USDA Natural Resources Conservation Service

Ecological site F116AY003MO
Chert Mudstone Upland 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.

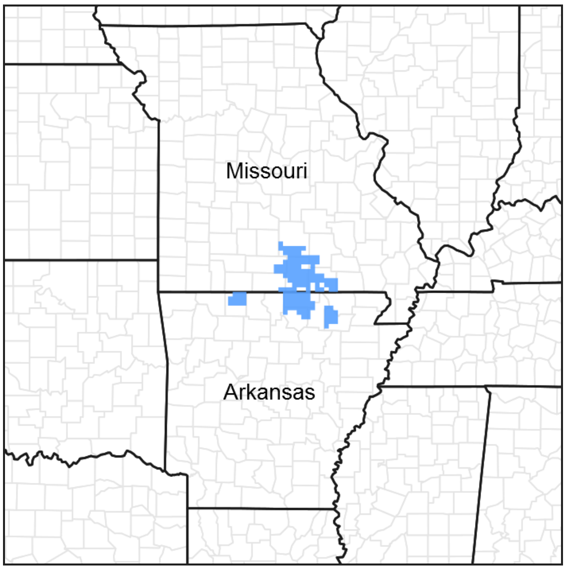


Figure 1. Mapped extent

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 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 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 / Schizachyrium scoparium Wooded Herbaceous Vegetation (CEGL002391).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs primarily within several Land Type Associations within 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”.

Chert Mudstone Upland Woodlands occur over distinctive Ordovician mudstones, primarily in south-central and southeastern parts of the MLRA. Soils are typically deep to mudstone, acidic, and low in bases such as calcium, with an abundance of chert fragments in the subsoil. The reference plant community is woodland with an overstory dominated by post oak and blackjack oak with scattered shortleaf pine and a ground flora of native grasses and forbs.

Associated sites

F116AY011MO	**Chert Upland Woodland** Chert Upland Woodlands are typically downslope, on gently sloping shoulders and upper backslopes.
F116AY044MO	**Chert Dolomite Upland Woodland** Chert Dolomite Upland Woodlands are typically downslope, on backslopes.
R116AY020MO	**Shallow Dolomite Upland Glade/Woodland** Shallow Dolomite Upland Glade/Woodlands are downslope in places, on backslopes.

Similar sites

F116AY011MO	**Chert Upland Woodland** Chert Upland Woodland are on somewhat steeper upland positions and are generally less productive.

Table 1. Dominant plant species

Tree	(1) *Quercus velutina* (2) *Quercus coccinea*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Schizachyrium scoparium*

Physiographic features

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

The following figure (adapted from Vander Veen and Preston, 2006) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “1” on the figure. The dashed lines within the area indicate the various soils included in this ecological site. Chert Mudstone sites are typically associated with Chert Upland and Chert Dolomite Upland sites, labeled “2” and “3”.

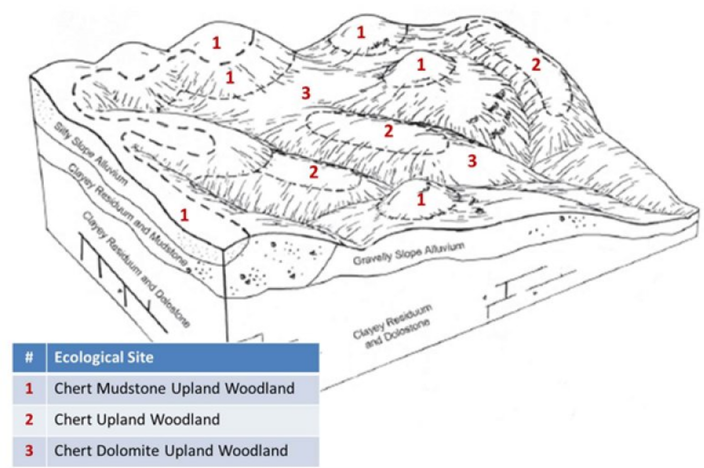


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Interfluve (3) Hill
Flooding frequency	None
Slope	1–15%
Water table depth	24–60 in
Aspect	Aspect is not a significant factor

Climatic features

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

The Ozark Highland experiences regional differences in climates, but these differences do not have obvious geographic boundaries. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line crossing the MLRA from northwest to southeast.
The average annual precipitation in almost all of this area is 38 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 53 to 60 degrees F. The lower temperatures occur at the higher elevations in the western part of the MLRA. Mean January minimum temperature follows a stronger north-to-south gradient. However, mean July maximum temperature shows hardly any geographic variation in the MLRA. Mean July maximum temperatures have a range of only two or three degrees across the area.

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

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

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

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

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

Table 3. Representative climatic features

Frost-free period (characteristic range)	164-183 days
Freeze-free period (characteristic range)	197-212 days
Precipitation total (characteristic range)	47-48 in
Frost-free period (actual range)	158-188 days
Freeze-free period (actual range)	192-213 days
Precipitation total (actual range)	46-48 in
Frost-free period (average)	173 days
Freeze-free period (average)	204 days
Precipitation total (average)	48 in

Climate stations used

- (1) MTN GROVE 2 N [USC00235834], Mountain Grove, MO
- (2) MTN HOME 1 NNW [USC00035036], Mountain Home, AR
- (3) POCAHONTAS 1 [USC00035820], Pocahontas, AR

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.

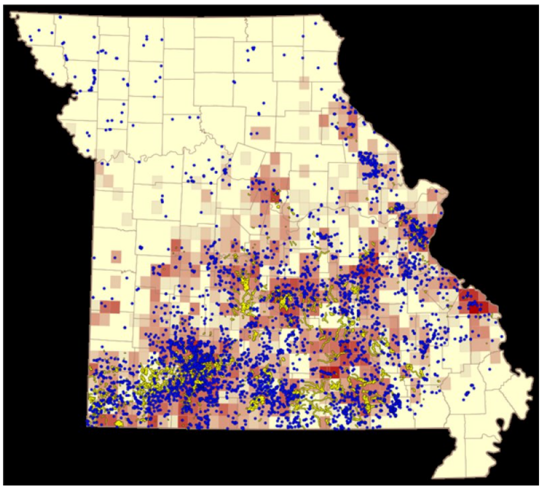


Figure 9. Distribution of karst-related features in Missouri. Image from Wikimedia Commons developed from the Missouri Department of Natural Resources, Division of Geology and Land Survey.

Soil features

These soils have acidic subsoils that are low in bases. Some areas have soft, dense mudstone below 40 inches. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum weathered from mudstone. Some areas have a thin surface layer of loess. They have silt loam surface layers that are gravelly to very gravelly in places, with loamy or clayey subsoils that have moderate amounts of chert gravel and cobbles. These soils are not affected by seasonal wetness. These soils are not affected by seasonal wetness. Soil series associated with this site include Agnos, Egyptgrove, Gassville, Kenaga and Tick.

The accompanying picture of the Tick series shows abundant chert fragments in the thin, light-colored surface horizon and reddish brown gravelly silty clay loam subsoil. Soft, dense mudstone is below 40 inches. Picture courtesy of John Preston, NRCS.

Figure 10. Tick series

Table 4. Representative soil features

Parent material	(1) Slope alluvium–mudstone (2) Residuum–mudstone (3) Loess

Surface texture	(1) Silt loam (2) Gravelly (3) Very gravelly
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow
Soil depth	72 in
Surface fragment cover <=3"	10–38%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4–7 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	3.5–6.5
Subsurface fragment volume <=3" (Depth not specified)	10–20%
Subsurface fragment volume >3" (Depth not specified)	0–2%

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.

Historically, Chert Mudstone Upland Woodlands were dominated by drought and fire-tolerant post and blackjack oaks with scattered shortleaf pine. Their landscape position and juxtaposition to prairies likely lead to a high fire frequency (every 1 to 5 years). They ranged from savannas near the prairie edge to open, park-like woodlands farther away. Canopy closure likely varied from 40 to 70 percent and tree height from 50 to 70 feet.

Native prairie grasses dominated the open understory, along with a diverse mix of native legumes, asters, sunflowers and other forbs. Dense thickets of oak sprouts may have occurred during periods of less-frequent fire, but periodic fire would eventually clear them out. Grazing by large native herbivores, such as bison, elk, and white-tailed deer, also influenced the understory, keeping it more open and structurally diverse.

Today, this community has either been cleared and converted to pasture, or has grown dense in the absence of fire. Most occurrences today exhibit canopy closure of 80 to 100 percent. In addition, the sub-canopy and understory layers are better developed. Post and scarlet oak share dominance with black oak, black hickory and an occasional white oak. Also, the understory has more saplings. Under these denser, more shaded conditions, the original sun-loving ground flora has diminished in diversity and cover. While some woodland species persist in the ground flora, many have been replaced by more shade-tolerant species.

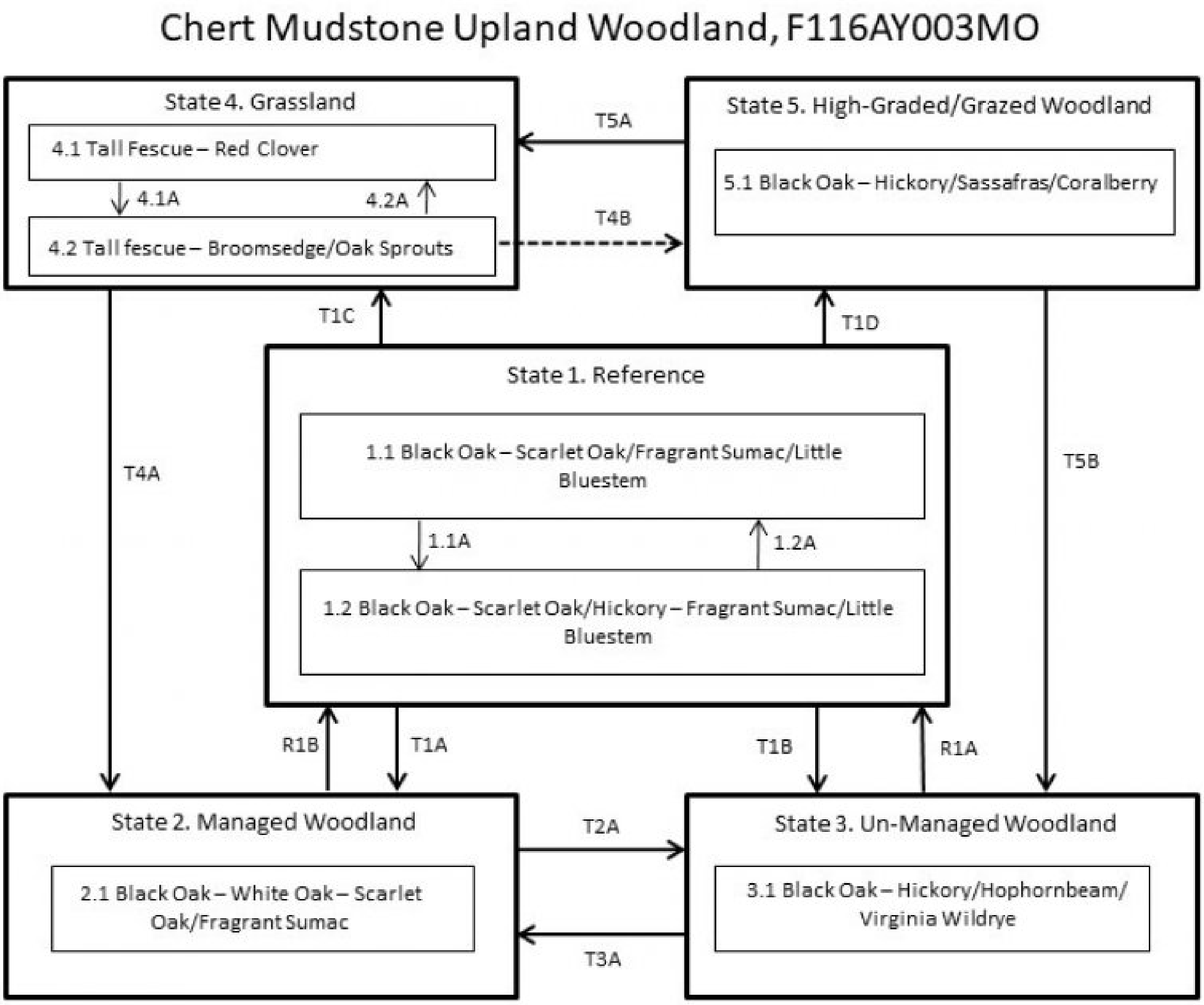
Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing invasive species that are tolerant of grazing, such as coralberry, gooseberry, Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction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

This site has moderate productivity. Logging does occur, and influences the community today. Occasional partial cuts provide sunlight to the woodland floor, stimulating native woodland ground flora. However, in the absence of fire and continual cultural treatments, oaks sprout and grow into a dense stand, again shading out the sun-loving ground flora.

Partial cutting and prescribed fire can restore the more open structure and diversity of ground flora species. Managed areas show an exceptional resiliency. This type of management may provide timber products, wildlife habitat, and potential native forage. 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



Code	Event/Process/Activity
T1A	Even-aged management; prescribed fire
T1B	Fire suppression; uneven-age management
T2B	Prescribed fire; thinning; grazing management
T1C, T6A	Clearing and pasture planting
T1D	Poorly planned harvest & uncontrolled grazing
T2A	Uneven-age management
T3A	Even-age management
T4A	Tree planting; long-term succession; no grazing
T4B	Light intermittent grazing; woody growth
T5B	Uneven-age management; tree planting; livestock exclusion

Code	Event/Process/Activity
1.1A	No disturbance (10+ yrs)
1.2A	Disturbance (fire, wind, ice) < 10 yrs
4.1A	Over grazing; no fertilization
4.2A	Brush management; grassland seeding; grassland management

Code	Event/Process/Activity
R1A	Prescribed fire and extended rotations
R1B	Uneven-age mgt, extended rotations

Figure 11. State and transition diagram for this ecological site

State 1

Reference

The historical reference state for this ecological site was old growth, oak woodland. The reference state was dominated by black oak and scarlet oak. 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. Reference states are rare today. Many sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvest coupled with uncontrolled domestic livestock grazing (State 5).

Community 1.1
Black Oak – Scarlet Oak/Fragrant Sumac/Little Bluestem

This phase has old growth black oak and scarlet oak that dominate the overstory with little bluestem and poverty oatgrass dominating the open ground layer. Numerous forbs and sedges are also present. Shrubs and forest understory trees can be locally abundant.

Forest overstory. The overstory is dominated by scarlet oak and black oak, with scattered post oak and black hickory. 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 abundant understory layer is dominated by little bluestem, big bluestem and Indiangrass. Forbs are common. 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
Black Oak – Scarlet Oak/Hickory – Fragrant Sumac/Little Bluestem

Periodic disturbances from fire, wind or ice maintained the woodland structure and diverse ground flora species.

Forest overstory. The overstory is dominated by post oak and blackjack oak, with scattered black oak and black hickory. The Overstory Species list is based commonly occurring species listed in Nelson (2010).

Forest understory. The abundant understory layer is dominated by little bluestem, big bluestem and indiangrass. Forbs are common. The Understory Species list is based commonly occurring species listed in Nelson (2010).

Pathway P1.1A
Community 1.1 to 1.2

This pathway is a gradual transition that results from extended, disturbance-free periods.

Pathway P1.2A
Community 1.2 to 1.1

This pathway is a transition that results from extended, disturbance periods returning, such as native fires, wind, and ice storms.

State 2
Managed Woodland

This state can start with a sequence of early seral mixed oak woodlands, which mature over time. 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.

Dominant resource concerns

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

Community 2.1
Black Oak – White Oak – Scarlet Oak/Aromatic Sumac

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

State 3
Un-Managed Woodland

This state results from no management. 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. The Un-Managed Woodland state is also denser because of fire suppression. Without periodic disturbance, stem density and fire intolerant species, like sassafras and hickory, increase in abundance.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

Community 3.1
Black Oak – Hickory/Ironwood/ Virginia Wildrye

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

State 4
Grassland

Conversion of woodlands to planted, non-native cool season grassland species such as tall fescue is common for this region. Surface fragments and low organic matter contents make grasslands harder to maintain in a healthy, productive state on this ecological site. Two community phases are recognized in the grassland state, with shifts between 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.

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).

Dominant resource concerns

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

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.

Dominant resource concerns

- 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 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 re-seeding and proper grassland management.

State 5
High-Graded/Grazed Woodland

States that were subjected to repeated, high-grading timber harvests and uncontrolled domestic grazing transitioned to a High-Graded/Grazed Woodland state. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as coralberry, gooseberry, poison ivy and Virginia creeper. The existing vegetation offers little nutritional value for cattle, and excessive cattle stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Two common transitions from this state are woody clearing and conversion to State 4, grassland or removing livestock, limited harvesting, and allowing long term succession to occur to some other woodland state.

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
- Feed and forage imbalance

Community 5.1
Black Oak - Hickory/Sassafras/Buckbrush

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

Transition T1A
State 1 to 2

This transition typically results from even-aged management, younger canopy ages, and prescribed fire.

Transition T1B
State 1 to 3

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

Transition T1C

State 1 to 4

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

Transition T1D
State 1 to 5

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

Restoration pathway R1B
State 2 to 1

This restoration transition generally requires extended rotations that allow mature trees to exceed ages of about 120 years along with prescribed fire.

Transition T
State 2 to 3

This transition typically results with initial uneven-age management and eventual cessation of any management.

Restoration pathway R1A
State 3 to 1

This restoration transition generally requires extended rotations that allow mature trees to exceed ages of about 120 years along with prescribed fire.

Transition T3A
State 3 to 2

This transition typically results from active even-age management.

Transition T4A
State 4 to 2

This transition typically results with tree planting, long-term succession, and no grazing.

Transition T4B
State 4 to 5

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

Transition T5B
State 5 to 3

This transition typically results with uneven-age management, tree planting and livestock exclusion.

Transition T5A
State 5 to 4

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

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
black oak	QUVE	*Quercus velutina*	Native	–	5–20	–	–
scarlet oak	QUCO2	*Quercus coccinea*	Native	–	5–20	–	–
post oak	QUST	*Quercus stellata*	Native	–	5–20	–	–
black hickory	CATE9	*Carya texana*	Native	–	5–20	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	5–20	–	–
white oak	QUAL	*Quercus alba*	Native	–	5–20	–	–
southern red oak	QUFA	*Quercus falcata*	Native	–	5–20	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	1–10
Indiangrass	SONU2	*Sorghastrum nutans*	Native	–	1–10
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	1–10
blue sedge	CAGL6	*Carex glaucodea*	Native	–	1–10
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	1–10
big bluestem	ANGE	*Andropogon gerardii*	Native	–	1–10
hirsute sedge	CACO9	*Carex complanata*	Native	–	1–10
broomsedge bluestem	ANVI2	*Andropogon virginicus*	Native	–	1–10
parasol sedge	CAUM4	*Carex umbellata*	Native	–	1–10
slimleaf panicgrass	DILI2	*Dichanthelium linearifolium*	Native	–	1–10
cypress panicgrass	DIDI6	*Dichanthelium dichotomum*	Native	–	1–10
Forb/Herb					
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	1–10
prostrate ticktrefoil	DERO3	*Desmodium rotundifolium*	Native	–	1–10
largeflower yellow false foxglove	AUGR	*Aureolaria grandiflora*	Native	–	1–10
arrowleaf violet	VISA2	*Viola sagittata*	Native	–	1–10
hairy bedstraw	GAPI2	*Galium pilosum*	Native	–	1–10
American ipecac	GIST5	*Gillenia stipulata*	Native	–	1–10
common dittany	CUOR	*Cunila origanoides*	Native	–	1–10
queendevil	HIGR3	*Hieracium gronovii*	Native	–	1–10
smooth small-leaf ticktrefoil	DEMA2	*Desmodium marilandicum*	Native	–	1–10
panicledleaf ticktrefoil	DEPA6	*Desmodium paniculatum*	Native	–	1–10
slender lespedeza	LEVI7	*Lespedeza virginica*	Native	–	1–10
sidebeak pencilflower	STBI2	*Stylosanthes biflora*	Native	–	1–10
stiff tickseed	COPA10	*Coreopsis palmata*	Native	–	1–10
largeflower yellow false foxglove	AUGR	*Aureolaria grandiflora*	Native	–	1–10
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	1–10
white wild indigo	BAAL	*Baptisia alba*	Native	–	1–10
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	1–10
common cinquefoil	POSI2	*Potentilla simplex*	Native	–	1–10
Virginia tephrosia	TEVI	*Tephrosia virginiana*	Native	–	1–10
pussytoes	ANTEN	*Antennaria*	Native	–	1–10
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	–	1–10
Shrub/Subshrub					
New Jersey tea	CEAM	*Ceanothus americanus*	Native	–	1–10
American hazelnut	COAM3	*Corylus americana*	Native	–	1–10
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	1–10
St. Andrew's cross	HYHY	*Hypericum hypericoides*	Native	–	1–10
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	Native	–	1–10

Table 7. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
post oak	QUST	*Quercus stellata*	Native	–	30–60	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	20–40	–	–
black hickory	CATE9	*Carya texana*	Native	–	10–30	–	–
black oak	QUVE	*Quercus velutina*	Native	–	10–30	–	–
sassafras	SAAL5	*Sassafras albidum*	Native	–	0–20	–	–

Table 8. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	30–50
Indiangrass	SONU2	*Sorghastrum nutans*	Native	–	10–20
big bluestem	ANGE	*Andropogon gerardii*	Native	–	10–20
big bluestem	ANGE	*Andropogon gerardii*	Native	–	10–20
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	10–20
hirsute sedge	CACO9	*Carex complanata*	Native	–	10–20
blue sedge	CAGL6	*Carex glaucodea*	Native	–	10–20
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	10–20
broomsedge bluestem	ANVI2	*Andropogon virginicus*	Native	–	5–10
Forb/Herb					
queendevil	HIGR3	*Hieracium gronovii*	Native	–	5–20
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–20
white wild indigo	BAAL	*Baptisia alba*	Native	–	5–20
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	5–20
smooth small-leaf ticktrefoil	DEMA2	*Desmodium marilandicum*	Native	–	5–20
panicledleaf ticktrefoil	DEPA6	*Desmodium paniculatum*	Native	–	5–20
slender lespedeza	LEVI7	*Lespedeza virginica*	Native	–	5–20
sidebeak pencilflower	STBI2	*Stylosanthes biflora*	Native	–	5–20
common cinquefoil	POSI2	*Potentilla simplex*	Native	–	5–20
Virginia tephrosia	TEVI	*Tephrosia virginiana*	Native	–	5–20
stiff tickseed	COPA10	*Coreopsis palmata*	Native	–	5–20
largeflower yellow false foxglove	AUGR	*Aureolaria grandiflora*	Native	–	5–20
pussytoes	ANTEN	*Antennaria*	Native	–	5–10
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	–	5–10
Shrub/Subshrub					
New Jersey tea	CEAM	*Ceanothus americanus*	Native	–	0–20
American hazelnut	COAM3	*Corylus americana*	Native	–	0–20
black huckleberry	GABA	*Gaylussacia baccata*	Native	–	0–20
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	10–20

Animal community

Wildlife (MDC 2006):

Numerous native legumes provide high-quality wildlife food.

Sedges and native cool-season grasses provide green browse; extensive native warm-season grasses 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 Pine and Pine-Oak Woodlands are Carolina Chickadee, Great Crested Flycatcher, Pine Warbler, White-breasted Nuthatch, Cooper's Hawk, Yellow-throated Warbler, Summer Tanager, Black-and-white Warbler, and Northern Bobwhite.

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

Other information

Forestry (NRCS 2002, 2014):

Management: Field measured site index values range from 47 to 62 for oak and 63 for shortleaf pine. Timber management opportunities are 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 small group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Prescribed fire is a useful management tool.

Limitations: Low to moderate coarse fragments occur soil profile; bedrock may be 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: Chert Mudstone Upland Woodland

Plot HOCOFS05 – Tick soil
Located in Mark Twain National Forest, USFS, Howell County, MO
Latitude: 37.041386
Longitude: -91.996259

Plot HOCOFS06 – Tick soil
Located Mark Twain National Forest, USFS, Howell County, MO
Latitude: 37.040364
Longitude: -92.056254

Plot DADECA02 – Egyptgrove soil
Located in Davis Dean CA, Howell County, MO
Latitude: 36.896967
Longitude: -91.913957

Plot HOCOFS01 – Egyptgrove soil
Located in Mark Twain National Forest, USFS, Howell County, MO
Latitude: 36.865681

Longitude: -91.934488

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Contributors

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Approval

Nels Barrett, 9/24/2020

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/29/2023
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:**

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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:**

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17. **Perennial plant reproductive capability:**
