

# Ecological site R116AY063MO

## Chert Upland Savanna

Last updated: 9/24/2020  
Accessed: 04/11/2026

---

### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

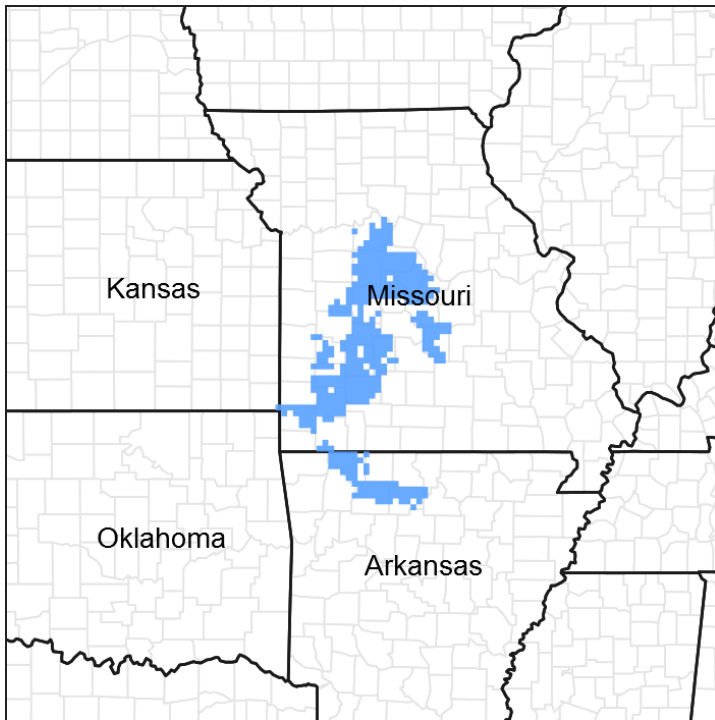


Figure 1. Mapped extent

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

### MLRA notes

Major Land Resource Area (MLRA): 116A–Ozark Highland

The Ozark Highland constitutes the Salem Plateau of the Ozark Uplift. Elevation ranges from about 300 feet on the southeast edge of the Ozark escarpment, to about 1,600 feet in

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

## Classification relationships

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

The reference state for this ecological site is most similar to a Chert Savanna.

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

The reference state for this ecological site is most similar to *Quercus stellata* - *Quercus marilandica* / *Schizachyrium scoparium* Wooded Herbaceous Vegetation (CEGL002391).

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

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

Prairie Ozark Border

Scarped Osage Plains

Central Plateau (western part)

## 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”.

Chert Upland Savannas occur in the northwest Ozark Highland. Soils are very deep, with an abundance of chert fragments. The reference plant community is a savanna with scattered post oak, and a ground flora of native grasses such as big bluestem, little bluestem, Indiangrass, switchgrass, and eastern gamagrass, and a wide variety of prairie wildflowers.

## Associated sites

R116AY006MO	<b>Loamy Upland Prairie</b> Loamy Upland Prairies are upslope, on convex summits, shoulders and upper backslopes.
-------------	--

## Similar sites

R116BY021MO	<b>Chert Upland Prairie</b> Chert Upland Prairies are on similar landscapes but have lower tree densities.
-------------	---

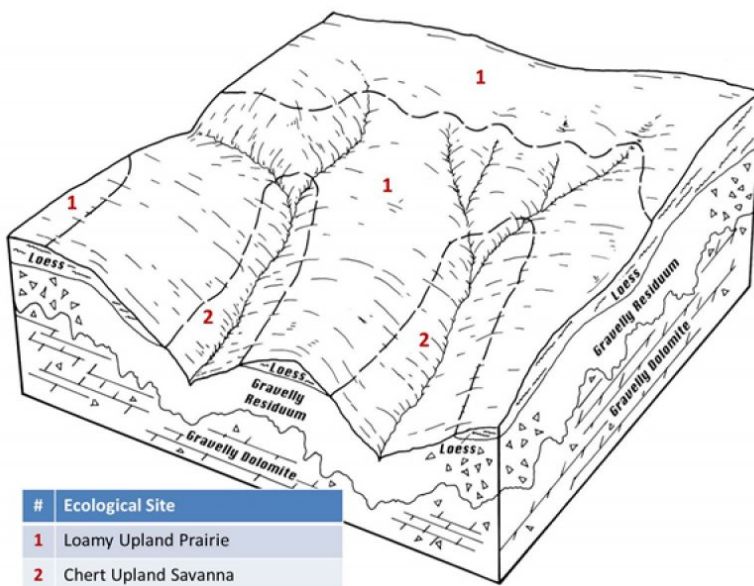
**Table 1. Dominant plant species**

Tree	(1) <i>Quercus stellata</i>
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 backslopes with slopes of 2 to 15 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The accompanying figure (adapted from Wolf, 2003) 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. Chert Upland Savanna sites are typically downslope from loamy Upland Prairie sites, labeled “1”. The dashed lines within the Loamy Upland Prairie area indicate the various soils included in this ecological site.



**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	2–15%
Water table depth	60 in
Aspect	Aspect is not a significant factor

## Climatic features

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

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

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

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

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

affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Deep sinkholes often have a microclimate significantly cooler, moister, and shadier than surrounding surfaces, a phenomenon that may result in a strikingly different ecology. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs.

Slope orientation is an important topographic influence on climate. Summits and south- and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

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

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	143-161 days
Freeze-free period (characteristic range)	174-184 days
Precipitation total (characteristic range)	44-45 in
Frost-free period (actual range)	142-170 days
Freeze-free period (actual range)	173-189 days
Precipitation total (actual range)	44-45 in
Frost-free period (average)	153 days
Freeze-free period (average)	179 days
Precipitation total (average)	44 in

### **Climate stations used**

- (1) ELDON [USC00232503], Eldon, MO
- (2) BUFFALO 2N [USC00231087], Buffalo, MO
- (3) SEDALIA WTP [USC00237632], Sedalia, 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 no rooting restriction. 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. Surface horizon texture is silt loam or gravelly silt loam. Subsoils are skeletal with high amounts of coarse fragments. These soils are not affected by seasonal wetness. Soil series associated with this site include Eldon.

**Table 4. Representative soil features**

Parent material	(1) Slope alluvium–cherty limestone
Surface texture	(1) Gravelly silt loam (2) Silt loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to slow
Soil depth	72 in
Surface fragment cover ≤3"	9–25%
Surface fragment cover >3"	0–8%
Available water capacity (0-40in)	3–4 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)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	35–50%
Subsurface fragment volume >3" (Depth not specified)	0–6%

## 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.

Chert Upland Savannas are scattered on summit crests, shoulders and backslopes and are often associated with Loamy Upland Prairies.

The reference plant community is characterized as open grassland with scattered post oaks. This site was dominated by 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. 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.

Fuel loads would have been altered by heavy grazing and fire behavior affected, providing for 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, 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

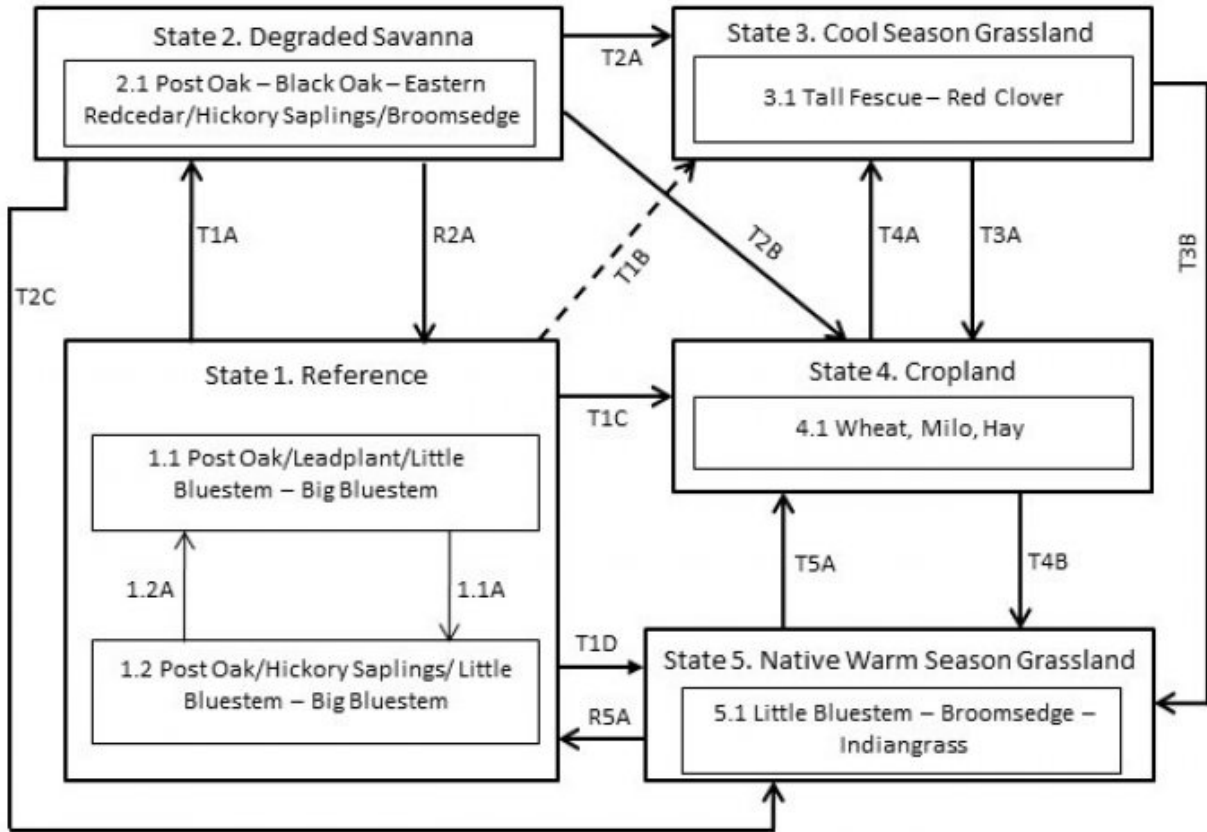
the vegetation.

Today, Chert Upland Savannas are very rare and scattered in the region, as most former sites have been converted to pasture and cropland. The known remnants are degraded by fire suppression and grazing by domestic livestock. However, when managed properly, existing remnants can respond to restoration efforts.

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 Savanna, R116AY063MO



Code	Event/Activity/Process
T1A	Fire suppression > 10 years; woody invasion; domestic grazing
T1B	Woody removal; vegetative seeding; grassland management
T3A, T5A	Conservation tillage; conservation cropping system
T1D	Prescribed grazing; prescribed fire
T2A	Woody removal; tillage; vegetative seeding; grassland management
T1C, 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	Thinning; prescribed fire 1-3 years
R5A	Vegetative seeding; prescribed fire 1-3 years; tree planting

Figure 9. State and transition diagram for this ecological site

## **State 1**

### **Reference**

This State is native savanna dominated by little bluestem, big bluestem, and forbs, along with numerous shrubs and scattered trees such as post oak and black 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 hickory. When fire intervals shorten these woody species will decrease.

### **Community 1.1**

#### **Post Oak/Leadplant/Little Bluestem – Big Bluestem**

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 hickory. When fire intervals shorten these woody species will decrease.

**Forest overstory.** The Overstory Species list is based on field surveys and commonly occurring species listed in Nelson (2010).

**Forest understory.** The Understory Species list is based on field surveys and commonly occurring species listed in Nelson (2010).

### **Community 1.2**

#### **Post Oak/Hickory/ Little Bluestem – Big Bluestem**

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 hickory. When fire intervals shorten these woody species will decrease.

### **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 Savanna**

Reference states that have experienced fire suppression for 20 or more years and domestic grazing will transition to this state. With fire suppression, woody species such as hickory and eastern redcedar will begin to increase. Native ground cover will also

decrease and invasive species such as tall fescue and sericea lespedeza may begin to dominate.

## **Community 2.1**

### **Post Oak – Black Oak – Eastern Redcedar/Hickory/Broomsedge**

#### **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 grasslands will have a few scattered post oaks and eastern redcedar. Long term uncontrolled grazing can cause significant soil erosion and compaction.

## **Community 3.1**

### **Tall Fescue – Red Clover**

#### **State 4**

##### **Cropland**

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

## **Community 4.1**

### **Wheat, Milo, Hay**

#### **State 5**

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

Conversion from Degraded Savanna (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 one of the most easily transformable states back to a reference state. Substantial restoration time, money, and management inputs will still be needed.

## **Community 5.1**

### **Little Bluestem – Broomsedge – Indiangrass**

#### **Transition T1A**

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

Fire suppression > 10 years; woody invasion; domestic grazing

## **Transition T1B**

### **State 1 to 3**

Woody removal; vegetative seeding; grassland management

## **Transition T1C**

### **State 1 to 4**

Woody removal; tillage; conservation cropping system

## **Transition T1D**

### **State 1 to 5**

Prescribed grazing; prescribed fire

## **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**

Woody removal; 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; tree planting

**Transition T5A  
State 5 to 4**

Conservation tillage; conservation cropping system

**Additional community tables**

Table 5. Community 1.1 forest overstory composition

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

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
<b>Grass/grass-like (Graminoids)</b>					
sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	Native	–	–
prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	Native	–	–
Canada wildrye	ELCA4	<i>Elymus canadensis</i>	Native	–	–
Mead's sedge	CAME2	<i>Carex meadii</i>	Native	–	–
Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	Native	–	–
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	–	–

big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	-	-
Indiangrass	SONU2	<i>Sorghastrum nutans</i>	Native	-	-
blue sedge	CAGL6	<i>Carex glaucoidea</i>	Native	-	-
broadleaf rosette grass	DILA8	<i>Dichanthelium latifolium</i>	Native	-	-
<b>Forb/Herb</b>					
largeflower tickseed	COGR5	<i>Coreopsis grandiflora</i>	Native	-	-
threadleaf evening primrose	OELI	<i>Oenothera linifolia</i>	Native	-	-
foxglove beardtongue	PEDI	<i>Penstemon digitalis</i>	Native	-	-
flowering spurge	EUCO10	<i>Euphorbia corollata</i>	Native	-	-
longbract wild indigo	BABR2	<i>Baptisia bracteata</i>	Native	-	-
ashy sunflower	HEMO2	<i>Helianthus mollis</i>	Native	-	-
green milkweed	ASHI	<i>Asclepias hirtella</i>	Native	-	-
purple milkwort	POSA3	<i>Polygala sanguinea</i>	Native	-	-
pale purple coneflower	ECPA	<i>Echinacea pallida</i>	Native	-	-
Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	Native	-	-
narrowleaf mountainmint	PYTE	<i>Pycnanthemum tenuifolium</i>	Native	-	-
stiff tickseed	COPA10	<i>Coreopsis palmata</i>	Native	-	-
smooth violet prairie aster	SYTU2	<i>Symphotrichum turbinellum</i>	Native	-	-
largeleaf wild indigo	BAALM	<i>Baptisia alba var. macrophylla</i>	Native	-	-
compassplant	SILA3	<i>Silphium laciniatum</i>	Native	-	-
hoary puccoon	LICA12	<i>Lithospermum canescens</i>	Native	-	-
hairy sunflower	HEHI2	<i>Helianthus hirsutus</i>	Native	-	-
butterfly milkweed	ASTU	<i>Asclepias tuberosa</i>	Native	-	-
compassplant	SILA3	<i>Silphium laciniatum</i>	Native	-	-
largeleaf wild indigo	BAALM	<i>Baptisia alba var. macrophylla</i>	Native	-	-
stiff tickseed	COPA10	<i>Coreopsis palmata</i>	Native	-	-
Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	Native	-	-
scaly blazing star	LISQ	<i>Liatis squarrosa</i>	Native	-	-
fewleaf sunflower	HEOC2	<i>Helianthus occidentalis</i>	Native	-	-
royal catchfly	SIRE2	<i>Silene regia</i>	Native	-	-

<b>Shrub/Subshrub</b>					
Carolina rose	ROCA4	<i>Rosa carolina</i>	Native	–	–
leadplant	AMCA6	<i>Amorpha canescens</i>	Native	–	–
New Jersey tea	CEAM	<i>Ceanothus americanus</i>	Native	–	–
Jersey tea	CEHE	<i>Ceanothus herbaceus</i>	Native	–	–
winged sumac	RHCO	<i>Rhus copallinum</i>	Native	–	–
fragrant sumac	RHAR4	<i>Rhus aromatica</i>	Native	–	–

## **Animal community**

### Wildlife\*

#### Prairie Phase:

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 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, Northern Bobwhite

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

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

Henslow's Sparrow, Dickcissel, Field Sparrow, Northern Bobwhite

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

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*), and Bullsnake (*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*), 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. nympheum*, *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.

### Savanna Phase

Oaks and hickories provide an important food source for many animals including White-tailed Deer, Wild Turkey, and Fox Squirrel.

Both snags and live cavity or den trees provide important food and cover for vertebrate wildlife. Snags are also very important to invertebrate species. Fox Squirrel, Red-headed Woodpecker and Eastern Bluebird utilize snags and den trees for foraging, nesting or shelter. "Wolf" trees are a particularly valuable type of live cavity tree. These large diameter, often open-grown, old-ages, hollow trees provide both cavities for wildlife and

usually hard or soft mast food sources. Large diameter snags and den trees are particularly important wildlife habitat features to retain.

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: Northern Bobwhite, Eastern Kingbird, Eastern Bluebird, Brown Thrasher, White-eyed Vireo, Prairie Warbler, Field Sparrow, Eastern Towhee, Red-headed Woodpecker, Great Crested Flycatcher, Loggerhead Shrike, Scissor-tailed Flycatcher

Winter resident: American Tree Sparrow, Harris' Sparrow

Amphibian and reptile species likely associated with this ecological site's reference state condition: Ornate Box Turtle (*Terrapene ornata ornata*), Northern Fence Lizard (*Sceloporus undulatus hyacinthinus*), Five-lined Skink (*Eumeces fasciatus*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), and Rough Green Snake (*Opheodrys aestivus aestivus*). Sites containing or nearby to fishless or ephemeral ponds/pools may support the Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*).

Small mammals likely associated with this ecological site's reference state condition: Fox Squirrel (*Sciurus niger*), Woodland Vole (*Microtus pinetorum*), and Least Shrew (*Cryptotis parva*).

Invertebrates – Many native insect species are likely associated with this phase of this ecological site's reference state condition, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids. However we don't have enough information on these groups to assign them to this phase of this ecological site's reference state condition at this time.

\*This section prepared by Mike Leahy, Natural Areas Coordinator, Missouri Department of

Conservation, 2013. References for this section: Fitzgerald and Pashley 2000a; 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 production activity. Historically this site was dominated by a ground cover of native prairie grasses and forbs. Some scattered open grown trees may have also been present. Altered sites may be suitable for non-traditional forestry uses such as windbreaks, environmental plantings, alley cropping (a method of planting, in which rows of trees or shrubs are interspersed with rows of crops) or woody biofuels.

## **Inventory data references**

Potential Reference Sites: Chert Upland Savanna

Plot DRPRCA01 – Eldon soil

Located in Drovers Prairie CA, Benton County

Latitude: 38.532011

Longitude: -93.291236

Plot FRPRCA02 – Eldon soil

Located in Friendly Prairie CA, Pettis County

Latitude: 38.551724

Longitude: -93.295139

Plot PAPRCA01 – Eldon soil

Located in Paintbrush Prairie CA, Pettis County

Latitude: 38.550658

Longitude: -93.265721

## **Other references**

Anderson, R.C. 1990. The historic role of fire in North American grasslands. Pp. 8-18 in S.L. Collins and L.L. Wallace (eds.). Fire in North American tallgrass prairies. University of Oklahoma Press, Norman.

Batek, M.J., A.J. Rebertus, W.A. Schroeder, T.L. Haithcoat, E. Compas, and R.P. Guyette. 1999. Reconstruction of early nineteenth-century vegetation and fire regimes in the Missouri Ozarks. *Journal of Biogeography* 26:397-412.

Fitzgerald, J.A. and D.N. Pashley. 2000a. Partners in Flight bird conservation plan for the Ozark/Ouachitas. American Bird Conservancy.

- Harlan, J.D., T.A. Nigh and W.A. Schroeder. 2001. The Missouri original General Land Office survey notes project. University of Missouri, Columbia.
- Heitzman, J.R. and J.E. Heitzman. 1996. Butterflies and moths of Missouri. 2nd ed. Missouri Department of Conservation, Jefferson City.
- Jacobs, B. 2001. Birds in Missouri. Missouri Department of Conservation, Jefferson City.
- Johnson, T.R. 2000. The amphibians and reptiles of Missouri. 2nd ed. Missouri Department of Conservation, Jefferson City.
- Ladd, D. 1991. Reexamination of the role of fire in Missouri oak woodlands. Pp. 67-80 in G.V. Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.
- Missouri Department of Conservation. 2010. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.
- NatureServe, 2010. Vegetation Associations of Missouri (revised). NatureServe, St. Paul, Minnesota.
- Nelson, Paul W. 2010. The Terrestrial Natural Communities of Missouri. Missouri Department of Conservation, Jefferson City, Missouri. 550p.
- Nigh, Timothy A. and Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City, Missouri. 212p.
- Pitts, D.E. and W.D. McGuire. 2000. Wildlife management for Missouri landowners. 3rd ed. Missouri Department of Conservation, Jefferson City.
- Schoolcraft, H.R. 1821. Journal of a tour into the interior of Missouri and Arkansas from Potosi, or Mine a Burton, in Missouri territory, in a southwest direction, toward the Rocky Mountains: performed in the years 1818 and 1819. Richard Phillips and Company, London.
- Schwartz, C.W., E.R. Schwartz and J.J. Conley. 2001. The wild mammals of Missouri. University of Missouri Press, Columbia and Missouri Department of Conservation, Jefferson City.
- United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. 682 pgs.

Wolf, David W. 2003. Soil Survey of Morgan County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

## Contributors

Fred Young  
Doug Wallace

## Acknowledgments

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

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	09/24/2020
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:**
-