out of the area. Relief is generally low, with low slope gradients and relatively narrow drainageways. Most of the Central Claypan is in the Salt River watershed. The characteristic “claypan” occurs in the loess that caps the pre-Illinoisan aged till on the broad interfluvial areas that characterize this region. Till is exposed on lower slopes. The underlying Mississippian aged limestone and Pennsylvanian aged shale is exposed in only a few places along lower slopes above the Salt River.

Classification relationships

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

The reference state for this ecological site is most similar to a Dry-Mesic Loess/Glacial Till Prairie.

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

The reference state for this ecological site is most similar to *Schizachyrium scoparium* - *Sorghastrum nutans* - *Bouteloua curtipendula* Herbaceous Vegetation (CEGL002214).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
 This ecological site occurs throughout the Claypan Till Plains Subsection, and in adjacent Land Type Associations of the Wyaconda River Dissected Till Plains and Chariton River Hills Subsections.

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”.

Loess Upland Prairies occur throughout the MLRA and adjacent areas. They are typically downslope from Claypan Summit Prairie ecological sites, and upslope from Till Upland Savanna sites. Soils are wet and seepy in the spring, which affects species composition. The reference plant community is prairie dominated by Indiangrass, big bluestem, little bluestem and sideoats grama, and a wide variety of prairie wildflowers.

Associated sites

F113XY005MO	Wet Upland Drainageway Woodland Wet Upland Drainageway Woodlands are downslope.
R109XY046MO	Till Upland Savanna Till Upland Savannas are often downslope.
R113XY001MO	Claypan Summit Prairie Claypan Summit Prairies are upslope, on broad summits.

Similar sites

R113XY001MO	Claypan Summit Prairie Claypan Summit Prairies are similar in overall species composition but are typically found on gentler slopes above this ecological site.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Amorpha canescens</i> (2) <i>Ceanothus americanus</i>
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

This site is on upland summit upper backslopes, particularly in headslopes, with slopes of 2 to 14 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood. The figure (adapted from Young and Geller, 1995) shows a typical landscape position of this ecological site, and landscape relationships among the three dominant upland ecological sites in this MLRA.

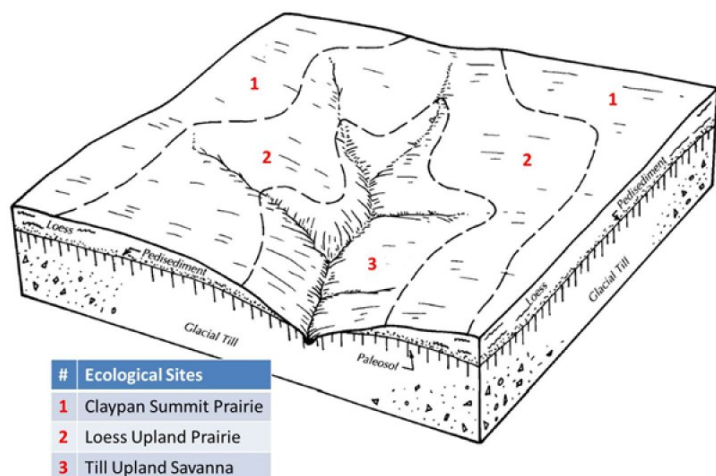


Figure 2. Landscape sequence of ecological sites

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Interfluve (3) Hill
Runoff class	Low to high
Elevation	191–305 m
Slope	2–14%
Water table depth	20–30 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The western part of the Central Claypan Area MLRA 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.

This western part of the MLRA experiences regional differences in climates that grade across the region. The basic gradient for most mean annual climatic characteristics is along a line from north to south. Both mean annual temperature and precipitation exhibit modest gradients along this line. Mean January minimum temperature follows a north to south gradient. However, mean July maximum temperature shows hardly any geographic variation in the region. Mean July maximum temperatures have a range of only two to three degrees across the region.

Mean annual precipitation also varies along the north to south gradient – lower annual precipitation in the north, somewhat higher in the south. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation.

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 influences ecological communities by limiting water supplies, especially at times of high temperatures and high evaporation rates. Drought indirectly affects ecological communities by increasing plant and animal susceptibility to the probability and severity of fire. Frequent fires encourage the development of grass/forb dominated communities and understories.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. 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. Finally, the cooler microclimate within a canopied forest is measurably different from the climate of a more open and warmer grassland or savanna area.

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)	155-165 days
Freeze-free period (characteristic range)	183-195 days
Precipitation total (characteristic range)	1,067-1,092 mm
Frost-free period (actual range)	147-166 days
Freeze-free period (actual range)	182-197 days
Precipitation total (actual range)	1,041-1,118 mm
Frost-free period (average)	159 days
Freeze-free period (average)	189 days
Precipitation total (average)	1,067 mm

Climate stations used

- (1) MEXICO [USC00235541], Mexico, MO
- (2) KIRKSVILLE [USC00234544], Kirksville, MO
- (3) VANDALIA [USC00238577], Vandalia, MO
- (4) COLUMBIA RGNL AP [USW00003945], Columbia, MO

Influencing water features

Many areas of this ecological site are influenced by a seasonal high water table, perched on the subsoil or on underlying till or residuum. Seeps may occur in headslope positions, particularly in the spring and following heavy rainfall events. These seeps are source areas for first-order ephemeral streams, typically within Upland Drainageway ecological sites downslope. Where present, these headslope seeps are in the SLOPE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993).

Soil features

These soils have no major rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is loess over pedisediment and till. The soils have silt loam surface horizons. Subsoils are silty clay loam to silty clay. A seasonal high water table is perched above the clayey subsoil during the spring months. Soil series associated with this site include Leonard.

Table 4. Representative soil features

Parent material	(1) Pedisediment (2) Till
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained to moderately well 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 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)	5.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

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. 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.

The reference plant community is characterized as a tallgrass prairie unit dominated by little bluestem, big bluestem, Indiangrass, sideoats grama, and a wide variety of prairie wildflowers. On lower slopes and draws where water periodically accumulates, more mesic prairie species such as switchgrass, eastern gamagrass, Culver's root, Michigan lily, and Virginia bunchflower are added to the diverse mix of prairie species. In some cases, bur oak, American hazelnut, prairie willow and wild plum occurred as widely scattered individuals across the ecological site.

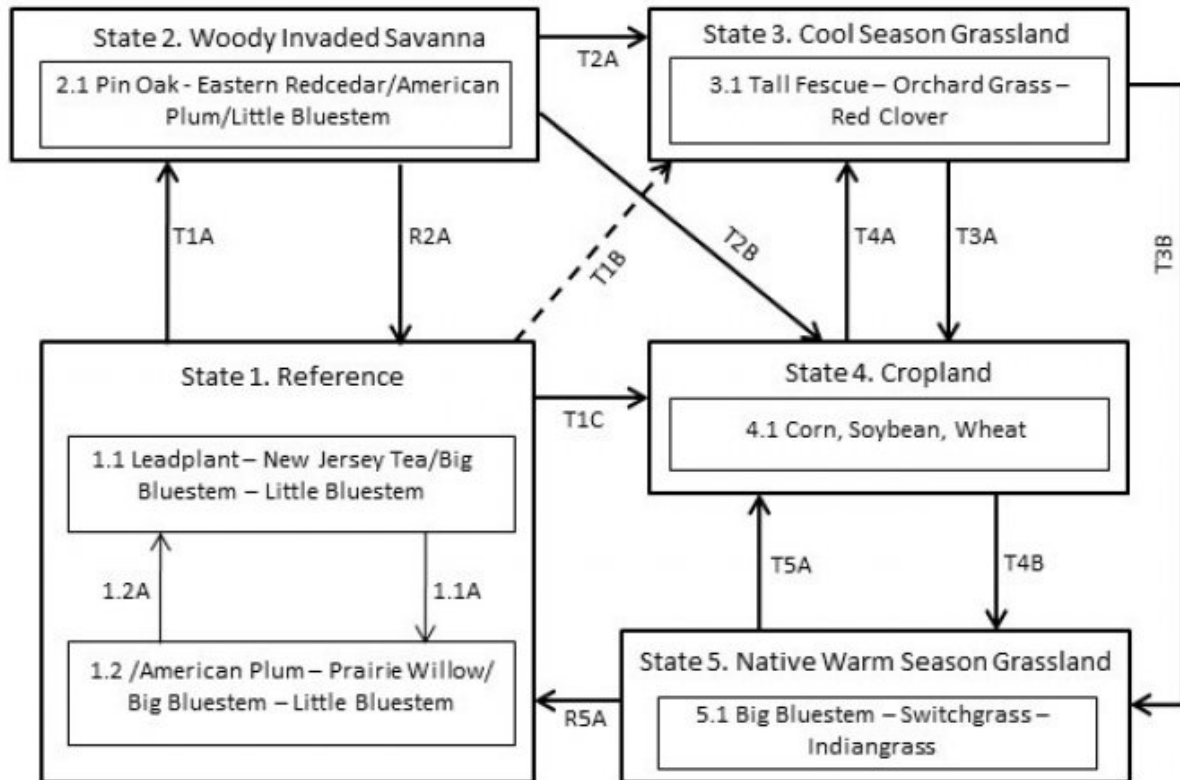
This ecological site likely burned every 1 to 3 years. Fire removed dead plant litter and provided room for a lush growth of prairie vegetation. Fire also kept woody species at bay. Grazing by native large herbivores, such as bison, prairie elk, and white-tailed deer, also impacted these sites. Their activities altered the composition, fuel loads and structure of the vegetation, creating a diversity of structure and composition. The partially wooded draws would have burned less intensely and less frequently. During fire free intervals woody species would have increased in abundance and spread out onto the prairie.

This site is very productive. Today, Loess Upland Prairies are nearly extirpated from the region as the former prairies have been converted to intensive row-crop agriculture. A few known remnants exist but are degraded by fire suppression and grazing by domestic livestock. While planting prairie on former prairie sites is beneficial to wildlife, restoration to the reference state from agricultural land is a long term proposition with uncertain outcomes.

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

Loess Upland Prairie, R113XY002MO



Code	Event/Activity/Process
T1A	Fire suppression > 20 years; woody invasion
T1B	Tillage; vegetative seeding; grassland management
T1C, T3A, T5A	Tillage; conservation cropping system
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 9. State and transition diagram for this ecological site

State 1

Reference

This State is native tall grass prairie dominated by little bluestem, big bluestem and a wide variety of prairie wildflowers. This State occurs on level to gently sloping soils. In some cases, bur oak, swamp white oak, post oak, elm, American hazelnut, prairie willow and wild plum occurred in small groves or as scattered individuals across the prairie landscape. 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 prairie willow, dogwoods and wild plum. When fire intervals shorten these woody species will decrease. This state is extinct. All sites have been converted to cool season grassland and intensive agriculture cropland.

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- New Jersey tea (*Ceanothus americanus*), shrub
- American plum (*Prunus americana*), shrub
- prairie willow (*Salix humilis*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1

Lead Plant - New Jersey Tea/Big Bluestem - Little Bluestem

This phase has scattered lead plant, New Jersey tea, and prairie willow with grasses such as big bluestem, Indian grass and dropseeds dominating the ground layer. Numerous forbs such as Missouri coneflower, prairie clovers, bunchflower, rosinweed, and compass plant are also present and locally abundant. Fire frequencies of 1 to 3 years helped maintain the community structure and composition. The Understory list is based on commonly occurring species listed in Nelson (2010).

Forest understory. The Forest Understory list is based on commonly occurring species listed in Nelson (2010).

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- New Jersey tea (*Ceanothus americanus*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.2

American Plum – Prairie Willow/ Big Bluestem - Little Bluestem

This phase is similar to community phase 1.1 but numerous shrubs are increasing due to longer periods of fire suppression. Some displacement of grasses and forbs may be occurring due to shading and competition from the increased densities of shrubs.

Dominant plant species

- American plum (*Prunus americana*), shrub
- prairie willow (*Salix humilis*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Pathway 1.1A

Community 1.1 to 1.2

Fire free interval 10 plus years.

Pathway 1.2A

Community 1.2 to 1.1

Fire interval 1-3 years

State 2

Woody Invaded Savanna

Degraded reference states that have experienced fire suppression for 20 or more years will transition to this state. With fire suppression, woody species such as bur oak and eastern redcedar will begin to increase transitioning this state from a prairie to a Woody Invaded Savanna. Native ground cover will also decrease and invasive species such as tall fescue may begin to dominate. Transition from this state to cool season grasslands (State 3) or intensive cropland (State 4) was very common.

Dominant plant species

- bur oak (*Quercus macrocarpa*), tree
- eastern redcedar (*Juniperus virginiana*), tree
- American plum (*Prunus americana*), shrub
- little bluestem (*Schizachyrium scoparium*), grass

Community 2.1

Pin Oak - Eastern Redcedar/American Plum/Little Bluestem

This phase is the result of prolonged fire suppression. With longer fire intervals woody species such as pin oak, single oak, and eastern redcedar, along with other shrubs, have developed and begun to form a tree canopy. Because of this native grass and forb densities are reduced.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- eastern redcedar (*Juniperus virginiana*), tree
- American plum (*Prunus americana*), shrub
- little bluestem (*Schizachyrium scoparium*), grass

State 3

Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue, orchard grass and red clover has been common in this area. Occasionally, these pastures will have scattered bur oaks. Long term uncontrolled grazing and a lack of grassland management can cause significant soil erosion and compaction and increases in less productive species such as Kentucky bluegrass and weedy forbs such as ironweed. A return to the Reference State may be impossible, requiring a very long term series of management options.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- orchardgrass (*Dactylis glomerata*), grass
- red clover (*Trifolium pratense*), other herbaceous

Community 3.1

Tall Fescue - Orchardgrass - Red Clover

This phase is a well managed grassland, composed of non-native cool season grasses and legumes. Grazing and haying is occurring. The effects of long-term liming on soil pH, and calcium and magnesium content, is most evident in this phase. Studies show that these soils have higher pH and higher base status in soil horizons as much as two feet below the surface, relative to poorly managed grassland.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- orchardgrass (*Dactylis glomerata*), grass
- red clover (*Trifolium pratense*), other herbaceous

State 4

Cropland

This is the dominant State that exists currently with intensive cropping of corn, soybeans, and wheat occurring. Some conversion to cool season hayland occurs for a limited period of time before transitioning back to cropland. Limited acres are sometimes converted to native warm season grassland.

Dominant plant species

- corn (*Zea mays*), grass
- soybean (*Glycine max*), other herbaceous
- common wheat (*Triticum aestivum*), other herbaceous

Community 4.1

Corn, Soybean, Wheat

This phase is due to a land use conversion to intensive agriculture. Principal crops are corn, soybeans, and wheat. Surface drainage has usually been altered.

Dominant plant species

- corn (*Zea mays*), grass
- common wheat (*Triticum aestivum*), grass
- soybean (*Glycine*), other herbaceous

State 5

Native Warm Season Grassland

Conversion from the 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 is the most easily transformable state back to a Reference State. Substantial restoration time and management inputs will still be needed.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Community 5.1

Big Bluestem - Switchgrass - Indiangrass

This phase, generally through re-establishment, is a native grassland phase dominated by native grasses such as big bluestem and Indian grass. Forbs are seldom present.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Transition T1A

State 1 to 2

Fire suppression; woody invasion; domestic uncontrolled grazing.

Transition T1B

State 1 to 3

Cool season grass dominance; Tillage, vegetative seeding; grassland management.

Transition T1C

State 1 to 4

Tillage; conservation cropping system.

Restoration pathway R2A

State 2 to 1

Vegetative seeding; prescribed fire 1-3 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.

Transition T3A

State 3 to 4

Tillage; conservation cropping system.

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

Restoration pathway T5A

State 5 to 4

Tillage; conservation cropping system

Additional community tables

Table 5. 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	—	30–50
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	—	30–50
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	—	10–20
switchgrass	PAVI2	<i>Panicum virgatum</i>	Native	—	5–10
eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	Native	—	5–10
prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	Native	—	5–10
porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	Native	—	5–10
Forb/Herb					
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	—	5–20
button eryngo	ERYU	<i>Eryngium yuccifolium</i>	Native	—	5–20
longbract wild indigo	BABR2	<i>Baptisia bracteata</i>	Native	—	5–20
prairie milkweed	ASSU3	<i>Asclepias sullivantii</i>	Native	—	5–20
wholeleaf rosinweed	SIIN2	<i>Silphium integrifolium</i>	Native	—	5–20
wild quinine	PAIN3	<i>Parthenium integrifolium</i>	Native	—	10–20
butterfly milkweed	ASTU	<i>Asclepias tuberosa</i>	Native	—	5–20
prairie blazing star	LIPY	<i>Liatris pycnostachya</i>	Native	—	5–20
Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	Native	—	5–20
white wild indigo	BAAL	<i>Baptisia alba</i>	Native	—	5–20
Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	Native	—	5–10
arrowleaf violet	VISAS5	<i>Viola sagittata</i> var. <i>sagittata</i>	Native	—	5–10
purple prairie clover	DAPU5	<i>Dalea purpurea</i>	Native	—	5–10
compassplant	SILA3	<i>Silphium laciniatum</i>	Native	—	5–10
purple milkwort	POSA3	<i>Polygala sanguinea</i>	Native	—	5–10
Shrub/Subshrub					
leadplant	AMCA6	<i>Amorpha canescens</i>	Native	—	5–20
Carolina rose	ROCA4	<i>Rosa carolina</i>	Native	—	5–10
prairie willow	SAHU2	<i>Salix humilis</i>	Native	—	5–10
American plum	PRAM	<i>Prunus americana</i>	Native	—	5–10
New Jersey tea	CEAM	<i>Ceanothus americanus</i>	Native	—	5–10

Animal community

Wildlife

Game species that utilize this ecological site include:

Northern Bobwhite will utilize this ecological site for food (seeds, insects) and cover needs (escape, nesting and roosting cover).

Cottontail rabbits will utilize this ecological site for food (seeds, soft mast) and cover needs.

Turkey will utilize this ecological site for food (seeds, green browse, soft mast, insects) and nesting and brood-rearing cover. Turkey poults feed heavily on insects provided by this site type.

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.

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

Breeding birds as related to vegetation structure (related to time since fire, grazing, haying, and mowing):

Vegetation Height Short (0.5 meter, low litter levels, bare ground visible):

Grasshopper Sparrow, Horned Lark, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite

Mid-Vegetation Height (0.5 – 1 meter, moderate litter levels, some bare ground visible):

Eastern Meadowlark, Dickcissel, Field Sparrow, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite, Eastern Kingbird, Bobolink, Lark Sparrow

Tall Vegetation Height (> 1 meter, moderate-high litter levels, little bare ground visible):

Henslow's Sparrow, Dickcissel, Greater Prairie Chicken, Field Sparrow, Northern Bobwhite, Sedge Wren, Northern Harrier

Brushy – Mix of grasses, forbs, native shrubs (e.g., *Rhus copallina*, *Prunus americana*, *Rubus* spp., *Rosa carolina*) and small trees (e.g., *Cornus racemosa*): Bell's Vireo, Yellow-Breasted Chat, Loggerhead Shrike, Brown Thrasher, Common Yellowthroat

Winter Resident: Short-Eared Owl, Le Conte's Sparrow

Amphibian and reptile species associated with this ecological site's reference state condition: prairies with or nearby to fishless ponds/pools (may be ephemeral) may have Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) and Western Chorus Frog (*Pseudacris triseriata triseriata*); prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circulosa*); other species include Northern Prairie Skink (*Eumeces septentrionalis septentrionalis*), Ornate Box Turtle (*Terrapene ornata ornata*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), and Bullsnake (*Pituophis catenifer sayi*).

Small mammals associated with this ecological site's reference state condition: Least Shrew (*Cryptotis parva*), Franklin's Ground Squirrel (*Spermophilus franklinii*), Plains Pocket Gopher (*Geomys bursarius*), Prairie Vole (*Microtus ochrogaster*), Southern Bog Lemming (*Synaptomys cooperi*), Meadow Jumping Mouse (*Zapus hudsonius*), Thirteen-lined Ground Squirrel (*Spermophilus tridecemlineatus*) and Badger (*Taxidea taxus*).

Invertebrates:

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: Regal Fritillary butterfly (*Speyeria idalia*) whose larvae feed primarily on native prairie violets (*Viola pedata*, *V. pedatifida*, and *V. sagittata*); Mottled Dusky Wing butterfly (*Erynnis martialis*), Golden Byssus butterfly (*Problema byssus kumskaka*), Delaware Skipper butterfly (*Atryone logan logan*), and Crossline Skipper butterfly (*Polites origenes*). The larvae of the moth *Eucosma bipunctella* bore into compass plant (*Silphium laciniatum*) roots and feed and the larvae of the moth *Eucosma giganteana* bore into a number of *Silphium* species roots and feed. Native bees, important pollinators, that may be associated with this ecological site's reference condition include: *Colletes brevicornis*, *Andrena beameri*, *A. helianthiformis*, *Protandrena rudbeckiae*, *Halictus parallelus*, *Lasioglossum albipennis*, *L. coreopsis*, *L. disparilis*, *L. nymphaeum*, *Ashmeadiella buconis*, *Megachile addenda*, *Anthidium psoraleae*, *Eucera hamata*, *Melissodes coloradensis*, *M. coreopsis*, and *M. vernoniae*. The Short-winged Katydid (*Amblycorypha parvipennis*), Green Grasshopper (*Hesperotettix speciosus*) and Two-voiced Conehead katydid (*Neoconcephalus bivocatus*) are possible orthopteran associates of this ecological site.

Other invertebrate associates include the 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 states 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: Loess Upland Prairie

No quality reference sites are known to exist

Other references

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Approval

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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	05/19/2024
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):**

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:**
