

## Ecological site F116AY048MO Chert Dolomite Exposed Backslope Woodland

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### General information

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

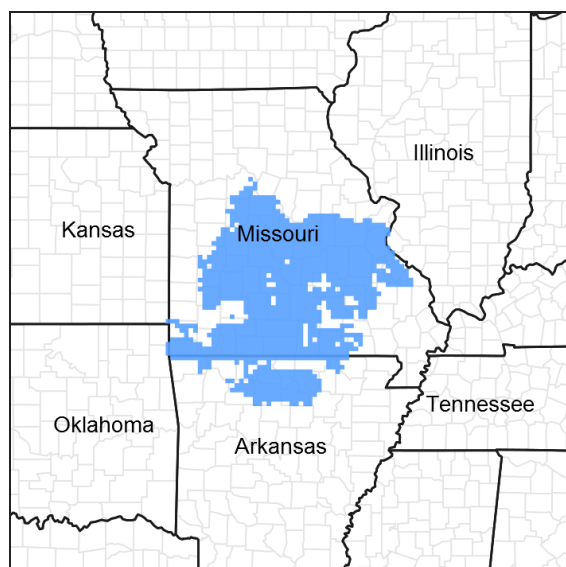


Figure 1. Mapped extent

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

### MLRA notes

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

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

### Classification relationships

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

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

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):

The reference state for this ecological site is most similar to a Post Oak Woodland.

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

The reference state for this ecological site is most similar to *Quercus stellata* - *Quercus marilandica* - *Quercus velutina* - *Carya texana* / *Schizachyrium scoparium* Woodland.

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):  
This ecological site is widespread across the Ozark Highlands Section.

## 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”.

The Chert Dolomite Exposed Backslope Woodlands occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Chert Dolomite Protected Backslope Forest ecological site. These ecological sites are extensive, particularly in the northern and western Ozark Highland over the Ordovician-aged Jefferson City formation. Soils are typically moderately deep over dolomite bedrock, with gravelly surfaces. The reference plant community is woodland with an overstory dominated by post oak and blackjack oak and a ground flora of native grasses and forbs.

## Associated sites

F116AY011MO	<b>Chert Upland Woodland</b> Chert Upland Woodlands are upslope where dolomite bedrock is below 40 inches, on upper backslopes.
F116AY012MO	<b>Low-Base Chert Upland Woodland</b> Low-base Chert Upland Woodlands are upslope where dolomite bedrock is very deep, on shoulders and upper backslopes.
F116AY016MO	<b>Chert Dolomite Protected Backslope Forest</b> Chert Dolomite Protected Backslope Forests are mapped in complex with this ecological site, on steep lower backslopes with northern to eastern aspects.
F116AY044MO	<b>Chert Dolomite Upland Woodland</b> Chert Dolomite Upland Woodlands are upslope, on upper backslopes.
R116AY020MO	<b>Shallow Dolomite Upland Glade/Woodland</b> Shallow Dolomite Upland Glade/Woodlands are adjacent, often downslope.

## Similar sites

F116AY016MO	<b>Chert Dolomite Protected Backslope Forest</b> Chert Dolomite Protected Backslope Forests are mapped in complex with this ecological site, on steep lower backslopes with northern to eastern aspects.
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**Table 1. Dominant plant species**

Tree	(1) <i>Quercus stellata</i> (2) <i>Quercus marilandica</i>
Shrub	(1) <i>Rhus aromatica</i>
Herbaceous	(1) <i>Schizachyrium scoparium</i>

## Physiographic features

This site is on backslopes with slopes of 15 to 70 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected aspects. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Wolf, 1994) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “3” on the figure, on lower backslopes with southerly to westerly exposures. Chert Dolomite Protected Backslope Forest sites are on the

corresponding northerly to easterly exposures. Chert Dolomite Upland Woodland sites, labeled “2”, are typically upslope on crests and shoulders. Small dolomite outcroppings are common in this ecological site. Low-base Chert Upland Woodland sites, labeled “1”, are often upslope on broader crests and summits where depth to dolomite bedrock is greater.

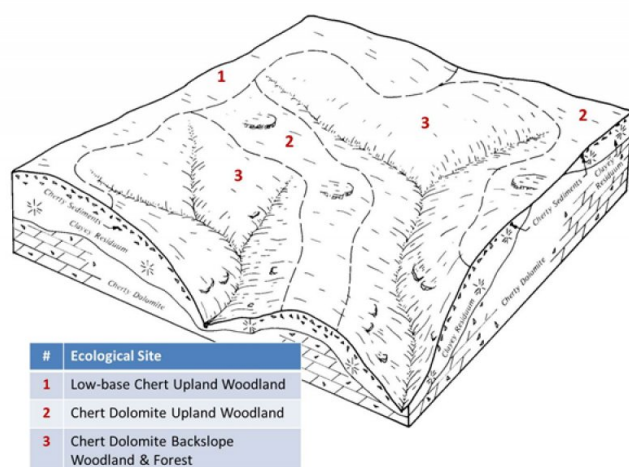


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope
Flooding frequency	None
Ponding frequency	None
Slope	15–70%
Water table depth	61–152 cm
Aspect	W, SE, S, SW

## 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)	142-162 days
Freeze-free period (characteristic range)	179-192 days
Precipitation total (characteristic range)	1,092-1,194 mm
Frost-free period (actual range)	140-164 days
Freeze-free period (actual range)	175-193 days
Precipitation total (actual range)	1,092-1,219 mm
Frost-free period (average)	152 days
Freeze-free period (average)	186 days
Precipitation total (average)	1,143 mm

## Climate stations used

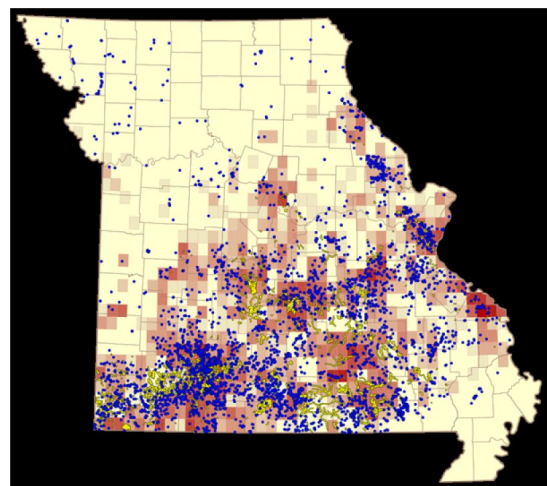
- (1) LICKING 4N [USC00234919], Licking, MO
- (2) ANDERSON [USC00230164], Anderson, MO
- (3) TRUMAN DAM & RSVR [USC00238466], Warsaw, MO
- (4) CALICO ROCK 2 WSW [USC00031132], Calico Rock, AR
- (5) FESTUS [USC00232850], Crystal City, MO

## Influencing water features

Water features associated with this upland ecological site are influenced by karst landscapes throughout the area (see diagram). Rainfall enters the groundwater system through the soil or by flowing into sinkholes and streams. Springs form where land drops low enough to meet underground water tables. Dissolution of carbonate rocks along fractures and faults has produced cave systems, sinkholes (closed and open), springs, and natural tunnels in the region. These sinkholes and losing streams can rapidly transfer water from upland recharge areas to spring outlets. The most common mechanism for groundwater recharge occurs by the relatively slow downward movement of water through soil and carbonate bedrock over a large area known as diffuse recharge, which maintains a high storage volume providing a consistent supply of water to springs. In addition to diffuse recharge, aquifers in karst terrain receive the relatively rapid transfer of water through sinkholes or losing streams connected by subsurface conduits. Surface water entering the aquifer in this fashion has very little contact with soil or rock and consequently

the chemical nature of the water changes little in route. Discharge variability does not seem to be controlled by drainage area, but rather the conduit capacity of losing stream sections that can transport the entire volume of base-flow during dry periods in the year. High variability in base flow shows the impact of karst in the form of losing and gaining stream sections (Owen and Pavlowsky 2010).

The accompanying map depicts the distribution of these karst-related features in the state of Missouri. Relative cave density per USGS 7.5" quadrangle is depicted by shades of red, deeper red signifying a larger number of caves in the quadrangle. Stretches of losing streams are shown in yellow. Known springs are shown as blue dots. Image from Wikimedia Commons developed from the Missouri Department of Natural Resources, Division of Geology and Land Survey.



**Figure 9. Distribution of karst-related features in Missouri.** Image from Wikimedia Commons developed from the Missouri Department of Natural Resources, Division of Geology and Land Survey.

## Soil features

These soils are underlain with dolomite bedrock at 20 to 40 inches deep. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum weathered from dolomite, overlying dolomite bedrock. They have gravelly to very gravelly and cobbly silt loam surface layers, with clayey subsoils that have moderate to high amounts of chert gravel and cobbles. These soils are not affected by seasonal wetness. Soil series associated with this site include Bardley, Gatewood, and Sonsac.

The accompanying picture of the Gatewood series shows abundant chert fragments in the upper part of the soil, over a reddish clay subsoil. Cherty dolomite bedrock limits rooting depth. Picture courtesy of John Preston, NRCS.



**Figure 10. Gatewood series**

**Table 4. Representative soil features**

Parent material	(1) Slope alluvium–dolomite (2) Residuum–dolomite
Surface texture	(1) Very gravelly silt loam (2) Gravelly silt loam (3) Very gravelly loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow
Soil depth	51–102 cm
Surface fragment cover <=3"	20–60%
Surface fragment cover >3"	0–15%
Available water capacity (0-101.6cm)	2.54–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	35–60%
Subsurface fragment volume >3" (Depth not specified)	0–50%

## 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 droughty, cherty soils of Chert Dolomite Exposed Backslope Woodlands and exposed aspects limit the growth of trees and support an abundance of native grasses and forbs in the understory. Fire also played an important role in the maintenance of these systems. It is likely that these sites, along with adjacent glades burned at least once every 3 to 10 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. Fire tolerant post oak and blackjack oak, dominated an open overstory. During fire free intervals, woody species, such as especially eastern redcedar and black hickory, would have increased and the herbaceous understory diminished. The return of fire would have opened the woodlands up again and stimulated the abundant ground flora.

Chert Dolomite Exposed Backslope Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison, elk, and white-tailed deer. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and sun-loving ground flora species.

In the long term absence of fire, woody species, especially eastern redcedar, hickory, black oak have encroached into these woodlands. This is especially true after grazing has reduced grass cover and exposed more surface to

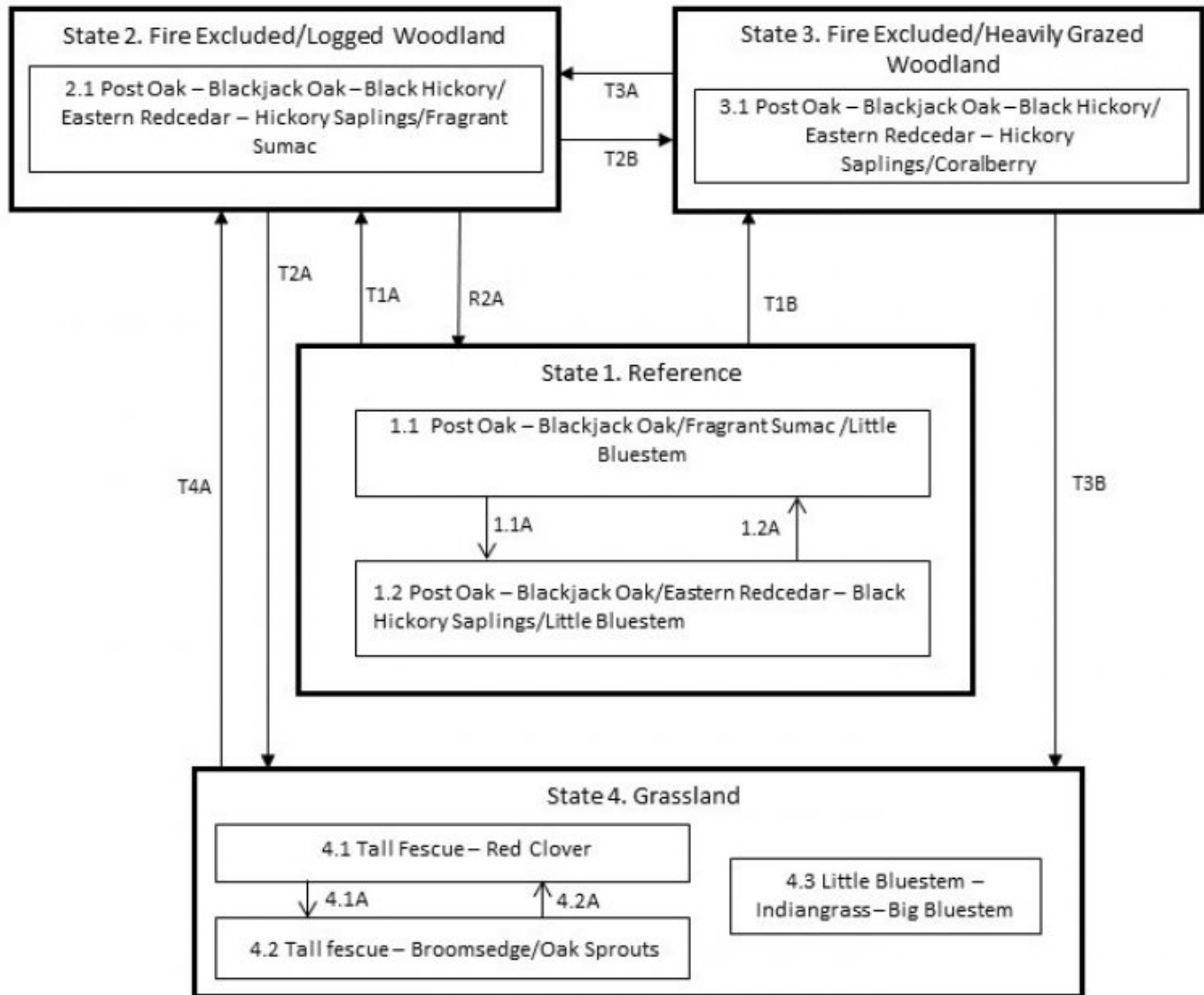
the dispersal of seeds by birds. Once established, these woodies can quickly fill the woodland system. Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as eastern redcedar, coralberry, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion due related to grazing can be a problem and lower site productivity.

Most occurrences today are dense, and shady with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools. Timber harvest opportunities are very limited on these sites because of shorter tree stature and lower tree quality. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration management practices. Characteristic plants in the ground flora can be used to gauge the restoration potential of a stand along with remnant open-grown old-age trees, and tree height growth.

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 Dolomite Exposed Backslope Woodland, F116AY048MO



Code	Event/Activity
T1A	Fire suppression; fire-free interval (20+ years); logging
T1B	Fire suppression; heavy grazing by livestock; logging
T2B	Uncontrolled domestic grazing
T3A	Livestock removal
T2A, T3B	Clearing; pasture seeding; grassland management
T4A	Tree planting; long term succession (50+ years); no grazing
R2A	Understory removal; prescribed fire
1.1A	Fire-free interval 10-20 years
1.2A	Fire 3-10 year cycle
4.1A	Over grazing; no fertilization
4.2A	Brush management; grassland seeding; grassland management

Figure 11. State and Transition Model for this ecological site.

### State 1



## Reference

Historically, these woodlands occurred on exposed slopes in the valleys of most major rivers of the region. The restricted soil depth, drought conditions, and native grasses made them susceptible to frequent fires, once every 3 to 5 years. Consequently, fire-tolerant post oak and blackjack oak dominated the open-canopy overstory, and the understory consisted of a dense cover of native grasses and forbs (Community 1.1). Tree height was 40 to 50 feet, and canopy closure 40 to 80 percent. During fire-free intervals, eastern redcedar, along with hickory and oak sprouts, increased in abundance and competed with the herbaceous ground flora, creating a more brushy woodland (Community 1.2). However, the return of fire would re-open the woodland and promote the development of ground flora.

### Community 1.1

#### Post Oak – Blackjack Oak/Fragrant Sumac /Little Bluestem



Figure 12. Example of a Chert Dolomite Exposed Backslope Woodland; photo credit – Photo credit MDC.

Fire-tolerant post oak and blackjack oak dominated the open-canopy overstory, and the understory consisted of a dense cover of native grasses and forbs.

**Forest overstory.** The Overstory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

**Forest understory.** The Understory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

### Community 1.2

#### Post Oak - Blackjack Oak/Eastern Redcedar – Black Hickory Saplings/Little Bluestem

During fire-free intervals, eastern redcedar, along with hickory and oak sprouts, increased in abundance and competed with the herbaceous ground flora, creating a more brushy woodland.

### Pathway P1.1A

#### Community 1.1 to 1.2

This pathway is the result of fire-free interval 10 to 20 years.

### Pathway P1.2A

#### Community 1.2 to 1.1

This pathway is the result of a fire 3 to 10 year cycle being reestablished.

## State 2

### Fire Excluded/Logged Woodland

Fire suppression over the last 50 years has allowed these open woodlands to become dense with less fire-tolerant trees and saplings such as eastern redcedar, black oak, and hickory. The dense, shaded conditions and lack of fire has caused the ground flora to decrease in cover and diversity. Fragrant sumac often forms a dense shrub understory under these conditions. However, many of the original herbaceous species persist as small plants or in the seed bank. Consequently, thinning of the woody species and the re-introduction of fire has shown these communities to be exceptionally resilient, and a return to the reference condition is possible.

## **Community 2.1**

### **Post Oak – Blackjack Oak – Black Hickory/ Eastern Redcedar – Hickory Saplings/Fragrant Sumac**

## **State 3**

### **Fire Excluded/Heavily Grazed Woodland**

In addition to fire exclusion, many of these sites have been subjected to heavy grazing by domestic livestock. Like State 2, these areas are dense and shady with a diminished ground flora. In addition, grazed areas exhibit a lower diversity of native ground flora species and an increased abundance of eastern redcedar and other invasive natives such as coralberry. Like State 2, restoration using thinning and fire is possible, but will take longer and require more effort. Restricting livestock access will be necessary for successful restoration.

## **Community 3.1**

### **Post Oak – Blackjack Oak – Black Hickory/ Eastern Redcedar – Hickory Saplings/Coralberry**

## **State 4**

### **Grassland**

Conversion of woodlands to planted, non-native cool season grassland species such as tall fescue is common for this region. Steep slopes, surface fragments, and low organic matter contents make grasslands harder to maintain in a healthy, productive state on this ecological site. Three community phases are recognized in the Grassland State, with shifts between some phases based on types of management. Poor management will result in a shift to Community 4.2 that shows an increase in oak sprouting and increases in broomsedge densities. If grazing and active pasture management is discontinued, the site will eventually transition to State 2 from this phase. Conversion to native warm season grasses and forbs has increased in recent years due federal and state cost-share programs and has created a third community phase. On many sites the simple activity of removing most if not all of the canopy will allow existing native grasses and forbs to increase in abundance and create a natural native ground cover.

## **Community 4.1**

### **Tall Fescue-Red Clover**

Three community phases are recognized in the Grassland State, with shifts between some phases based on types of management.

## **Community 4.2**

### **Tall Fescue-Broomsedge/Oak Sprouts**

Poor management will result in a shift to Community 4.2 that shows an increase in oak sprouting and increases in broomsedge density.

## **Community 4.3**

### **Little Bluestem – Indiangrass – Big Bluestem**

Conversion to native warm season grasses and forbs has increased in recent years due federal and state cost-share programs and has created a third community phase.

## **Pathway P4.1A**

## **Community 4.1 to 4.2**

This pathway is the result of over grazing and lack of proper grassland management.

## **Pathway P4.2A**

### **Community 4.2 to 4.1**

This pathway is the result of brush management, grassland reseeding and proper grassland management.

## **Transition T1A**

### **State 1 to 2**

This is a gradual transition that results from extended, disturbance free periods of roughly 50 years or longer. Selective logging is also occurring.

## **Transition T1B**

### **State 1 to 3**

This transition is the result of high-grade logging, uncontrolled domestic livestock grazing and fire suppression.

## **Restoration pathway R2A**

### **State 2 to 1**

This restoration pathway is the result of the systematic application of prescribed fire. Mechanical thinning may also be used along with understory removal.

## **Transition T2B**

### **State 2 to 3**

This transition is the result of high-grade logging and uncontrolled domestic livestock grazing.

## **Transition T2A**

### **State 2 to 4**

This transition is the result of clearing and conversion to non-native cool season grassland.

## **Transition T3A**

### **State 3 to 2**

This transition results from the cessation of livestock grazing and forest stand improvement.

## **Transition T4A**

### **State 4 to 2**

This is a gradual transition that results from extended, disturbance free periods of roughly 50 years or longer, selective logging, tree planting and no grazing.

## **Additional community tables**

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
<b>Tree</b>							
post oak	QUST	<i>Quercus stellata</i>	Native	–	–	–	–
blackjack oak	QUMA3	<i>Quercus marilandica</i>	Native	–	–	–	–
black oak	QUVE	<i>Quercus velutina</i>	Native	–	–	–	–
black hickory	CATE9	<i>Carya texana</i>	Native	–	–	–	–
scarlet oak	QUCO2	<i>Quercus coccinea</i>	Native	–	–	–	–
eastern redcedar	JUVI	<i>Juniperus virginiana</i>	Native	–	–	–	–
common serviceberry	AMAR3	<i>Amelanchier arborea</i>	Native	–	–	–	–

**Table 6. Community 1.1 forest understory composition**

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
<b>Grass/grass-like (Graminoids)</b>					
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	–	–
Muhlenberg's sedge	CAMU4	<i>Carex muehlenbergii</i>	Native	–	–
western panicgrass	DIACF	<i>Dichanthelium acuminatum var. fasciculatum</i>	Native	–	–
big bluestem	ANGE	<i>Andropogon gerardii</i>	Native	–	–
whitetinge sedge	CAALA	<i>Carex albicans var. albicans</i>	Native	–	–
blue sedge	CAGL6	<i>Carex glaucoidea</i>	Native	–	–
fuzzy wuzzy sedge	CAHI6	<i>Carex hirsutella</i>	Native	–	–
black edge sedge	CANI3	<i>Carex nigromarginata</i>	Native	–	–
reflexed sedge	CARE9	<i>Carex retroflexa</i>	Native	–	–
poverty oatgrass	DASP2	<i>Danthonia spicata</i>	Native	–	–
slimleaf panicgrass	DILI2	<i>Dichanthelium linearifolium</i>	Native	–	–
roundseed panicgrass	DISPI	<i>Dichanthelium sphaerocarpon var. isophyllum</i>	Native	–	–
<b>Forb/Herb</b>					
Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	Native	–	–
common dittany	CUOR	<i>Cunila origanoides</i>	Native	–	–
stiff tickseed	COPA10	<i>Coreopsis palmata</i>	Native	–	–
downy ragged goldenrod	SOPE	<i>Solidago petiolaris</i>	Native	–	–
elmleaf goldenrod	SOUL2	<i>Solidago ulmifolia</i>	Native	–	–
manyray aster	SYAN2	<i>Symphotrichum anomalum</i>	Native	–	–
late purple aster	SYAP2	<i>Symphotrichum patens var. patens</i>	Native	–	–
smooth violet prairie aster	SYTU2	<i>Symphotrichum turbinellum</i>	Native	–	–
tall blazing star	LIAS	<i>Liatris aspera</i>	Native	–	–
scaly blazing star	LISQ	<i>Liatris squarrosa</i>	Native	–	–
Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	Native	–	–
wild quinine	PAIN3	<i>Parthenium integrifolium</i>	Native	–	–
hairy goldenrod	SOHI	<i>Solidago hispida</i>	Native	–	–
gray goldenrod	SONE	<i>Solidago nemoralis</i>	Native	–	–
prostrate ticktrefoil	DERO3	<i>Desmodium rotundifolium</i>	Native	–	–

hairy sunflower	HEHI2	<i>Helianthus hirsutus</i>	Native	–	–
flaxleaf whitetop aster	IOLI2	<i>Ionactis linariifolius</i>	Native	–	–
hairy lespedeza	LEHI2	<i>Lespedeza hirta</i>	Native	–	–
trailing lespedeza	LEPR	<i>Lespedeza procumbens</i>	Native	–	–
violet lespedeza	LEVI6	<i>Lespedeza violacea</i>	Native	–	–
Parlin's pussytoes	ANPA9	<i>Antennaria parlinii</i>	Native	–	–
longbract wild indigo	BABR2	<i>Baptisia bracteata</i>	Native	–	–
white prairie clover	DACA7	<i>Dalea candida</i>	Native	–	–
purple prairie clover	DAPU5	<i>Dalea purpurea</i>	Native	–	–
smooth small-leaf ticktrefoil	DEMA2	<i>Desmodium marilandicum</i>	Native	–	–
stiff ticktrefoil	DEOB5	<i>Desmodium obtusum</i>	Native	–	–
<b>Shrub/Subshrub</b>					
leadplant	AMCA6	<i>Amorpha canescens</i>	Native	–	–
New Jersey tea	CEAM	<i>Ceanothus americanus</i>	Native	–	–
fragrant sumac	RHAR4	<i>Rhus aromatica</i>	Native	–	–
Carolina buckthorn	FRCA13	<i>Frangula caroliniana</i>	Native	–	–
St. Andrew's cross	HYHY	<i>Hypericum hypericoides</i>	Native	–	–
<b>Tree</b>					
rusty blackhaw	VIRU	<i>Viburnum rufidulum</i>	Native	–	–

## Animal community

Wildlife (MDC 2006):

Oaks provide hard mast for wildlife; scattered shrubs provide soft mast; frequent bedrock outcrops provide reptile habitat and a patchier ground flora.

Sedges and native grasses provide green browse; native grasses on dry sites provide cover and nesting habitat and a diversity of forbs provides a diversity and abundance of insects.

Post-burn areas can provide temporary bare-ground – herbaceous cover habitat important for turkey poults and quail chicks.

Bird species associated with dolomite woodlands include Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's widow, and Red-eyed Vireo.

Reptiles and amphibians associated with mature dolomite woodlands include: ornate box turtle, northern fence lizard, five-lined skink, coal skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, rough earth snake, red milk snake, western pygmy rattlesnake, and timber rattlesnake.

## Other information

Forestry (NRCS 2002, 2014):

Management: Field measured site index value average 44 for oak. These site index values range from 30 to 58. Timber management opportunities are poor to fair. Create group openings of at least 2 acres. Large clearcuts should be minimized if possible to reduce impacts on wildlife and aesthetics. Uneven-aged management using single tree selection or group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Using prescribed fire is an effective management tool.

Limitations: Significant amounts of coarse fragments throughout profile; bedrock is within 40 inches. Surface stones and rocks are problems for efficient and safe equipment operation and will make equipment use somewhat difficult. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which leaves a greater amount of coarse fragments on the surface. Hand planting or direct seeding may be necessary. Seedling mortality due to low available water capacity may be high. Mulching or providing shade can improve seedling survival. Mechanical tree planting will be limited. Erosion is a hazard when slopes exceed 15 percent. On steep slopes greater than 35%, traction problems increase and equipment use is not recommended.

## **Inventory data references**

Potential Reference Sites: Chert Dolomite Exposed Backslope Woodland

Plot HATOSP11 - Bardley soil

Located in HaHa Tonka State Park, Camden County, MO

Latitude: 37.964141

Longitude: -92.76271

Plot CAMOCA02 – Gatewood soil

Located in Caney Mountain CA, Ozark County, MO

Latitude: 36.678152

Longitude: -92.388947

Plot MERASP\_KS01 - Bardley soil

Located in Meramec State Park, Crawford County, MO

Latitude: 38.203741

Longitude: -91.111838

Plot STJOSP\_KS06 - Bardley soil

Located in St. Joe State Park, St. Francois County, MO

Latitude: 37.817137

Longitude: -90.529485

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## Contributors

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## Approval

Nels Barrett, 9/24/2020

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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	05/05/2024
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):**



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

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

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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:**

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17. **Perennial plant reproductive capability:**

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