USDA Natural Resources Conservation Service

Ecological site F116BY007MO
Dry Sandstone Upland Woodland

Last updated: 10/06/2020
Accessed: 05/03/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 116B–Springfield Plain

The Springfield Plain (area outlined in red on the map) 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 Sandstone 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 Woodland.

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:
Stockton Prairie/Savannah Dissected Plain
Upper Sac River Oak Savanna/Woodland Low Hills
Lower Sac River Oak Woodland Hills
Clear Creek Prairie/Savannah Dissected Plain
Bolivar Prairie/Savanna Plain
Upper Pomme de Terre Oak Savanna/Woodland Dissected 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”.

Dry Sandstone Upland Woodlands (green areas on the map) occur mainly in the north part of the Springfield Plain, on the Pennsylvanian-aged sandstone deposits. An isolated area also occurs in the far south of the area in Barry county, on Mississippian-aged sandstone. Soils are loamy and are moderately deep over sandstone bedrock. The reference plant community is woodland with an overstory dominated by post oak with lesser amounts of black oak

and white oak, and a ground flora of native grasses and forbs.

Associated sites

F116BY017MO	**Gravelly/Loamy Upland Drainageway Woodland** Gravelly/Loamy Upland Drainageway Woodlands are downslope.
F116BY019MO	**Low-Base Interbedded Sedimentary Upland Woodland** Low-base Low-Base Interbedded Sedimentary Upland Woodland Upland Woodlands are commonly downslope, on loser backslopes.
R116BY025MO	**Shallow Sandstone Upland Glade/Woodland** Shallow Sandstone Upland Glade/Woodlands are adjacent, and often downslope, where the depth to sandstone bedrock is less than 20 inches.

Similar sites

F116BY019MO	**Low-Base Interbedded Sedimentary Upland Woodland** Low-base Low-Base Interbedded Sedimentary Upland Woodland Upland Woodlands are similar in structure and overstory composition but understory species are different. These sites are somewhat more productive.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus velutina*
Shrub	(1) *Vaccinium pallidum* (2) *Rhus aromatica*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Desmodium*

Physiographic features

This site is on upland summits, shoulders and backslopes with slopes of 2 to 15 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Dodd, 1985) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. In this figure, there is no demarcation between the Dry Sandstone Upland Woodland, labeled “1”, and the Shallow Sandstone Upland Glade/Woodland, labeled “2”. In general the Dry Sandstone Upland sites are upslope, on summits, shoulders and upper backslopes, whereas the Shallow Sandstone sites are on lower slopes above the Drainagway sites. Dry Sandstone Upland Woodlands and Shallow Sandstone Upland Glade/Woodland sites are intermingled in places.

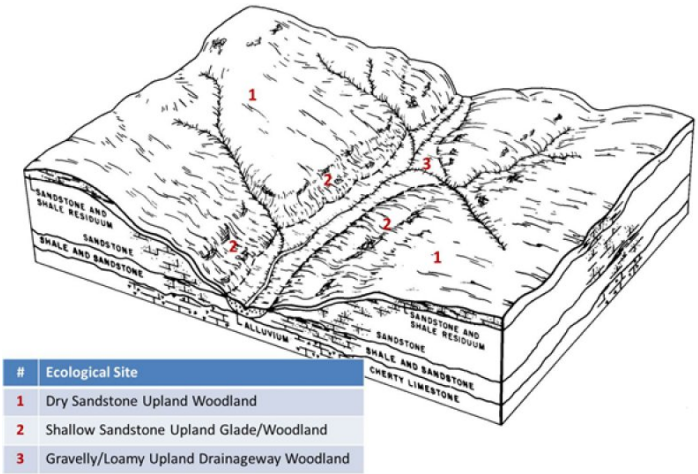


Figure 1. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Interfluve
Flooding frequency	None
Ponding frequency	None
Slope	2–15%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

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 (average)	172 days
Freeze-free period (average)	196 days
Precipitation total (average)	1,245 mm

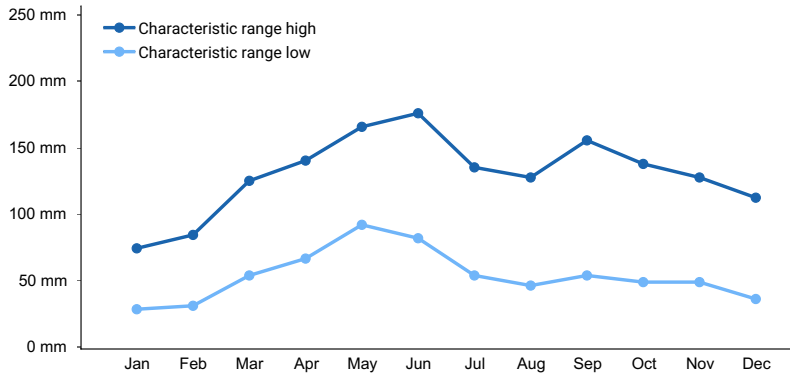


Figure 2. Monthly precipitation range

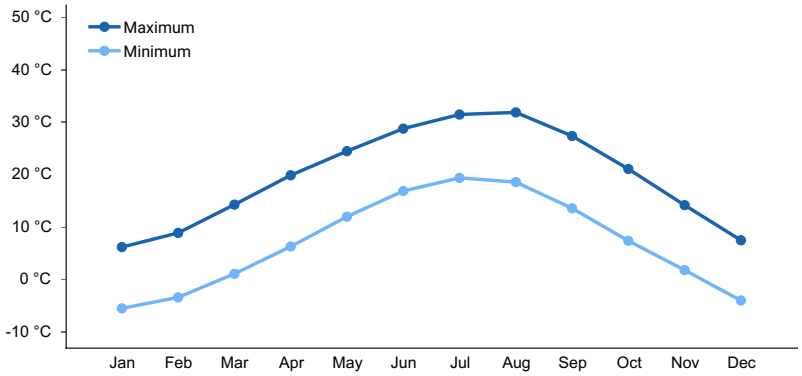


Figure 3. Monthly average minimum and maximum temperature

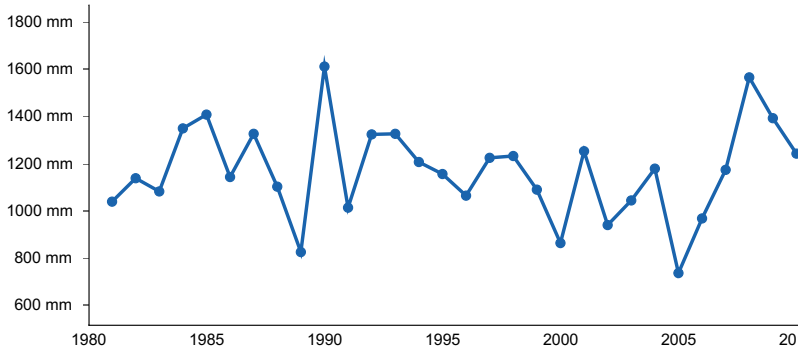


Figure 4. Annual precipitation pattern

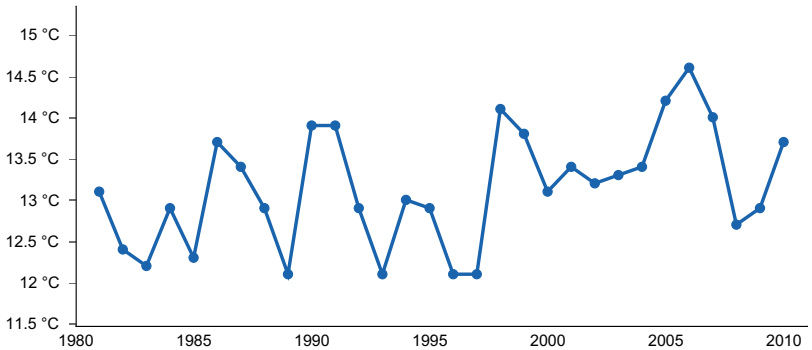


Figure 5. Annual average temperature pattern

Climate stations used

- (1) SELIGMAN [USC00237645], Seligman, MO
- (2) STOCKTON DAM [USC00238082], Stockton, MO

- (3) ASH GROVE 4S [USC00230304], Ash Grove, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

These soils are underlain by sandstone bedrock at 20 to 40 inches. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is residuum weathered from sandstone. They have loam or fine sandy loam surface horizons, and loamy subsoils. These soils are not affected by seasonal wetness. Soil series associated with this site include Bolivar and Lily.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone
Surface texture	(1) Loam (2) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow
Soil depth	51–102 cm
Surface fragment cover <=3"	0–11%
Surface fragment cover >3"	0–16%
Available water capacity (0-101.6cm)	7.62–15.24 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)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–18%
Subsurface fragment volume >3" (Depth not specified)	0–25%

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.

Dry Sandstone Upland Woodlands are dominated by post oak with lesser amounts of black oak and white oak. The canopy is height (50 to 70 feet) is fairly limited and somewhat open (45 to 85 percent canopy closure). Fire played an important role in the maintenance of this system. It is likely that this ecological site burned at least once every 5 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. Along with the moderate soil depth they would have further limited the growth and dominance of

trees, especially eastern redcedar. 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.

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.

Dry Sandstone Upland 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 large herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction.

Today, these ecological sites have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing wooded ecological sites have a younger (50 to 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 eastern redcedar and 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.

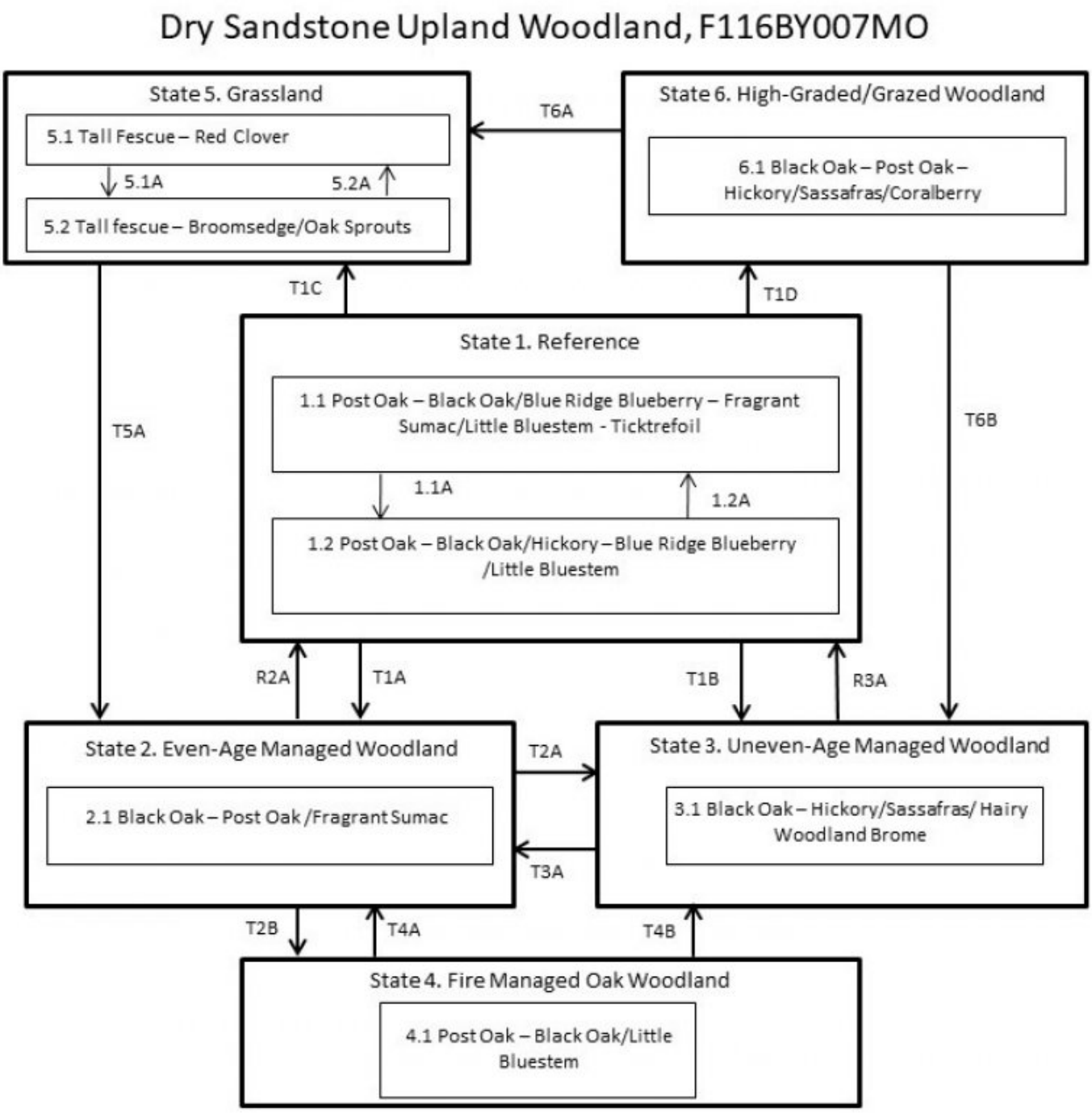
Uncontrolled domestic grazing has also impacted this community, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as coralberry, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and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

This ecological site is marginally productive. Single tree selection timber harvests are used in this community but 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.

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	Even-aged management; fire suppression
T1B	Fire suppression; uneven-age management
T2B	Prescribed fire; thinning
T1C, T6A	Clearing; pasture planting; grassland management
T1D	Poorly planned harvest; uncontrolled grazing
T2A	Uneven-age management
T3A	Even-age management
T5A	Tree planting; long-term succession; no grazing
T6B	Uneven-age management; no grazing
T4A	Uneven-age management; fire suppression
T4B	Even-age management; fire suppression

Code	Event/Process
1.1A	No disturbance (10+ yrs)
1.2A	Disturbance (fire, wind, ice) every 5-10 years
5.1A	Over grazing; no fertilization
5.2A	Brush management; grassland seeding; grassland management

Code	Event/Process
R2A	Prescribed fire; extended rotations
R3A	Uneven-age management; extended rotations

Figure 6. State and Transition Diagram for this ecological site.

State 1

Reference

The historical reference state for this ecological site was old growth woodland. This stage was dominated by post oak and black 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 very rare today. Many sites have been converted to non-native pasture (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 states have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) woodlands.

Community 1.1
Post Oak – Black Oak/Blue Ridge Blueberry – Fragrant Sumac/Little Bluestem - 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 on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

Community 1.2
Post Oak – Black Oak/Hickory – Blue Ridge Blueberry /Little Bluestem

Pathway P1.1A
Community 1.1 to 1.2

No disturbance (10+ yrs)

Pathway P1.2A
Community 1.2 to 1.1

Disturbance (fire, wind, ice) every 5-10 years

State 2
Even-Age Managed Woodland

This state starts with a sequence of early seral mixed oak woodlands, which mature over time. These woodlands tend to be rather dense, with an underdeveloped 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 Fire Managed Oak Woodlands (State 4).

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition

Community 2.1
Black Oak – Post Oak /Aromatic Sumac

State 3
Uneven-Age Managed Woodland

Uneven-Age Managed Woodlands resemble their reference state. The biggest difference is tree age, most being only 50 to 90 years old. Composition is also likely 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. Uneven Age Managed Woodland is also dense because of fire suppression, but less so than the Even-Age Managed state. Consequently, the woodland ground flora is less suppressed and structural diversity is better maintained. 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/Sassafras/ Woodland Brome

State 4
Fire Managed Oak Woodland

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

Dominant resource concerns

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

Community 4.1
Post Oak – Black Oak/Little Bluestem

State 5
Grassland

Type conversion of woodlands to planted, non-native pasture species such as tall fescue has been common in the Springfield plateau. Steep slopes, abundant surface fragments, low organic matter contents and soil acidity make non-native pastures difficult to maintain in a healthy, productive state on this ecological site. If grazing and active pasture management is discontinued, the site will eventually transition to State 2 (Even-Age Managed). Timber Stand Improvement practices can hasten this process.

Community 5.1
Tall Fescue - Red Clover

Dominant resource concerns

- 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
- 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 management; grassland seeding; grassland management

State 6
High-Graded/Grazed Woodland

Wooded 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 Managed).

Community 6.1
Black Oak – Post Oak - Hickory/Sassafras/Buckbrush

Transition T1A
State 1 to 2

Even-aged management; fire suppression

Transition T1B
State 1 to 3

Fire suppression; uneven-age management

Transition T1C
State 1 to 5

Clearing; pasture planting; grassland management

Transition T1D
State 1 to 6

Poorly planned harvest; uncontrolled grazing

Restoration pathway R2A
State 2 to 1

Prescribed fire; extended rotations

Transition T2A
State 2 to 3

Uneven-age management

Transition T2B
State 2 to 4

Prescribed fire; thinning

Restoration pathway R3A
State 3 to 1

Uneven-age management; extended rotations

Transition T3A
State 3 to 2

Even-age management

Transition T4A
State 4 to 2

Uneven-age management; fire suppression

Restoration pathway T4B
State 4 to 3

Even-age management; fire suppression

Transition T5A
State 5 to 2

Tree planting; long-term succession; no grazing

Transition T6A
State 6 to 5

Clearing; pasture planting; grassland management

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							
post oak	QUST	*Quercus stellata*	Native	–	10–30	–	–
black oak	QUVE	*Quercus velutina*	Native	–	10–30	–	–
white oak	QUAL	*Quercus alba*	Native	–	10–30	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	0–10	–	–
sassafras	SAAL5	*Sassafras albidum*	Native	–	0–10	–	–
black hickory	CATE9	*Carya texana*	Native	–	0–10	–	–
common serviceberry	AMAR3	*Amelanchier arborea*	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
fuzzy wuzzy sedge	CAHI6	*Carex hirsutella*	Native	–	5–20
Muhlenberg's sedge	CAMU4	*Carex muehlenbergii*	Native	–	5–20
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	5–20
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–20
variable panicgrass	DICO2	*Dichanthelium commutatum*	Native	–	5–20
oval-leaf sedge	CACE	*Carex cephalophora*	Native	–	5–20
Forb/Herb					
common dittany	CUOR	*Cunila origanoides*	Native	–	5–20
prostrate ticktrefoil	DERO3	*Desmodium rotundifolium*	Native	–	5–20
flaxleaf whitetop aster	IOLI2	*Ionactis linariifolius*	Native	–	5–20
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	5–20
Sampson's snakeroot	ORPE	*Orbexilum pedunculatum*	Native	–	5–20
hairy goldenrod	SOHI	*Solidago hispida*	Native	–	5–20
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	5–20
gravelweed	VEHE	*Verbesina helianthoides*	Native	–	5–20
birdfoot violet	VIPE	*Viola pedata*	Native	–	5–20
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–20
eastern purple coneflower	ECPU	*Echinacea purpurea*	Native	–	5–20
Virginia spiderwort	TRVI	*Tradescantia virginiana*	Native	–	5–20
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	5–20
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	5–20
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	5–20
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	Native	–	5–20
farkleberry	VAAR	*Vaccinium arboreum*	Native	–	5–20
St. Andrew's cross	HYHY	*Hypericum hypericoides*	Native	–	5–20
Tree					
sassafras	SAAL5	*Sassafras albidum*	Native	–	5–20

Animal community

Wildlife (MDC 2006):
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; native warm-season grasses provide cover and nesting habitat; and a diversity of forbs provides a diversity and abundance of insects.

Birds species associated with late successional to mature ecological sites 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 open 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 55 for shortleaf pine and 53 for black oak. Timber management opportunities are fair. Sandy textures and lower available water affects tree growth and increases windthrow hazards. Harvest methods that leave some mature trees to provide shade and soil protection may be desirable. Restrict cuttings to group selection cuttings of 2 to 5 acres or single tree selections. These sites respond well to prescribed fire as a management tool.

Limitations: Bedrock may be within 40 inches. 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: Dry Sandstone Upland Woodland

Plot STLACE01 – Bolivar soil
Located in Stockton Lake COE/CA, Cedar County, MO
Latitude: 37.581311
Longitude: -93.699679

Plot BLSPCA01 – Bolivar soil
Located in Bluff Spring CA, Cedar County, MO
Latitude: 37.787834
Longitude: -93.76076

Plot TUCRCA02 – Bolivar soil
Located in Turkey Creek CA, Cedar County, MO
Latitude: 37.781428
Longitude: -93.680559

Plot TUCRCA03 – Bolivar soil
Located in Turkey Creek CA, Cedar County, MO
Latitude: 37.782699
Longitude: -93.683402

Other references

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Approval

Nels Barrett, 10/06/2020

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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	09/15/2020
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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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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:**

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17. **Perennial plant reproductive capability:**
