USDA Natural Resources Conservation Service

Ecological site F116AY010MO
Calcareous Dolomite Protected Backslope Forest

Last updated: 9/24/2020
Accessed: 04/25/2024

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 Mississipian 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-Mesic Limestone/Dolomite Forest.

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

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

The reference state for this ecological site is most similar to Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis Forest (CEGL002070).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs in the Current River Hills Subsection.

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 Calcareous Dolomite Protected Backslope Forests occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Calcareous Dolomite Exposed Backslope Woodland ecological site. This ecological site is typically associated with glades, and occurs primarily on slopes above the Current and Jacks Fork rivers in Shannon County, Missouri. Soils are high in bases, and are moderately deep over dolomite bedrock, with gravelly surfaces. The reference plant community is forest dominated by chinkapin oak and white oak, with a well-developed understory and a rich herbaceous ground flora.

Associated sites

R116AY020MO	**Shallow Dolomite Upland Glade/Woodland** Shallow Dolomite Upland Glade/Woodlands are typically directly upslope.
F116AY037MO	**Gravelly/Loamy Upland Drainageway Forest** Gravelly/Loamy Upland Drainageway Forests are often downslope.
F116AY044MO	**Chert Dolomite Upland Woodland** Chert Dolomite Upland Woodlands are often adjacent or upslope.
F116AY047MO	**Calcareous Dolomite Exposed Backslope Woodland** Calcareous Dolomite Exposed Backslope Woodlands are mapped in complex with this ecological site, on steep lower backslopes with southern to western aspects.
F116AY009MO	**Calcareous Dolomite Upland Woodland** Calcareous Dolomite Upland Woodlands are often upslope, on upper backslopes.

Similar sites

F116AY047MO	**Calcareous Dolomite Exposed Backslope Woodland** Calcareous Dolomite Exposed Backslope Woodlands are mapped in complex with this ecological site, on steep lower backslopes but with southern to western aspects.

Table 1. Dominant plant species

Tree	(1) *Quercus muehlenbergii* (2) *Quercus alba*
Shrub	(1) *Cercis canadensis*
Herbaceous	(1) *Elymus virginicus* (2) *Uvularia grandiflora*

Physiographic features

This site is on backslopes with slopes of 15 to 55 percent. It is on protected aspects (north, northeast, and east), which receive significantly less solar radiation than the exposed aspects. Sites are often downslope from dolomite glades. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The adjacent figure (adapted from Dodd and Dettman 1996) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled "4" on the figure. The dashed lines within the area indicate the various soils included in this ecological site. Shallow Dolomite Upland

Glade/Woodland sites are typically associated with this ecological site.

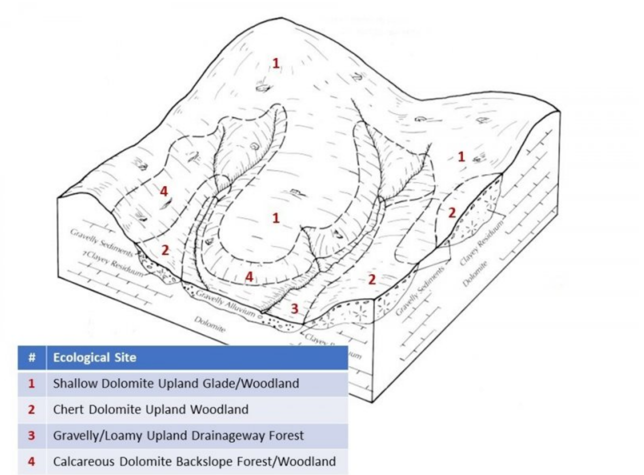


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope
Flooding frequency	None
Ponding frequency	None
Slope	15–55%
Water table depth	152 cm
Aspect	NW, N, NE, E

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)	177-185 days
Freeze-free period (characteristic range)	206-208 days
Precipitation total (characteristic range)	1,168-1,219 mm
Frost-free period (actual range)	176-186 days
Freeze-free period (actual range)	206-208 days
Precipitation total (actual range)	1,143-1,219 mm
Frost-free period (average)	181 days
Freeze-free period (average)	207 days
Precipitation total (average)	1,194 mm

Climate stations used

- (1) EUREKA SPRINGS 3 WNW [USC00032356], Eureka Springs, AR
- (2) MTN HOME 1 NNW [USC00035036], Mountain Home, AR
- (3) EMINENCE 1 N [USC00232619], Eminence, 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 ?ow 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.

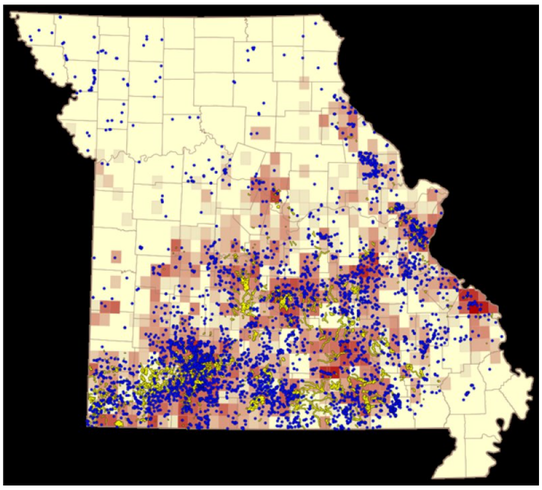


Figure 9. Distribution of karst-related features in Missouri. Image from Wikimedia Commons developed from the Missouri Department of Natural Resources, Division of Geology and Land Survey.

Soil features

These soils are underlain with dolomite bedrock at 20 to 40 inches. The soils were formed under a mixture of prairie and woodland vegetation, and have dark, organic-rich surface horizons that are enriched in places by upslope prairie glades. Parent material is slope alluvium over residuum weathered from dolomite, overlying dolomite bedrock. They have gravelly or cobbly silt loam surface layers, with clayey subsoils that have moderate to high amounts of chert and dolomite gravel and cobbles. These soils are base-rich, but do not contain free carbonates. These soils are not affected by seasonal wetness. Soil series associated with this site include Arkana.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–dolomite (2) Residuum–dolomite
Surface texture	(1) Very gravelly silt loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Not specified
Soil depth	51–102 cm
Surface fragment cover <=3"	35–50%
Surface fragment cover >3"	5–30%
Available water capacity (0-101.6cm)	5.08–10.16 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)	4.5–7.3

Subsurface fragment volume <=3" (Depth not specified)	25–40%
Subsurface fragment volume >3" (Depth not specified)	5–20%

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.

Calcareous Dolomite Protected Backslope Forests occur in protected landscape positions on steep slopes in the deeper valleys furthest from the prairie and woodland uplands. While the upland woodlands had an estimated fire frequency of 3 to 10 years, Calcareous Dolomite Protected Backslope Forests burned less frequently (estimated 10 to 25 years) and with lower intensity. The historic reference plant community for these forests has a well-developed forest canopy (70 to 80 feet tall and 90 to 100 percent cover) and subcanopy dominated by chinkapin oak and white oak, a structurally diverse understory and an abundant forest ground flora. Inclusions of dolomite woodlands on shallower soil patches are common.

Historically, Calcareous Dolomite Protected Backslope Forests 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 large native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and ground flora species.

Today, these communities have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50 to 80 years) canopy layer whose composition may have been altered by timber harvesting practices. An increase in hickories over historic conditions is common.

The absence of periodic fire may have allowed more shade-tolerant tree species, such as sugar maple, white ash, or hickories to increase in abundance. 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 related to grazing can be a problem and lower site productivity.

These ecological sites are moderately productive. Oak regeneration is typically problematic. Maples, elms, and hickories are often dominant competitors in the understory. Maintenance of the oak component will require disturbances that will encourage more sun adapted species and reduce shading effects.

Single tree selection timber harvests are common in this region 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.

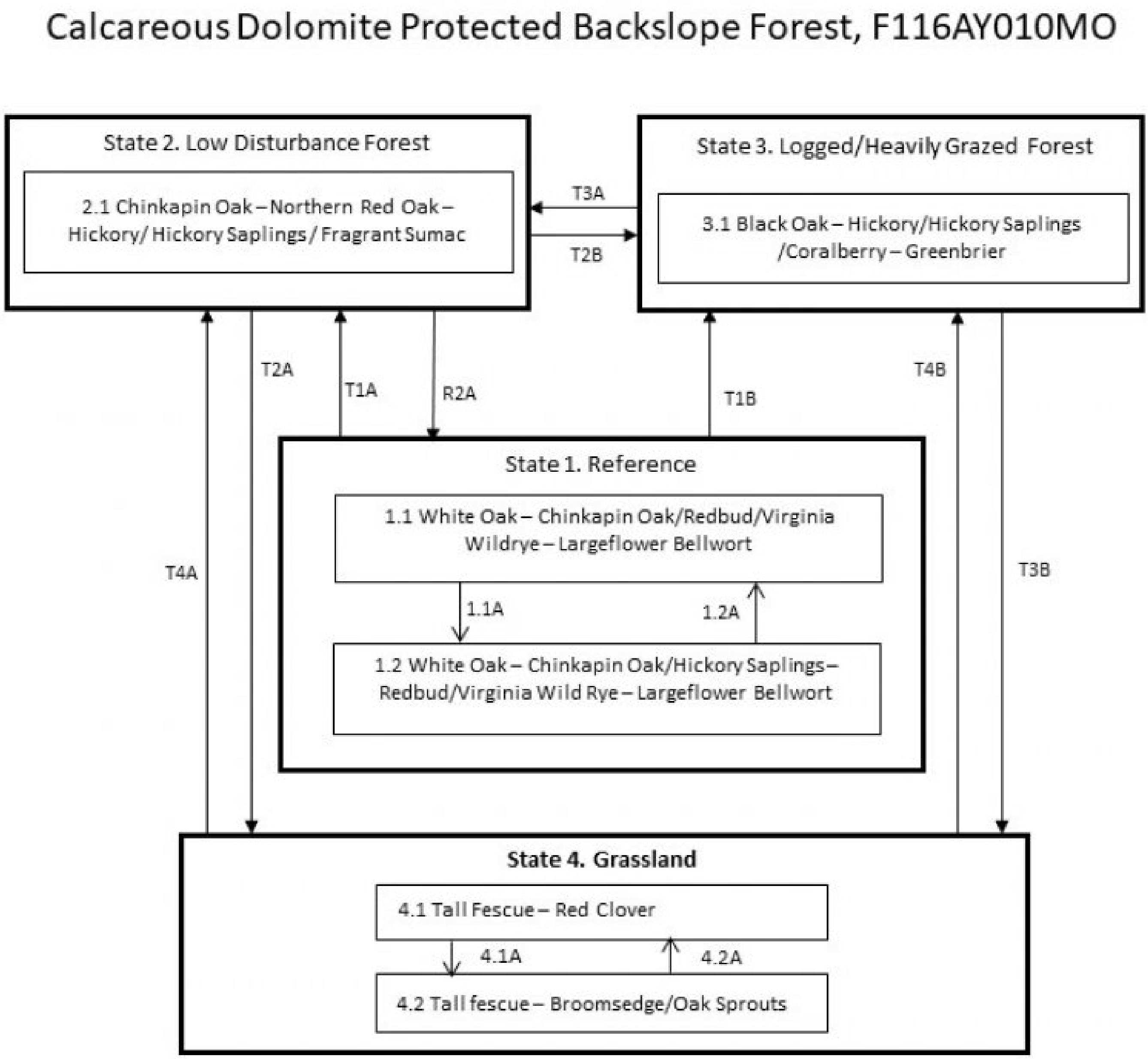
Clearcutting also occurs and results in dense, even-aged stands dominated by oak. This may be most beneficial for existing stands whose composition has been highly altered by past management practices. However, without some thinning of the dense stands and the application of prescribed fire, the ground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

Prescribed fire can play a beneficial but limited role in the management of this ecological site. It has been used successfully to open understory and provide light to the ground for oak regeneration. Protected aspect forests did evolve with some fire, but their composition often reflects more closed, forested conditions, with fewer woodland ground flora species that can respond to fire.

Control of woody species will be more difficult than on poorer woodland sites. Consequently, while having protected aspects in a burn unit is acceptable, targeting them solely for woodland restoration is not advisable.

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/Activity
T1A	Fire-free interval (20+ years)
T1B	Fire suppression; heavy grazing by livestock; logging
T3A	Livestock removal
T2B	Heavy grazing by livestock; logging
T2A, T3B	Clearing; grassland seeding; grassland management
T4A	Tree planting; long term succession (50+ years); no grazing
T4B	Long term succession (50+ years); light periodic grazing
R2A	Understory removal; prescribed fire
1.1A	Disturbance-free interval >20 years
1.2A	Disturbance 10-20 year cycle
4.1A	Over grazing; no fertilization
4.2A	Brush management; grassland seeding; grassland management

Figure 10. State and transition diagram for this ecological site

State 1

Reference

The reference state was dominated by white oak and chinkapin oak. Periodic disturbances from fire, wind or ice maintained the dominance of white and chinkapin oak by opening up the canopy and allowing more light for white oak reproduction. Long disturbance-free periods allowed an increase in more shade tolerant species such as northern red oak and sugar maple. Two community phases are recognized in this state, with shifts between phases based on disturbance frequency. This reference state is uncommon today. Some sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvest coupled with domestic livestock grazing (State 5). 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 harvests.

Community 1.1
White oak – Chinkapin oak/Redbud/Virginia wildrye – Largeflower bellwort

While this phase is dominated by white oak and chinkapin oak, hickory can also be common. This forest community has a multi-tiered structure, and a canopy with 80 to 100 percent closure. The sub-canopy and understory are well developed. A moderate abundance of shade tolerant forest generalists, such as mayapple, fern, ticktrefoil and white snakeroot cover the ground.

Forest overstory. Forest Overstory Composition 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. Understory Composition 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
White Oak – Chinkapin Oak/Hickory Saplings – Red Bud/Virginia Wild Rye – Large Flower Bellwort

This phase is similar to community phase 1.1 but northern red oak and hickory densities are increasing due to longer periods of fire suppression (>20 years) and lack of natural disturbances such as ice and wind. Displacement of some less shade tolerant grasses and forbs along with lower densities of most species may be occurring due to shading and competition from the increased densities of oak, maple and hickory saplings in the mid-story.

Pathway P1.1A
Community 1.1 to 1.2

This pathway is the result of a disturbance-free interval >20 years.

Pathway P1.2A
Community 1.2 to 1.1

This pathway is the result of a fire 10 to 20-year disturbance cycle being reestablished.

State 2
Low Disturbance Forest

Lower disturbance levels has allowed these forests to become dense with saplings such as sugar maple, northern red oak, and hickory. The dense, shaded conditions and lack of disturbance has caused the ground flora to decrease in cover and diversity. However, many of the original herbaceous species persist as small plantlets or in the seed bank. Consequently, thinning of the woody species and the re-introduction of periodic disturbances has shown these communities to be exceptionally resilient, and a return, after a period of many years, to the reference condition is possible.

Community 2.1
Chinkapin Oak – Northern Red Oak – Hickory/ Hickory Saplings / Fragrant Sumac

This is the only phase associated with this state at this time. See the corresponding state narrative for details.

State 3
Logged/Heavily Grazed Forest

Many of these sites have been subjected to heavy grazing by domestic livestock and periodic logging. These areas are more open 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 buck brush. Restricting livestock access and eliminating logging will be necessary for successful restoration.

Community 3.1
Black Oak – Hickory/Hickory Saplings /Coralberry – Greenbrier

This is the only phase associated with this state at this time. See the corresponding state narrative for details.

State 4
Grassland

Conversion of other states to non-native cool season species such as tall fescue, orchard grass, and red clover has been common. Occasionally, these pastures will have scattered oaks. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may be impossible, requiring a very long term series of management options. If oak sprouting is left unchecked and grazing is eliminated or reduced then over time this state will transition to a fire excluded woodland or to a high-graded/grazed woodland.

Community 4.1
Tall Fescue - Red Clover

This phase is well managed grassland, composed of non-native cool season grasses and legumes. Grazing and haying is occurring. The effects of long-term liming on soil pH, and calcium and magnesium content, is most evident in this phase. Studies show that these soils have higher pH and higher base status in soil horizons as much as two feet below the surface, relative to poorly managed grassland and to woodland communities (where liming is not practiced).

Community 4.2
Tall fescue - Broomsedge/Oak Sprouts

This phase is the result of poor grassland management. Over grazing and little fertility application has allowed broomsedge and oak sprouts to increase in cover and density reducing overall forage quality and site productivity. Soil pH and bases such as calcium and magnesium are lower, relative to well-managed pastures.

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 cattle grazing.

Transition T3B
State 3 to 4

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

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.

Transition T3B
State 4 to 3

This transition is the result of light intermittent grazing, long idle periods and increased woody growth and development.

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							
blue ash	FRQU	*Fraxinus quadrangulata*	Native	–	–	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	–	–	–
pignut hickory	CAGL8	*Carya glabra*	Native	–	–	–	–
white oak	QUAL	*Quercus alba*	Native	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	–	–	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	–	–	–	–
white ash	FRAM2	*Fraxinus americana*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Indian woodoats	CHLA5	*Chasmanthium latifolium*	Native	–	–
Bosc's panicgrass	DIBO2	*Dichanthelium boscii*	Native	–	–
eastern bottlebrush grass	ELHY	*Elymus hystrix*	Native	–	–
slender looseflower sedge	CAGR8	*Carex gracilescens*	Native	–	–
oval-leaf sedge	CACE	*Carex cephalophora*	Native	–	–
hairy wildrye	ELVI	*Elymus villosus*	Native	–	–
woodland muhly	MUSY	*Muhlenbergia sylvatica*	Native	–	–
Forb/Herb					
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	–
dutchman's breeches	DICU	*Dicentra cucullaria*	Native	–	–
heartleaf bittercress	CACO6	*Cardamine cordifolia*	Native	–	–
purple meadowparsnip	THTR	*Thaspium trifoliatum*	Native	–	–
meadow zizia	ZIAP	*Zizia aptera*	Native	–	–
largeflower bellwort	UVGR	*Uvularia grandiflora*	Native	–	–
roundlobe hepatica	HENOO	*Hepatica nobilis var. obtusa*	Native	–	–
eastern greenviolet	HYCO6	*Hybanthus concolor*	Native	–	–
wild comfrey	CYVI	*Cynoglossum virginianum*	Native	–	–
early meadow-rue	THDI	*Thalictrum dioicum*	Native	–	–
clustered blacksnakeroot	SAOD	*Sanicula odorata*	Native	–	–
threeflower melicgrass	MENI	*Melica nitens*	Native	–	–
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	–	–
Wood's bunchflower	VEWO3	*Veratrum woodii*	Native	–	–
downy pagoda-plant	BLCI	*Blephilia ciliata*	Native	–	–
tall tickseed	COTR4	*Coreopsis tripteris*	Native	–	–
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	–
smooth oxeye	HEHE5	*Heliopsis helianthoides*	Native	–	–
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	–

stalked wild petunia	RUPE4	*Ruellia pedunculata*	Native	–	–
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	–
bloodroot	SACA13	*Sanguinaria canadensis*	Native	–	–
Baldwin's ironweed	VEBA	*Vernonia baldwinii*	Native	–	–
golden zizia	ZIAU	*Zizia aurea*	Native	–	–
orangefruit horse-gentian	TRAU4	*Triosteum aurantiacum*	Native	–	–
tall tickseed	COTR4	*Coreopsis tripteris*	Native	–	–
Carolina elephantsfoot	ELCA3	*Elephantopus carolinianus*	Native	–	–
yellow passionflower	PALU2	*Passiflora lutea*	Native	–	–
Fern/fern ally					
rattlesnake fern	BOVI	*Botrychium virginianum*	Native	–	–
Shrub/Subshrub					
hophornbeam	OSVI	*Ostrya virginiana*	Native	–	–
Carolina buckthorn	FRCA13	*Frangula caroliniana*	Native	–	–
rusty blackhaw	VIRU	*Viburnum rufidulum*	Native	–	–
eastern redbud	CECA4	*Cercis canadensis*	Native	–	–
shrubby lespedeza	LEFR5	*Lespedeza frutescens*	Native	–	–
American bladdernut	STTR	*Staphylea trifolia*	Native	–	–
Tree					
flowering dogwood	COFL2	*Cornus florida*	Native	–	–
red mulberry	MORU2	*Morus rubra*	Native	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	–	–

Animal community

Wildlife (MDC 2006):

This forest type contains high structural and compositional diversity important for a number of songbirds and amphibians.

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.

Birds associated with this ecological site include Worm-eating warbler, Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Wood Thrush, Red-eyed Vireo, Northern Parula, Louisiana Waterthrush (near streams), and Broad-winged Hawk.

Reptile and amphibian species associated with mature forests include: ringed salamander, spotted salamander, marbled salamander, central newt, long-tailed salamander, dark-sided salamander, southern red-backed salamander, three-toed box turtle, western worm snake, western earth snake, and American toad.

Other information

Forestry (NRCS 2002, 2014):

Management: Estimated site index estimates range from 50 to 60 for oak. 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 small 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 should be used with caution on a particular site if timber management is the primary objective.

Limitations: Coarse fragments occur 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 percent, traction problems increase and equipment use is not recommended.

Inventory data references

Potential Reference Sites: Calcareous Dolomite Protected Backslope Forest

Plot MERASP09 - Arkana soil
Located in Meramec State Park, Franklin County, MO
Latitude: 38.197304
Longitude: -91.117104

Plot CURINP02 - Arkana soil
Located in Current River, Ozark National Scenic Riverway, National Park Service, Shannon County, MO
Latitude: 37.124208
Longitude: -91.169827

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Contributors

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Approval

Nels Barrett, 9/24/2020

Acknowledgments

Missouri Department of Conservation and Missouri Department of Natural Resources personnel provided significant and helpful field and technical support during this project.

Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	04/25/2024
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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:**