

Ecological site R116BY022MO Loamy 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): 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 Dry-Mesic Limestone/Dolomite Prairie.

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

The reference state for this ecological site is most similar to *Andropogon gerardii* - *Sorghastrum nutans* Unglaciated Herbaceous Vegetation (CEGL002204).

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

This ecological site occurs primarily within the following Land Type Associations:

Lockwood Smooth Prairie Plain
Spring River Prairie/Savanna Dissected Plain
Springfield Karst Prairie Plain

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”.

Loamy Upland Prairie occur on the broad gently rolling surface of the Springfield Plain, particularly in the Spring River watershed in Jasper County, Missouri, and in the vicinity of Springfield between the James and Sac River watersheds. Soils are very deep, and are silt loam loess overlying loamy or gravelly residuum. The reference plant community is prairie dominated by little bluestem, big bluestem, Indiangrass, prairie dropseed, and a wide variety of prairie wildflowers.

Associated sites

R116BY020MO	Claypan Summit Prairie Claypan Summit Prairies are upslope, on nearly level interfluves.
R116BY021MO	Chert Upland Prairie Chert Upland Prairies are downslope, on shoulders and upper backslopes.
R116BY023MO	Sandstone/Shale Upland Prairie Sandstone/Shale Upland Prairies are downslope in places, on backslopes underlain by sandstone and shale.

Similar sites

R116BY021MO	Chert Upland Prairie Chert Upland Prairies are downslope, on shoulders and upper backslopes. These sites are generally dryer and less productive.
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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>Sporobolus heterolepis</i>

Physiographic features

This site is on upland summit interfluves, crests and shoulders with slopes of 1 to 5 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Peer, 2004) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “2” on the figure, on convex summits and shoulders. The dashed lines within the area indicate the various soils included in this ecological site. Clayey Summit Prairie sites, labeled “1”, are upslope in areas where summits are nearly level. Chert Upland Prairie sites, labeled “3”, are often downslope.

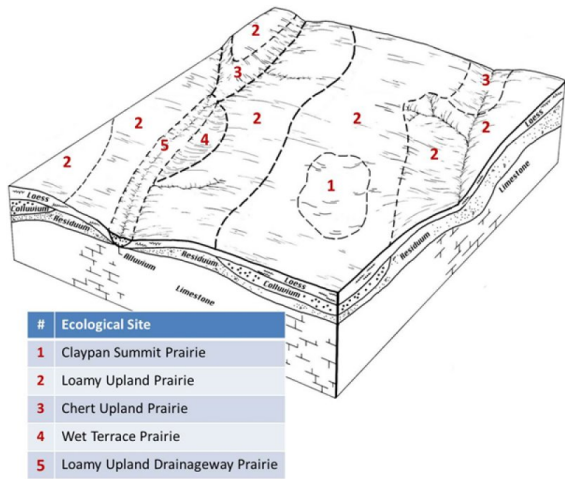


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Interfluve
Flooding frequency	None
Ponding frequency	None
Slope	1–5%
Water table depth	152 cm
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)	153-166 days
Freeze-free period (characteristic range)	186-195 days
Precipitation total (characteristic range)	1,143-1,194 mm
Frost-free period (actual range)	144-170 days
Freeze-free period (actual range)	182-196 days
Precipitation total (actual range)	1,143-1,194 mm
Frost-free period (average)	159 days
Freeze-free period (average)	190 days
Precipitation total (average)	1,168 mm

Climate stations used

- (1) CARTHAGE [USC00231356], Carthage, MO
- (2) MONETT 4SW [USC00235704], Monett, MO
- (3) NEOSHO [USC00235976], Neosho, MO
- (4) SPRINGFIELD [USW00013995], Springfield, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. However, 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 rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is loess over slope alluvium. Some soils are underlain by residuum derived primarily from limestone. They have silt loam surface horizons, with loamy subsoils. Some soils have gravelly substrata. These soils are not affected by seasonal wetness. Soil series associated with this site include Newtonia, Maplegrove, and Wanda.

The accompanying picture of the Newtonia series shows the relatively uniform dark reddish brown silty clay loam subsoil characteristic of this series. Scattered limestone and chert fragments are visible in the lower part of the profile. (Photo credit - NRCS)



Figure 9. Newtonia series

Table 4. Representative soil features

Parent material	(1) Slope alluvium–limestone (2) Loess (3) Residuum–cherty limestone
Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to very slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	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)	5.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–15%
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, 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.

Loamy Upland Prairies are characterized as a tallgrass prairie unit dominated by little bluestem¹, big bluestem, Indiangrass, prairie dropseed and a wide variety of prairie wildflowers. In some cases, bur oak, post oak, hazelnut, prairie willow and American plum occurred in small groves or as scattered individuals across the prairie landscape. On lower slopes and draws where water balances are enhanced, 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.

The open landscape allowed this ecological site to burn 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, 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.

Today, Loamy Upland Prairies are nearly extirpated from the region as the former prairies have been converted to pasture or cropland. The remaining known remnants are degraded by fire suppression and grazing by domestic livestock. Many of the forbs are very palatable and readily grazed by livestock. These palatable forbs decrease with even moderate continuous grazing, but composition can be maintained using prescribed grazing. Forbs that increase include heathaster, goldenrod, western ragweed and Louisiana sagewort. Woody plants such as coralberry, blackberry and sumac also increase with continuous overgrazing and the the absence of fire on site.

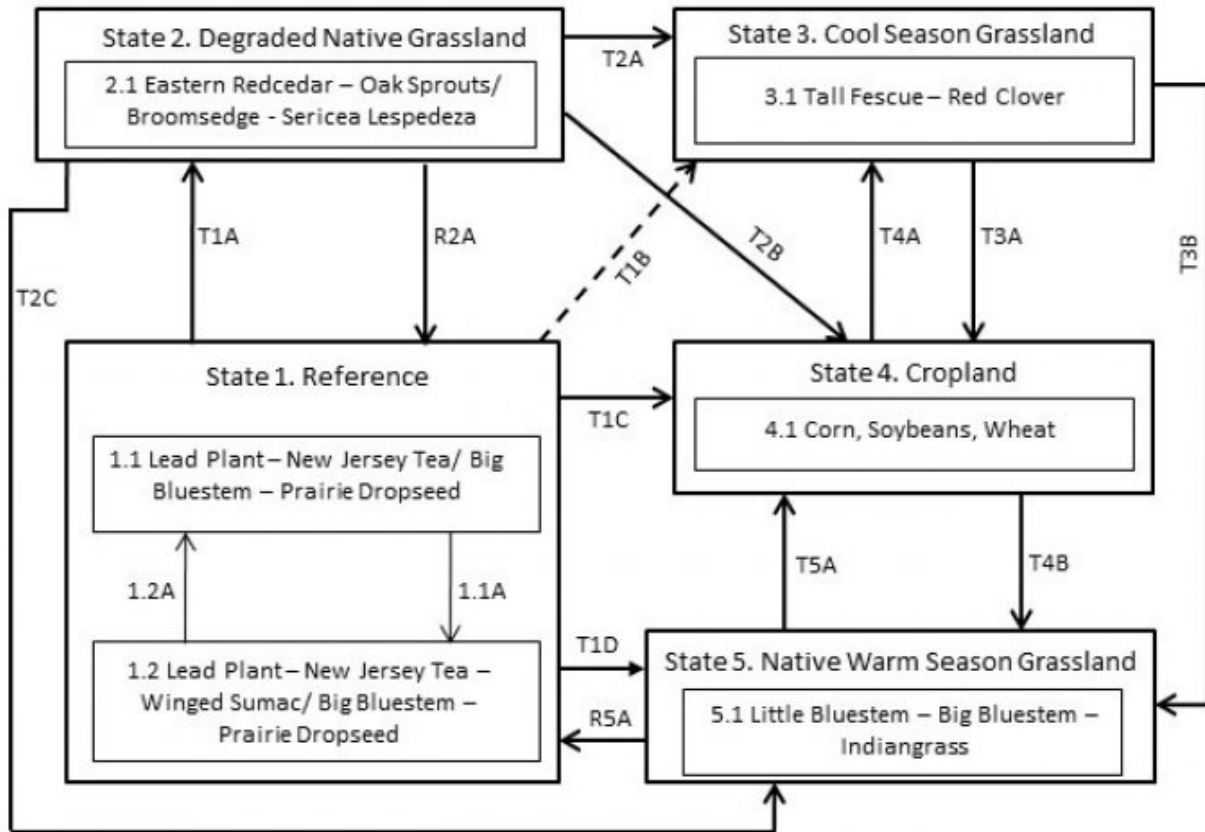
The absence of both grazing and fire will encourage a gradual increase of mulch and litter. Heavy accumulations of mulch and litter will negatively affect vegetation growth. Herbage production will be reduced. Bunchgrasses, especially little bluestem, are usually reduced. Heavy mulch accumulation also accommodates the encroachment of woody plant species such as coralberry, blackberry, roughleaf dogwood, sumac, elm, persimmon, hawthorn and hackberry.

However, when properly managed, including the reintroduction of fire, existing remnants of Loamy Upland Prairies show great resiliency and the stand composition can be improved and maintained indefinitely.

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, R116BY022MO



Code	Event/Activity/Process
T1A	Fire suppression > 10 years; woody invasion; domestic grazing
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
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

Figure 10. State and transition diagram for this ecological site

State 1

Reference

This state is native prairie dominated by prairie dropseed, big bluestem, little bluestem, and forbs, along with numerous shrubs and occasional, widely scattered, stunted trees such as post 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 post oak and eastern redcedar. When fire intervals shorten these woody species will decrease. This undisturbed state is uncommon but some excellent examples still exist. Most sites, however, have been converted to cool season grasslands, cropland, or degraded by domestic grazing.

Community 1.1

Lead Plant – New Jersey Tea/ Big Bluestem – Prairie Dropseed



Forest understory. The following "Understory plant type" list is based on reconnaissance-level plots, inventory plots, as well as commonly occurring species listed in Nelson (2010). Species identified from plot data include cover percentages. Note that plot data for canopy heights are by height class, not actual species heights. Names and symbols are from USDA PLANTS database.

Community 1.2

Leadplant – New Jersey Tea – Winged Sumac/ Big Bluestem – Prairie Dropseed

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

Degraded Native Grassland

Reference states that have experienced fire suppression for 10 or more years and heavy domestic grazing will transition to this State. With fire suppression, woody species such as post oak and eastern redcedar will begin to increase transitioning this state from a prairie to a woody invaded state. Native ground cover will also decrease and invasive species such as tall fescue, broomsedge and sericea lespedeza may begin to dominate. 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 back to a reference state.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Community 2.1

Eastern Redcedar - Oak Sprouts/ Broomsedge - Sericea Lespedeza

State 3

Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue and red clover has been common in this area. Occasionally, these pastures will have scattered post oak and eastern redcedar. 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 productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 3.1

Tall Fescue – Red Clover

State 4

Cropland

This is a common state that currently exists in the region with corn, 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.

Community 4.1

Corn, 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 be needed.

Dominant resource concerns

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

Community 5.1

Little Bluestem – Big Bluestem – Indiangrass

Transition T1A

State 1 to 2

Fire suppression > 10 years; woody invasion; domestic grazing

Transition T1B

State 1 to 3

Tillage; vegetative seeding; grassland management

Transition T1C

State 1 to 4

Tillage; conservation cropping system

Transition T1D

State 1 to 5

Prescribed grazing; prescribed fire

Restoration pathway R2A

State 2 to 1

Woody removal; prescribed fire 1-3 years; limited grazing

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 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 understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	–	5–95
prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	Native	–	25–50
switchgrass	PAVI2	<i>Panicum virgatum</i>	Native	–	0.1–50
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	–	5–25
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	–	5–20
whip nutrush	SCTR	<i>Scleria triglomerata</i>	Native	–	0.1–1
marsh bristlegrass	SEPA10	<i>Setaria parviflora</i>	Native	–	0.1–1
Heller's rosette grass	DIOL	<i>Dichanthelium oligosanthos</i>	Native	–	0.1–1
prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	Native	–	0.1–1
porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	Native	–	0.1–1
Forb/Herb					
white heath aster	SYER	<i>Symphyotrichum ericoides</i>	Native	–	5–10
golden zizia	ZIAU	<i>Zizia aurea</i>	Native	–	2–5
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	–	0.1–5
sessileleaf ticktrefoil	DESE	<i>Desmodium sessilifolium</i>	Native	–	0.1–5
flowering spurge	EUCO10	<i>Euphorbia corollata</i>	Native	–	2–5
manyray aster	SYAN2	<i>Symphyotrichum anomalum</i>	Native	–	2–5
winecup	CADI2	<i>Callirhoe digitata</i>	Native	–	0.1–2
common sneezeweed	HEAU	<i>Helenium autumnale</i>	Native	–	1–2
Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	Native	–	1–2
gray goldenrod	SONE	<i>Solidago nemoralis</i>	Native	–	0.1–1
western rough goldenrod	SORA	<i>Solidago radula</i>	Native	–	0.1–1
wild bergamot	MOFI	<i>Monarda fistulosa</i>	Native	–	0.1–1
Sampson's snakeroot	ORPE	<i>Orbexilum pedunculatum</i>	Native	–	0.1–1

Canadian lousewort	PECA	<i>Pedicularis canadensis</i>	Native	–	0.1–1
downy phlox	PHPI	<i>Phlox pilosa</i>	Native	–	0.1–1
common cinquefoil	POSI2	<i>Potentilla simplex</i>	Native	–	0.1–1
narrowleaf mountainmint	PYTE	<i>Pycnanthemum tenuifolium</i>	Native	–	0.1–1
Virginia strawberry	FRVI	<i>Fragaria virginiana</i>	Native	–	0.1–1
agueweed	GEQU2	<i>Gentianella quinquefolia</i>	Native	–	0.1–1
skyblue aster	SYOO	<i>Symphotrichum oolentangiense</i>	Native	–	0.1–1
Arkansas ironweed	VEAR3	<i>Vernonia arkansana</i>	Native	–	0.1–1
prairie blazing star	LIPY	<i>Liatris pycnostachya</i>	Native	–	0.1–1
roundhead lespedeza	LECA8	<i>Lespedeza capitata</i>	Native	–	0.1–1
slender lespedeza	LEVI7	<i>Lespedeza virginica</i>	Native	–	0.1–1
Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	Native	–	0.1–1
stiff ticktrefoil	DEOB5	<i>Desmodium obtusum</i>	Native	–	0.1–1
blackeyed Susan	RUHI2	<i>Rudbeckia hirta</i>	Native	–	0.1–1
fringeleaf wild petunia	RUHU	<i>Ruellia humilis</i>	Native	–	0.1–1
azure blue sage	SAAZ	<i>Salvia azurea</i>	Native	–	0.1–1
milkweed	ASCLE	<i>Asclepias</i>	Native	–	0.1–1
tall tickseed	COTR4	<i>Coreopsis tripteris</i>	Native	–	0.1–1
Texas goldentop	EUGY	<i>Euthamia gymnospermoides</i>	Native	–	0.1–1
button eryngo	ERYU	<i>Eryngium yuccifolium</i>	Native	–	0.1–1
pale purple coneflower	ECPA	<i>Echinacea pallida</i>	Native	–	0.1–1
white wild indigo	BAAL	<i>Baptisia alba</i>	Native	–	0.1–1
Indianhemp	APCA	<i>Apocynum cannabinum</i>	Native	–	0.1–1
Shrub/Subshrub					
prairie willow	SAHU2	<i>Salix humilis</i>	Native	–	0.1–10
New Jersey tea	CEAM	<i>Ceanothus americanus</i>	Native	–	2–5
leadplant	AMCA6	<i>Amorpha canescens</i>	Native	–	0.1–2
Carolina rose	ROCA4	<i>Rosa carolina</i>	Native	–	0.1–1

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

Vegetation Height Moderate (0.5 – 1 meter, moderate litter levels, some bare ground visible): Eastern Meadowlark, Dickcissel, Field Sparrow, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite, Blue Grosbeak, Scissor-Tailed Flycatcher, Eastern Kingbird, Lark Sparrow

Vegetation Height Tall (> 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*), native vines (*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, Northern Harrier

Amphibian and reptile species associated with this ecological site's reference state condition: prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circulosa*); Ornate Box Turtle (*Terrapene ornata ornata*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), Prairie Kingsnake (*Lampropeltis calligaster calligaster*), and Bullsnae (*Pituophis catenifer sayi*).

Prairies with ephemeral vernal fishless wetlands: Western Chorus Frog (*Pseudacris triseriata triseriata*), Southern Leopard Frog (*Rana sphenoccephala*), and Eastern Tiger Salamander (*Ambystoma tigrinum*).

Small mammals associated with this ecological site's reference state condition:

Least Shrew (*Cryptotis parva*), Plains Pocket Gopher (*Geomys bursarius*), Prairie Vole (*Microtus ochrogaster*), Meadow Jumping Mouse (*Zapus hudsonius*), and Badger (*Taxidea taxus*).

Many native insect species are likely associated with this ecological site, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydid. 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*), Ottoo Skipper butterfly (*Hesperia ottoe*), Arogos Skipper butterfly (*Atrytone arogos iowa*), 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*), Prairie Mole Cricket (*Gryllotalpa major*), 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 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: Loamy Upland Prairie

Plot DIGRCA05 – Maplegrove soil
Located in Diamond Grove CA, Newton County, MO
Latitude: 37.017071
Longitude: -94.376844

Plot GOPRPF04 – Maplegrove soil
Located in Golden Prairie MPF, Barton County, MO
Latitude: 37.351885
Longitude: -94.148681

Plot WOPROR03 – Wanda soil
Located in Woods Prairie ORLT, Lawrence County, MO
Latitude: 37.09251
Longitude: -93.731905

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Contributors

Doug Wallace
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Approval

Nels Barrett, 10/07/2020

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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:

-
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:**
