USDA Natural Resources Conservation Service

Ecological site F116BY010MO
Low-Base Chert Protected 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.

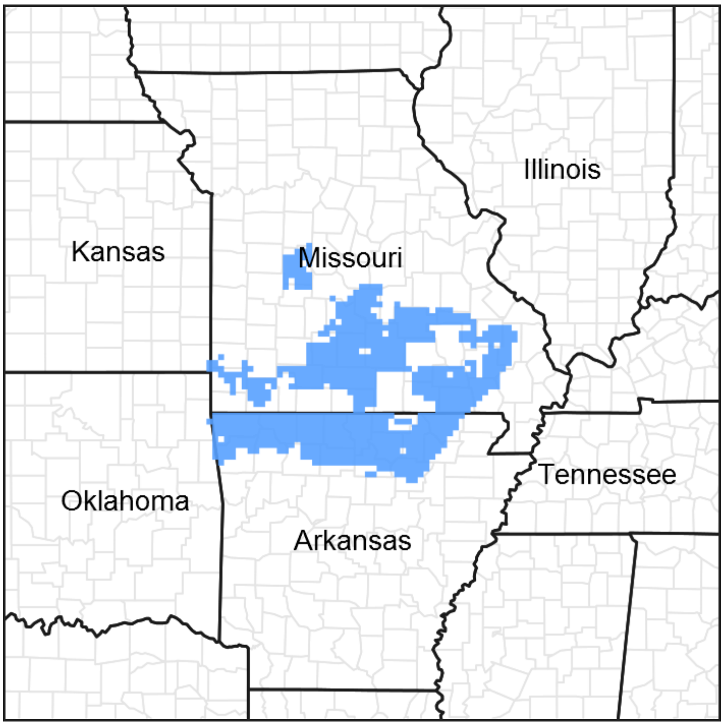


Figure 1. Mapped extent

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): 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 Woodland.

Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006):
The reference state for this ecological site is most similar to a Mixed Oak-Hickory Forest.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus alba - Quercus stellata - Quercus velutina / Schizachyrium scoparium Woodland (CEGL002150).

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
James River Oak Savanna/Woodland Low Hills
Finley River Oak Savanna/Woodland Low Hills
Seymour Highland Oak Savanna/Woodland Dissected Karst Plain

Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. After additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Low-base Chert Protected Backslope Woodlands occur on steep backslopes with northern and eastern aspects. In Missouri they are prevalent in the easternmost lobe of the Springfield Plain in the upper watersheds of the James River and Finley Creek. They are also prevalent on steep backslopes in the Spring River watershed in south-west Kansas and north-east Oklahoma. This site is mapped in complex with the Low-base Chert Exposed Backslope Woodland ecological site. Soils are typically very deep, acidic, and low in bases such as calcium, with an abundance of chert fragments. The reference plant community is woodland with an overstory dominated by white oak and black oak, and a ground flora of native grasses and forbs.

Associated sites

F116BY033MO	**Low-Base Chert Exposed Backslope Woodland** Low-base Chert Exposed Backslope Woodlands are mapped in complex with this ecological site, on steep southern and western aspects.
F116BY004MO	**Low-Base Chert Upland Woodland** Low-base Chert Upland Woodlands are upslope, on convex summit crests, and often contain a fragipan in the subsoil.
F116BY017MO	**Gravelly/Loamy Upland Drainageway Woodland** Gravelly/Loamy Upland Drainageway Woodlands are downslope.

Similar sites

F116BY003MO	**Chert Upland Woodland** Chert Upland Woodlands are very similar in composition except that they may be more dense and productive and are generally on more gentle slopes.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Amelanchier arborea*
Herbaceous	(1) *Desmodium*

Physiographic features

This site is on upland backslopes with slopes of 15 to 50 percent. It is on protected aspects (north, northeast, and east), which receive significantly less solar radiation than the exposed 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 Aldrich, 1989) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. Low-base Chert Protected Backslope Woodland sites are within the area labeled “2”, on lower backslopes with northerly to easterly exposures. Low-base Chert Exposed Backslope Woodland sites are on the corresponding southerly to westerly exposures. Low-base Chert Upland Woodland sites, labeled “1”, are typically upslope on crests and shoulders.

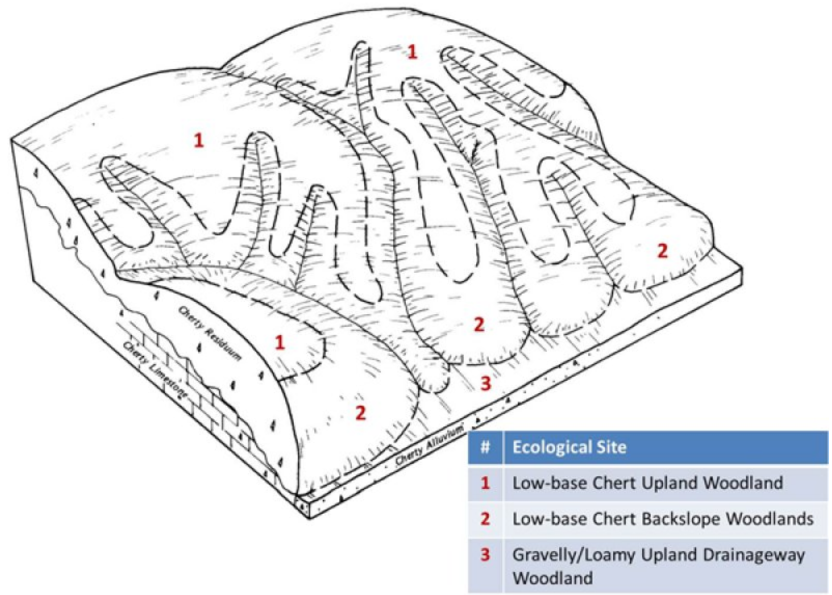


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope
Flooding frequency	None
Ponding frequency	None
Slope	15–50%
Water table depth	152 cm
Aspect	NW, N, NE, E

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)	152-164 days
Freeze-free period (characteristic range)	188-194 days
Precipitation total (characteristic range)	1,168-1,194 mm
Frost-free period (actual range)	148-166 days
Freeze-free period (actual range)	187-195 days
Precipitation total (actual range)	1,168-1,194 mm
Frost-free period (average)	158 days
Freeze-free period (average)	191 days

Precipitation total (average)	1,168 mm

Climate stations used

- (1) CASSVILLE RANGER STN [USC00231383], Cassville, MO
- (2) JOPLIN REGIONAL AIRPORT [USW00013987], Webb City, MO
- (3) SPRINGFIELD [USW00013995], Springfield, MO

Influencing water features

Water features associated with this upland ecological site are influenced by karst landscapes throughout the area (see following graphic). 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 following graphic 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.

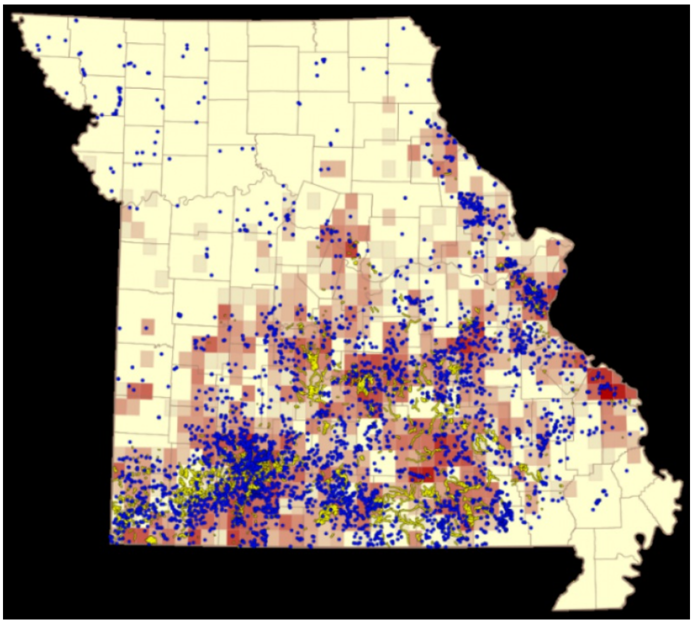


Figure 9. Image from Wikimedia Commons developed from the Missouri Department of Natural Resources, Division of Geology and Land Survey.

Soil features

These soils have acidic subsoils that are low in bases. Soils having low concentrations of calcium and containing few calcium bearing minerals along with increased levels of aluminum may also be vulnerable to base depletion by timber harvesting, plant uptake, and leaching. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum weathered primarily from limestone. They have very gravelly or very cobbly silt loam surface horizons, and skeletal subsoils with high amounts of chert gravel and cobbles. They are not affected by seasonal wetness. Soil series associated with this site include Clarksville, Crackerneck, and Noark.

The accompanying picture of a roadcut in the Clarksville series shows a thin, light-colored surface horizon underlain by reddish loam with a high chert fragment content. Although rooting depth is high, as is shown in this picture, plants must be adapted to these low-base soils, which are high in soluble aluminum. Picture courtesy of John Preston, NRCS.

Figure 10. Clarksville series

Table 4. Representative soil features

Parent material	(1) Residuum–cherty limestone (2) Slope alluvium
Surface texture	(1) Very gravelly silt loam (2) Extremely gravelly silt loam
Family particle size	(1) Loamy
Soil depth	183 cm
Surface fragment cover <=3"	40–70%
Surface fragment cover >3"	0–6%
Available water capacity (0-101.6cm)	2.54–10.16 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)	3.5–5.5
Subsurface fragment volume <=3" (Depth not specified)	40–65%
Subsurface fragment volume >3" (Depth not specified)	0–30%

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 well developed woodland dominated by an overstory of white oak and black oak. It is very similar to Chert Upland Woodlands, except that it may be less dense and productive. The canopy is rather tall and more dense than exposed slopes and the understory is better developed with more structural diversity. Decreased light from the canopy and aspect causes the diversity of ground flora species to diminish. Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species. 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.

Fire played an important role in the maintenance of Low-base Chert Protected Backslope Woodlands. It is likely that these ecological sites burned at least once every 5 to 10 years, although with lower intensity than exposed slopes. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open the woodlands up again and stimulate the abundant ground flora.

Low-base Chert Protected 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.

Today, these ecological sites have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing forested ecological sites have a younger (50-80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices. In the long term absence of fire, woody species, especially hickory, encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means.

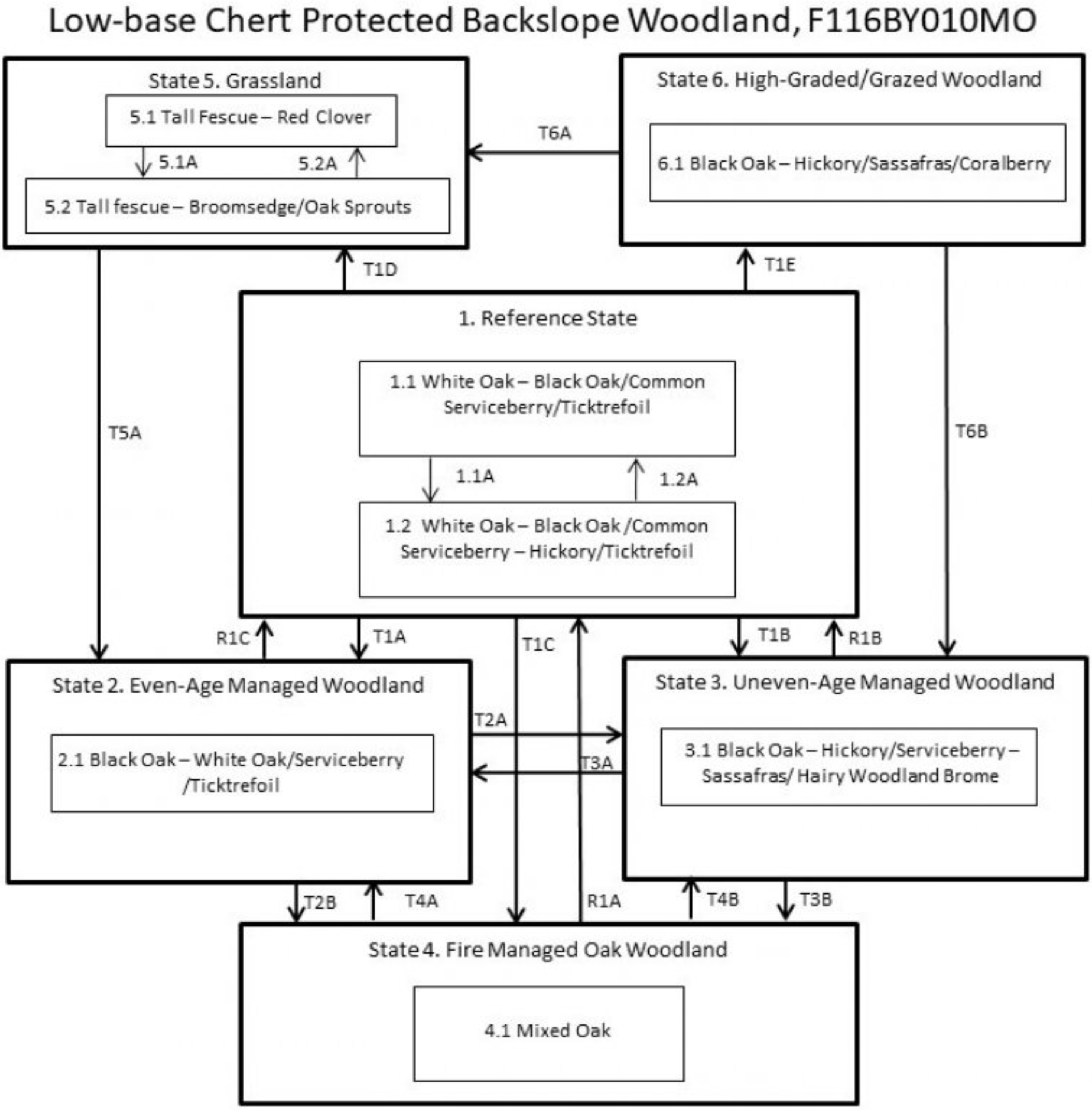
Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as coralberry, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion from grazing can be a problem and lower site productivity.

Single tree selection timber harvests are common with this site and often results in removal of the most productive trees (high grading) in the stand leading to poorer quality timber and a shift in species composition away from more valuable oak species. Better planned single tree selection or the creation of group openings can help regenerate and maintain more desirable oak species and increase vigor on the residual trees.

Clearcutting also occurs and results in dense, even-aged stands dominated by oak. This may be most beneficial for existing stands whose composition has been highly altered by past management practices. However, without some thinning of the dense stands and the reintroduction of prescribed fire, the ground flora diversity can be shaded out and diversity of the stand may suffer.

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



Code	Event/Process
T1A, T4A	Fire suppression; even-age management; harvesting
T1B, T4B	Fire suppression; uneven-age management; harvesting
T1C, T2B, T3B	Prescribed fire; forest stand improvement; harvesting
T1D, T6A	Clearing; grassland planting; grassland management
T1E	Poorly planned harvest; uncontrolled grazing
T2A	Uneven-age management; forest stand improvement
T3A	Even-age management; forest stand improvement
T5A	Tree planting; long-term succession
T6B	Uneven-age management; tree planting
R1A	Extended rotations; forest stand improvement
R1B, R1C	Forest management; extended rotations; prescribed fire

Code	Event/Process
1.1A	No disturbance (10+ years)
1.2A	Disturbance (fire, wind, ice) < 10 years
5.1A	Over grazing; no fertilization
5.2A	Brush removal; grassland management; prescribed grazing

Figure 11. State and transition diagram for this ecological site

State 1
Reference State

The historical reference state for this ecological site was likely dominated by white oak, black oak and post oak. Scattered shortleaf pine may also have been present in the canopy. Periodic disturbances from fire, wind or ice maintained the woodland structure and diverse ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Many sites have been converted to grassland (State 5). Others have been subject to repeated, high-graded timber harvest coupled with domestic livestock grazing (State 6). Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many reference sites have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) woodlands.

Community 1.1
White Oak – Black Oak/Common Serviceberry/Ticktrefoil

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 commonly occurring species listed in Nelson (2010).

Community 1.2
White Oak – Black Oak /Common Serviceberry – Hickory/Ticktrefoil

Pathway 1.1A
Community 1.1 to 1.2

This pathway is a gradual transition that results from extended, disturbance-free periods of roughly 10 years or longer.

Pathway 1.2A
Community 1.2 to 1.1

This pathway results from ecological disturbances such as fire, ice storms, or violent wind storms occurring on a periodic basis. Historically, native grazers such as bison provided disturbance events as well.

State 2
Even-Age Managed Woodland

These woodlands tend to be rather dense, with a sparse understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. However, in the absence of fire, the diversity and cover of the ground flora is still diminished. Continual timber management, depending on the practices used, will either maintain this state, or convert the site to uneven-age (State 3) woodlands. Prescribed fire without extensive timber harvest will, over time, cause a transition to Managed Oak Woodlands (State 4).

Dominant resource concerns

- Plant structure and composition
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

Community 2.1
Black Oak-White Oak/Serviceberry/Tick Trefoil

State 3
Uneven-Age Managed Woodland

Composition is altered from the reference state depending on tree selection during harvest. In addition, without a regular 15 to 20 year harvest re-entry into these stands, they will slowly increase in more shade tolerant species and white oak will become less dominant.. Without periodic disturbance, stem density and fire intolerant species, like hickory, increase in abundance.

Dominant resource concerns

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

Community 3.1
Black oak-Hickory/Serviceberry-Sassafras/Woodland Brome

State 4
Fire Managed Oak Woodland

The Fire Managed Oak Woodland state results from managing woodland communities on exposed aspects in States 2 or 3 with prescribed fire, over time. This state resembles the reference state, with younger maximum tree ages and lower ground flora diversity.

Dominant resource concerns

- Plant structure and composition

Community 4.1
Mixed Oak

State 5
Grassland

Conversion of woodlands to non-native cool season grassland species such as tall fescue has been common. Low available water, abundant surface fragments, low organic matter contents and soil acidity make non-native grasslands difficult to maintain in a healthy, productive state on this ecological site. Occasionally, these pastures will have scattered patches of tall, mature pine. If grazing and pasture management is discontinued, oak sprouts will occur and the site will eventually transition to State 2. Forest stand improvement and tree planting practices can hasten this process.

Community 5.1
Tall Fescue - Red Clover

Dominant resource concerns

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

Community 5.2
Tall Fescue - Broomsedge/Oak Sprouts

Dominant resource concerns

- Sheet and rill erosion
- Ephemeral gully erosion
- Nutrients transported to surface water
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Feed and forage imbalance

Pathway P5.1A
Community 5.1 to 5.2

Over grazing; no fertilization

Pathway P5.2A
Community 5.2 to 5.1

Brush removal; grassland management; prescribed grazing

State 6
High-Graded / Grazed Woodland

Timbered sites subjected to repeated, high-graded timber harvests and domestic grazing transition to this State. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as buckbrush, gooseberry, poison ivy and Virginia creeper. The vegetation offers little nutritional value for cattle, and excessive stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Exclusion of cattle from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

Dominant resource concerns

- Ephemeral gully erosion
- Nutrients transported to surface water
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

Community 6.1
Black Oak-Hickory/Sassafras/Buckbrush

Transition T1A
State 1 to 2

This transition typically results from even-age forest management practices, such as clear-cut, seed tree or shelterwood harvest and fire suppression.

Transition T1B
State 1 to 3

This transition pathway generally requires forest management practices. Prescribed fire is is maintained. Mechanical thinning may be necessary in dense woodlands. Periodic timber harvests occur.

Transition T1C
State 1 to 4

This transition is the result of the systematic application of prescribed fire; forest stand improvement; harvesting.

Transition T1D
State 1 to 5

This transition is the result of clearing the woodland community and planting pasture species. Soil erosion can be extensive in this process, along with loss of organic matter. Liming and fertilizing associated with pasture management typically raises the soil pH and increases the cation concentration (such as calcium and magnesium) of the upper soil horizons.

Transition T1E
State 1 to 6

This transition is the result of poorly planned timber harvest techniques such as high-grading, accompanied by unmanaged livestock grazing. Soil erosion and compaction often result from grazing after the understory has been damaged.

Restoration pathway R1C
State 2 to 1

This restoration pathway generally requires forest management practices with extended rotations that allow mature trees to exceed ages of about 100 years. Prescribed fire is part of the restoration process. Mechanical thinning may be necessary in dense woodlands.

Transition T2A
State 2 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest.

Transition T2B
State 2 to 4

This transition is the result of the systematic application of prescribed fire; forest stand improvement; harvesting.

Restoration pathway R1B
State 3 to 1

This restoration pathway generally requires forest management practices with extended rotations that allow mature trees to exceed ages of about 100 years. Prescribed fire is part of the restoration process. Mechanical thinning may be necessary in dense woodlands.

Transition T3A
State 3 to 2

This transition typically results from even-age forest management practices, such as clear-cut, seed tree or shelterwood harvest.

Transition T3B
State 3 to 4

This transition is the result of the systematic application of prescribed fire. Mechanical thinning may also be used; forest stand improvement; harvesting

Restoration pathway R1A
State 4 to 1

This restoration pathway generally requires forest management practices with extended rotations that allow mature trees to exceed ages of about 100 years. Prescribed fire is part of the restoration process. Mechanical thinning may be necessary in dense woodlands.

Transition T4A
State 4 to 2

This transition typically results from even-age forest management practices, such as clear-cut, seed tree or shelterwood harvest and fire suppression.

Transition T4B
State 4 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest; fire suppression; harvesting

Transition T5A
State 5 to 2

This transition results from the cessation of grazing and associated pasture management such as mowing and brush-hogging. Herbicide application, tree planting and forest stand improvement techniques can speed up this otherwise very lengthy transition.

Transition T6B
State 6 to 3

This transition results from the cessation of grazing and associated pasture management such as mowing and brush-hogging. Herbicide application, tree planting and forest stand improvement techniques can speed up this otherwise very lengthy transition.

Transition T6A

State 6 to 5

This transition is the result of clearing the woodland communities and planting grassland species. Soil erosion can be extensive in this process, along with loss of organic matter. Liming and fertilizing associated with pasture management typically raises the soil pH and increases the cation concentration (such as calcium and magnesium) of the upper soil horizons.

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)
Tree							
white oak	QUAL	*Quercus alba*	Native	–	20–50	–	–
black oak	QUVE	*Quercus velutina*	Native	–	20–50	–	–
post oak	QUST	*Quercus stellata*	Native	–	5–10	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	5–10	–	–
black hickory	CATE9	*Carya texana*	Native	–	5–10	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	5–10	–	–
shortleaf pine	PIEC2	*Pinus echinata*	Native	–	0–10	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	5–20
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–20
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	5–20
oval-leaf sedge	CACE	*Carex cephalophora*	Native	–	5–20
fuzzy wuzzy sedge	CAHI6	*Carex hirsutella*	Native	–	5–20
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	5–20
eastern star sedge	CARA8	*Carex radiata*	Native	–	5–20

Forb/Herb					
arrowleaf violet	VISA2	*Viola sagittata*	Native	–	5–20
calico aster	SYLA4	*Symphyotrichum lateriflorum*	Native	–	5–20
stiff tickseed	COPA10	*Coreopsis palmata*	Native	–	5–20
largeflower yellow false foxglove	AUGR	*Aureolaria grandiflora*	Native	–	5–20
American ipecac	GIST5	*Gillenia stipulata*	Native	–	5–20
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–20
feathery false lily of the valley	MARA7	*Maianthemum racemosum*	Native	–	5–20
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	5–20
bristly buttercup	RAHI	*Ranunculus hispidus*	Native	–	5–20
fire pink	SIVI4	*Silene virginica*	Native	–	5–20
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	Native	–	5–20
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	5–20
smooth small-leaf ticktrefoil	DEMA2	*Desmodium marilandicum*	Native	–	5–20
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	5–20
Arkansas bedstraw	GAAR4	*Galium arkansanum*	Native	–	5–20
spotted geranium	GEMA	*Geranium maculatum*	Native	–	5–20
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	5–20
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	5–20
rue anemone	THTH2	*Thalictrum thalictroides*	Native	–	5–20
Shrub/Subshrub					
deerberry	VAST	*Vaccinium stamineum*	Native	–	5–20
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	5–20
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	Native	–	5–20
Tree					
flowering dogwood	COFL2	*Cornus florida*	Native	–	5–20
leadplant	AMCA6	*Amorpha canescens*	Native	–	5–20

Animal community

Wildlife (MDC 2006):
Wild turkey, white-tailed deer, and eastern gray squirrel depend on hard and soft mast

food sources and are typical upland game species of this type.

Oaks provide abundant hard mast; scattered shrubs provide soft mast; native legumes provide high-quality wildlife food.

Sedges and native cool-season grasses provide green browse.

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

Bird species associated with early-successional woodlands are Northern Bobwhite, Prairie Warbler, Field Sparrow, Blue-winged Warbler, Yellow-breasted Chat, and Brown Thrasher.

Bird species associated with mid- to late successional woodlands are Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's widow, Red-eyed Vireo, Rose-breasted Grosbeak, Yellow-billed Cuckoo, and Broad-winged Hawk.

Reptile and amphibian species associated with woodlands include ornate box turtle, northern fence lizard, five-lined skink, broad-headed skink, six-lined racerunner, flat-headed snake, rough earth snake, and timber rattlesnake.

Other information

Forestry (NRCS 2002; 2014):
Management: Field measured site index values average 64 for white oak, 65 for black oak and 70 for shortleaf pine. Timber management opportunities are generally good. 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 as a management tool could have a negative impact on timber quality, may not be fitting, or should be used with caution on a particular site if timber management is the primary objective.

Limitations: Large amounts of coarse fragments throughout profile; bedrock may be within 60 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 percent, traction problems increase and equipment use is not recommended

Inventory data references

Potential Reference Sites: Low-Base Chert Protected Backslope Woodland

Plot COHOCA_JK02 – Noark soil
Located in Compton Hollow CA, Webster County, MO
Latitude: 37.239758
Longitude: -92.995287

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Contributors

Doug Wallace
Fred Young

Approval

Nels Barrett, 10/06/2020

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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	09/17/2020
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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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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:

17. **Perennial plant reproductive capability:**