

Ecological site R116BY021MO Chert 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 Chert Prairie.

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

The reference state for this ecological site is most similar to *Schizachyrium scoparium* - *Sorghastrum nutans* - *Danthonia spicata* - *Silene regia* Chert Herbaceous Vegetation (CEGL002211).

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

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

Spring River Prairie/Savanna Dissected Plain
 Lockwood Smooth Prairie Plain
 Springfield Karst Prairie Plain
 Buffalo Prairie/Savanna Plain
 Bolivar Prairie/Savanna Plain
 Stockton Prairie/Savanna Dissected Plain
 Weaubleau Prairie/Savanna Dissected 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. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Chert Upland Prairies occur extensively on the rolling, weakly dissected hillslopes of the Springfield Plain, especially in the Spring River, Shoal Creek and Sac River watersheds and tributaries. Soils have low plant-available water due to high gravel contents, a fragipan rooting restriction, or both. The reference plant community is prairie dominated by little bluestem, big bluestem, and Indiangrass and a wide variety of prairie wildflowers.

Associated sites

F116BY017MO	Gravelly/Loamy Upland Drainageway Woodland Gravelly/Loamy Upland Drainageway Woodlands are downslope.
R116BY020MO	Claypan Summit Prairie Claypan Summit Prairies are upslope, on nearly level interfluves.
R116BY022MO	Loamy Upland Prairie Loamy Upland Prairies are upslope, on convex summits and shoulders.
R116BY023MO	Sandstone/Shale Upland Prairie Sandstone/Shale Upland Prairies are upslope in places, on convex summits.

Similar sites

R116BY020MO	Claypan Summit Prairie Claypan Summit Prairies are upslope, on nearly level interfluves. These sites are seasonally wet. Composition is similar and the sites are often in close proximity.
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Table 1. Dominant plant species

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

Physiographic features

This site is on upland summit crests, shoulders and upper backslopes with slopes of 1 to 15 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Kichler and Henderson, 1999) 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. The dashed lines within the area indicate the various soils included in this ecological site. Sandstone/Shale Upland Prairie sites, labeled “1”, are often upslope. In areas where summits are nearly level, Claypan Summit Prairie sites are upslope.

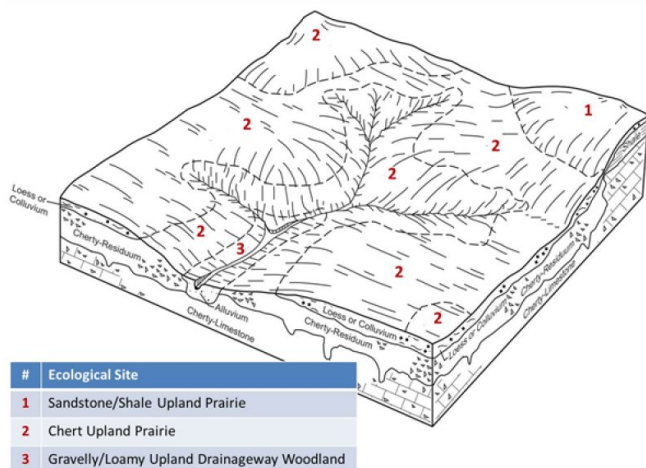


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Interfluve (3) Hill
Flooding frequency	None
Ponding frequency	None
Slope	1–15%
Water table depth	19–27 in
Aspect	Aspect is not a significant factor

Climatic features

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

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

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

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

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Deep sinkholes often have a

microclimate significantly cooler, moister, and shadier than surrounding surfaces, a phenomenon that may result in a strikingly different ecology. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

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

Table 3. Representative climatic features

Frost-free period (characteristic range)	154-164 days
Freeze-free period (characteristic range)	186-195 days
Precipitation total (characteristic range)	46 in
Frost-free period (actual range)	146-165 days
Freeze-free period (actual range)	182-196 days
Precipitation total (actual range)	46-47 in
Frost-free period (average)	158 days
Freeze-free period (average)	190 days
Precipitation total (average)	46 in

Climate stations used

- (1) MT VERNON M U SW CTR [USC00235862], Mount Vernon, MO
- (2) STOCKTON DAM [USC00238082], Stockton, MO
- (3) JOPLIN REGIONAL AIRPORT [USW00013987], Webb City, MO
- (4) SPRINGFIELD [USW00013995], Springfield, MO

Influencing water features

The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams.

Soil features

These soils have low plant-available water due to high gravel contents, a fragipan rooting restriction, or both. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is slope alluvium over residuum derived primarily from cherty limestone. Some soils have loess surface layers. Surface horizon texture is silt loam, gravelly silt loam or very gravelly silt loam. Subsoils are loamy, clayey, or skeletal with high amounts of coarse fragments. These soils are not affected by seasonal wetness. Soil series associated with this site include Bona, Crelton, Eldorado, Hoberg, and Keeno.

The accompanying picture of the Crelton series shows a dark, organic-rich silt loam surface horizon and brown silty clay loam subsoil, over a fragipan at about 27 inches. The fragipan is a barrier to roots. Chert fragments are abundant in the lower horizons. Scale is in feet. Picture from Aldrich and Meinert (1994).



Figure 9. Creldon series

Table 4. Representative soil features

Parent material	(1) Slope alluvium–cherty limestone (2) Loess (3) Residuum–cherty limestone
Surface texture	(1) Silt loam (2) Gravelly silt loam (3) Very gravelly silt loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow
Depth to restrictive layer	18–27 in
Soil depth	18–72 in
Surface fragment cover ≤3"	0–25%
Surface fragment cover >3"	0–5%
Available water capacity (0–40in)	3–6 in
Calcium carbonate equivalent (0–40in)	0%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0
Soil reaction (1:1 water) (0–40in)	4.5–6.5
Subsurface fragment volume ≤3" (Depth not specified)	15–50%
Subsurface fragment volume >3" (Depth not specified)	5–50%

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.

The reference plant community is only moderately productive and is characterized as open prairie with occasional widely scattered trees such as post oak. This site was dominated by native warm-season grasses including little bluestem, big bluestem, and Indiangrass. Combined, these grasses typically accounted for much of the vegetational production. Other occurring grasses were sideoats grama, prairie dropseed, and Canada wildrye. Scattered throughout were minor amounts of short-grasses consisting of Scribner's panicum and sedge. Leadplant and New Jersey tea were typical low growing shrubs that occurred over the site. Unlike most shrubs, these plants are both tolerant to fire. Islands of other shrubs such as dogwood, Jersey tea, coralberry and Carolina rose were also found on the site.

This vast expanse of grass frequently stretched for miles and was only interrupted by shallow drainages whose wetness lessened the influence of frequent, intense fires. With little to interrupt fire, this ecological site 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. The partially wooded draws would have burned less intensely and less frequently. During fire free intervals woody species would have increased in abundance, spread out onto the prairie and expanded the savanna component.

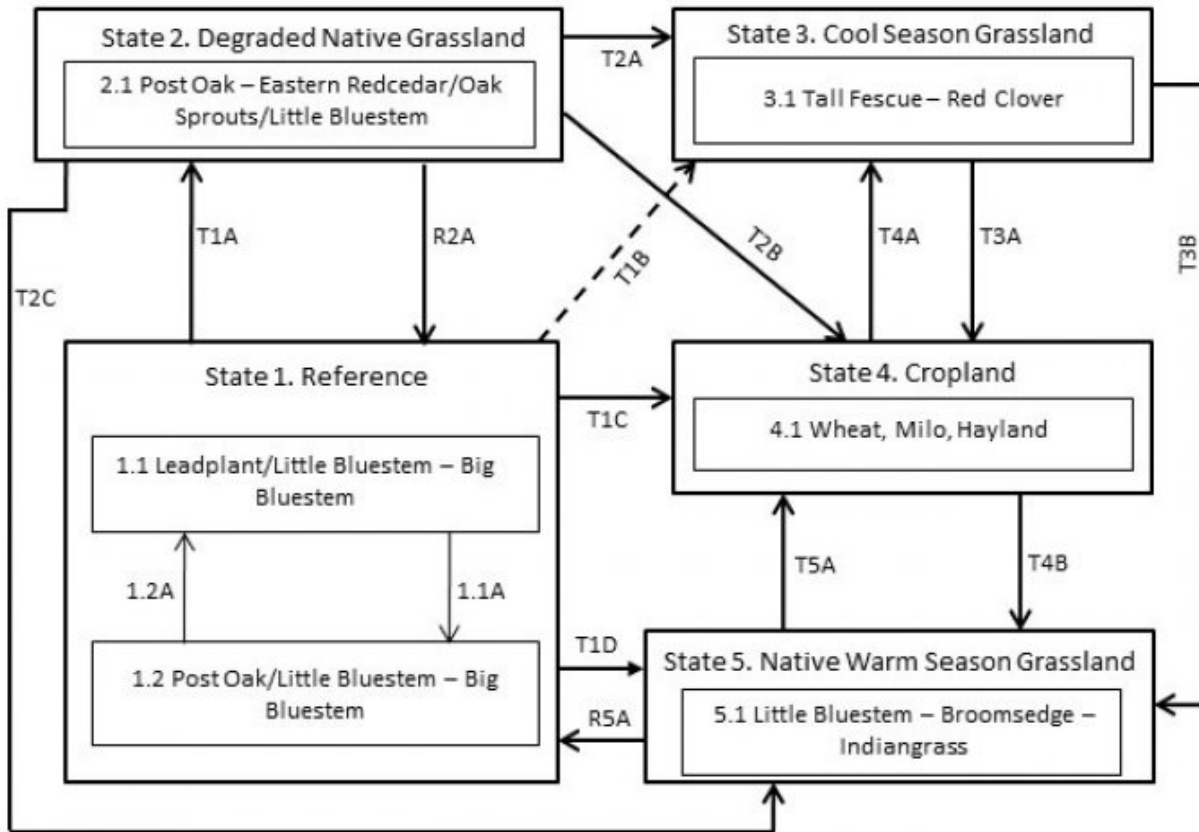
Grazing by native large herbivores, such as bison, elk, and white-tailed deer, also impacted these sites. Their activities would have altered composition and structure of the vegetation. Fuel loads would have been altered by heavy grazing and fire behavior affected, providing for a diversity of structure and composition.

Today, reference Chert Upland Prairie is rare and scattered in the region, as the former prairies have been converted to pasture and cropland. The known remnants are mostly degraded by fire suppression and unmanaged grazing by domestic livestock. However, when managed properly, existing remnants will respond to restoration efforts. A few isolated remnants still exist and reflect original reference state composition and structure.

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

Chert Upland Prairie, R116BY021MO



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 Model for this ecological site

State 1

Reference

This State is native prairie dominated by little bluestem, big bluestem, and forbs, along with numerous shrubs and occasional, widely scattered, stunted trees such as post oak and blackjack 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

Leadplant/Little Bluestem - Big Bluestem



Figure 11. Shelton L. Cook Meadow (The Nature Conservancy), Barton County, Missouri (Photo credit - MDC)

Forest overstory. Occasional, widely scattered, stunted trees such as post oak and blackjack oak are present.

Forest understory. Rich prairie grass and forb composition with a diverse mixture of shrubs. 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 and canopy heights. Note that plot data for canopy heights are by height class, not actual species heights. Species not found in plots, but listed in Nelson, include only cover data.

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	2-25%
Forb foliar cover	1-25%
Non-vascular plants	0%
Biological crusts	0%
Litter	0-95%
Surface fragments >0.25" and <=3"	0-25%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	0.1-25.0%

Table 6. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0-25%	25-75%	10-50%
>0.5 <= 1	0%	0-25%	25-75%	10-50%
>1 <= 2	0%	0-25%	2-50%	1-50%
>2 <= 4.5	0%	0-1%	0-25%	0-10%
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2 Post Oak/Little Bluestem – Big Bluestem



Figure 12. Woody invasion beginning to occur on a native chert prairie in Barton County, Missouri. Photo credit - MDC.

Pathway P1.1A Community 1.1 to 1.2



Leadplant/Little Bluestem - Big Bluestem



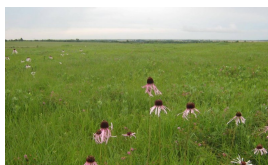
Post Oak/Little Bluestem – Big Bluestem

Fire-free interval 5-10 years

Pathway P1.2A Community 1.2 to 1.1



Post Oak/Little Bluestem – Big Bluestem



Leadplant/Little Bluestem - Big Bluestem

Fire interval 1-3 years

State 2

Degraded Native Grassland

Reference States that have experienced fire suppression for 20 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 and sericea lespedeza may begin to dominate. Transition to cool season grasslands (State 3) or cropland (State 4) is very common.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates
- Feed and forage imbalance

Community 2.1

Post Oak-Eastern Redcedar/Oak Sprouts/Little Bluestem



Figure 13. Cook Meadow - Degraded Native Grassland

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 a few 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 structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 3.1

Tall Fescue - Red Clover



Figure 14. Converted cool season grassland in Barton County, Missouri.
Photo credit NRCS.

State 4 Cropland

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

Dominant resource concerns

- Sheet and rill erosion
- Ephemeral gully erosion
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Community 4.1 Wheat, Milo, Hayland



Figure 15. Cropland

State 5 Native Warm Season Grassland

Conversion from Degraded Native Grassland (State 2) 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, is the most easily transformable state back to a Reference State. Substantial restoration time and management inputs will be needed.

Community 5.1 Little Bluestem-Broomsedge-Indiangrass



Figure 16. Native Warm Season Grassland

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 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

Restoration pathway 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 7. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
black hickory	CATE9	<i>Carya texana</i>	Native	–	0–2	–	–
post oak	QUST	<i>Quercus stellata</i>	Native	–	0–2	–	–
blackjack oak	QUMA3	<i>Quercus marilandica</i>	Native	–	0–2	–	–

Table 8. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	Native	0.3–2	0.1–75
big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	0.3–4.5	0.1–50
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	0.3–4.5	0.1–50
cypress panicgrass	DIDI6	<i>Dichanthelium dichotomum</i>	Native	0.3–1	10–25
switchgrass	PAVI2	<i>Panicum virgatum</i>	Native	0.3–2	2–25
Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	Native	–	10–20
sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	Native	–	10–20
Canada wildrye	ELCA4	<i>Elymus canadensis</i>	Native	–	10–20
Mead's sedge	CAME2	<i>Carex meadii</i>	Native	–	10–20

Heller's rosette grass	DIOL	<i>Dichantherium oligosanthes</i>	Native	0.3–1	0.1–10
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	0.3–1	0.1–1
lovegrass	ERAGR	<i>Eragrostis</i>	Native	0.3–1	0.1–1
panicgrass	PANIC	<i>Panicum</i>	Native	0.3–1	0.1–1
German knotgrass	SCLER	<i>Scleranthus</i>	Introduced	0.3–1	0.1–1
whip nutrush	SCTR	<i>Scleria triglomerata</i>	Native	0.3–1	0.1–1
marsh bristlegrass	SEPA10	<i>Setaria parviflora</i>	Native	0.3–2	0.1–1
composite dropseed	SPCO16	<i>Sporobolus compositus</i>	Native	0.3–4.5	0.1–1
purpletop tridens	TRFL2	<i>Tridens flavus</i>	Native	0.3–4.5	0.1–1
purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	Native	0.3–0.5	0.1–1
prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	Native	0.3–0.5	0.1
Virginia wildrye	ELVI3	<i>Elymus virginicus</i>	Native	0.3–4.5	0.1
slimspike threeawn	ARLO16	<i>Aristida longespica</i>	Native	0.3–1	0.1
Forb/Herb					
Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	Native	0.3–2	1–50
slender lespedeza	LEVI7	<i>Lespedeza virginica</i>	Native	0.3–4.5	0.1–25
Curtis' star-grass	HYCU5	<i>Hypoxis curtissii</i>	Native	–	5–20
compassplant	SILA3	<i>Silphium laciniatum</i>	Native	–	5–20
smooth violet prairie aster	SYTU2	<i>Symphyotrichum turbinellum</i>	Native	–	5–20
hoary puccoon	LICA12	<i>Lithospermum canescens</i>	Native	–	5–20
hairy sunflower	HEHI2	<i>Helianthus hirsutus</i>	Native	–	5–20
Ozark milkvetch	ASDI4	<i>Astragalus distortus</i>	Native	–	5–20
widowsfrill	SIST	<i>Silene stellata</i>	Native	–	5–20
butterfly milkweed	ASTU	<i>Asclepias tuberosa</i>	Native	–	5–20
slimflower scurfpea	PSTE5	<i>Psoraleidium tenuiflorum</i>	Native	–	5–20
Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	Native	0.3–1	0.1–10
western rough goldenrod	SORA	<i>Solidago radula</i>	Native	0.3–2	0.1–5
Texas goldentop	EUGY	<i>Euthamia gymnospermoides</i>	Native	0.3–2	0.1–5
Arkansas ironweed	VEAR3	<i>Vernonia arkansana</i>	Native	0.3–4.5	0.1–5
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	0.3–2	2–5
foxtail amaranth	AMCA3	<i>Amaranthus caudatus</i>	Introduced	0.3–1	1–2
bastard toadflax	COUM	<i>Comandra umbellata</i>	Native	0.3–0.5	0.1–2
manyray aster	SYAN2	<i>Symphyotrichum anomalum</i>	Native	0.3–2	1–2
white heath aster	SYER	<i>Symphyotrichum ericoides</i>	Native	0.3–2	0.1–2
late purple aster	SYPA11	<i>Symphyotrichum patens</i>	Native	0.3–2	0.1–1
purple prairie clover	DAPU5	<i>Dalea purpurea</i>	Native	0.3–2	0.1–1
skyblue aster	SYOO	<i>Symphyotrichum oolentangiense</i>	Native	0.3–2	0.1–1
prairie blazing star	LIPY	<i>Liatris pycnostachya</i>	Native	0.3–4.5	0.1–1
violet woodsorrel	OXVI	<i>Oxalis violacea</i>	Native	0.3–1	0.1–1
blackeyed Susan	RUHI2	<i>Rudbeckia hirta</i>	Native	0.3–1	0.1–1
fringeleaf wild petunia	RUHU	<i>Ruellia humilis</i>	Native	0.3–1	0.1–1
white wild indigo	BAAL	<i>Baptisia alba</i>	Native	0.3–1	0.1–1
longbract wild indigo	BABR2	<i>Baptisia bracteata</i>	Native	0.3–1	0.1–1

button erylngo	ERYU	<i>Eryngium yuccifolium</i>	Native	0.3–2	0.1–1
tall thoroughwort	EUAL3	<i>Eupatorium altissimum</i>	Native	0.3–2	0.1–1
flowering spurge	EUCO10	<i>Euphorbia corollata</i>	Native	0.3–2	0.1–1
sidebeak pencilflower	STBI2	<i>Stylosanthes biflora</i>	Native	0.3–1	0.1–1
narrowleaf mountainmint	PYTE	<i>Pycnanthemum tenuifolium</i>	Native	0.3–1	0.1–1
azure blue sage	SAAZ	<i>Salvia azurea</i>	Native	0.3–2	0.1–1
stiff tickseed	COPA10	<i>Coreopsis palmata</i>	Native	0.3–1	0.1
pale purple coneflower	ECPA	<i>Echinacea pallida</i>	Native	0.3–0.5	0.1
common yarrow	ACMI2	<i>Achillea millefolium</i>	Native	0.3–0.5	0.1
roundstem false foxglove	AGGA	<i>Agalinis gattingeri</i>	Native	0.3–1	0.1
golden zizia	ZIAU	<i>Zizia aurea</i>	Native	0.3–2	0.1
small geranium	GEP2	<i>Geranium pusillum</i>	Native	0.3–0.5	0.1
downy gentian	GEP5	<i>Gentiana puberulenta</i>	Native	0.3–2	0.1
hairy hawkweed	HILO2	<i>Hieracium longipilum</i>	Native	0.3–0.5	0.1
tall blazing star	LIAS	<i>Liatris aspera</i>	Native	0.3–2	0.1
Texas bergia	BETE	<i>Bergia texana</i>	Native	0.3–1	0.1
prairie tea	CRMO6	<i>Croton monanthogynus</i>	Native	0.3–1	0.1
sessileleaf ticktrefoil	DESE	<i>Desmodium sessilifolium</i>	Native	0.3–2	0.1
downy phlox	PHPI	<i>Phlox pilosa</i>	Native	0.3–1	0.1
white prairie clover	DACA7	<i>Dalea candida</i>	Native	0.3–1	0.1
Shrub/Subshrub					
New Jersey tea	CEAM	<i>Ceanothus americanus</i>	Native	0.3–2	5–10
Jersey tea	CEHE	<i>Ceanothus herbaceus</i>	Native	–	5–10
fragrant sumac	RHAR4	<i>Rhus aromatica</i>	Native	–	5–10
winged sumac	RHCO	<i>Rhus copallinum</i>	Native	0.3–1	1–2
Carolina rose	ROCA4	<i>Rosa carolina</i>	Native	0.3–1	1–2
northern dewberry	RUFL	<i>Rubus flagellaris</i>	Native	0.3–1	0.1–2
leadplant	AMCA6	<i>Amorpha canescens</i>	Native	0.3–4.5	0.1–2

Table 9. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
post oak	QUST	<i>Quercus stellata</i>	Native	–	0–5	–	–
blackjack oak	QUMA3	<i>Quercus marilandica</i>	Native	–	0–5	–	–
black hickory	CATE9	<i>Carya texana</i>	Native	–	0–5	–	–

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, and insects) and nesting and brood-

rearing cover. Turkey poult 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).

Bird species associated with this ecological site reference state condition:

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

Vegetation Height Short (< 1.5 feet, low litter levels, bare ground visible):

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

Vegetation Height Moderate (1.5 – 3 feet, 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

Tall Vegetation Height (> 3 feet, 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, Le Conte's Sparrow, Savannah Sparrow

Amphibian and reptile species associated with this ecological site reference state condition: 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*), Great Plains Skink (*Eumeces obsoletus*), Southern Prairie Skink (*E. septentrionalis obtusirostris*), and Bullsake (*Pituophis catenifer sayi*).

Small mammals associated with this ecological site reference state condition:

Least Shrew (*Cryptotis parva*), Prairie Vole (*Microtus ochrogaster*), Plains Pocket Gopher (*Geomys bursarius*), 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 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*), Ottoo Skipper butterfly (*Hesperia ottoe*), Arogos Skipper butterfly (*Atrytone arogos iowa*), Golden Byssus butterfly (*Problema byssus kumskaka*), Delaware Skipper butterfly (*Atrytone 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. A number of leaf beetle species (*Anisostena funesta*, *Chaetocnema fuscata* and *Cryptocephalus striatulus*) may utilize this ecological site.

(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: Chert Upland Prairie

Plot GOPRPF01 – Eldorado soil

Located in Golden Prairie MPF, Barton County, MO

Latitude: 37.35556

Longitude: 94.15388

Plot COMENC01 – Eldorado soil

Located in Cook Meadow TNC, Barton County, MO

Latitude: 37.41820

Longitude: 94.13328

Plot WOPROR02 – Hoberg soil

Located in Woods Prairie ORLT, Lawrence County, MO

Latitude: 37.09189

Longitude: 93.72943

Plot DIGRCA07 – Keeno soil

Located in Diamond Grove CA, Newton County, MO

Latitude: 37.01483

Longitude: 94.37578

Plot GOPRPF03 – Creldon soil

Located in Golden Prairie MPF, Barton County, MO

Latitude: 37.356956

Longitude: -94.151875

Plot WOPROR01 – Keeno soil

Located in Woods Prairie ORLT, Lawrence County, MO

Latitude: 37.0924

Longitude: -93.729464

Type locality

Location 1: Barton County, MO	
Township/Range/Section	T30N R29W S8
UTM zone	N
UTM northing	4134941
UTM easting	397810
Latitude	37° 21' 20"
Longitude	94° 9' 13"
General legal description	Plot GOPRPF01; located in Golden Prairie (Missouri Prairie Foundation); pedon Eldorado/Eldon similar soil.

Location 2: Barton County, MO	
Township/Range/Section	T31N R29W S21
UTM zone	N
UTM northing	4141870
UTM easting	399717
Latitude	37° 25' 5"
Longitude	94° 7' 59"
General legal description	Plot COMENC01; Located in Cook Meadow (The Nature Conservancy); Keeno pedon.
Location 3: Lawrence County, MO	
Township/Range/Section	T28N R26W S36
UTM zone	N
UTM northing	4105315
UTM easting	435176
Latitude	37° 5' 30"
Longitude	93° 43' 45"
General legal description	Plot WOPROR02; Located in Woods Prairie (Ozark Regional Land Trust); Hoberg pedon.
Location 4: Newton County, MO	
Township/Range/Section	T27N R31W S31
UTM zone	N
UTM northing	4096919
UTM easting	378198
Latitude	37° 0' 53"
Longitude	94° 22' 32"
General legal description	Plot DIGRCA07; Located in Diamond Grove Conservation Area (Missouri Dept of Conservation); Keeno pedon.

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Contributors

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Approval

Nels Barrett, 10/07/2020

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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:**
