USDA Natural Resources Conservation Service

Ecological site F116BY012MO
Interbedded Sedimentary Protected Backslope Forest

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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.

MLRA notes

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

The Springfield Plain is in the western part of the Ozark Uplift. It is primarily a smooth plateau with some dissection along streams. Elevation is about 1,000 feet in the north to over 1,700 feet in the east along the Burlington Escarpment adjacent to the Ozark Highlands. The underlying bedrock is mainly Mississippian-aged limestone, with areas of shale on lower slopes and structural benches, and intermittent Pennsylvanian-aged sandstone deposits on the plateau surface.

Classification relationships

Terrestrial Natural Community Type in Missouri (Nelson, 2010):
The reference state for this ecological site is most similar to a Dry-Mesic Chert Forest.

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 Hardwood Mesic Forest.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus alba - Quercus rubra - Acer saccharum - Carya cordiformis / Lindera benzoin Forest (CEGL002058).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs primarily within the following Land Type Associations:
Little Sac River Oak Savanna/Woodland Low Hills
James River Oak Savanna/Woodland Low Hills

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”.

Interbedded Sedimentary Protected Backslope Forests occur on steep backslopes with northern and eastern aspects primarily along the northeast edge of the Springfield Plain, typically on lower hillslopes where shale is near the surface. A few areas occur to the south in upper reaches of the Elk River and Roaring River, and along upper reaches of Bull Shoals Lake. This site is mapped in complex with the Interbedded Exposed Exposed Backslope Woodland ecological site. Soils are moderately deep to deep over interbedded shale, mudstone and limestone bedrock, and typically have shale and mudstone fragments in clayey subsoils. The reference plant community is forest with an overstory dominated by white oak and northern red oak, an understory dominated by hickory, dogwood, hophornbeam and haws and a rich herbaceous ground flora.

Associated sites

F116BY004MO	**Low-Base Chert Upland Woodland** Low-base Chert Upland Woodlands are upslope.
F116BY017MO	**Gravelly/Loamy Upland Drainageway Woodland** Gravelly/Loamy Upland Drainageway Woodlands are downslope.
F116BY036MO	**Interbedded Sedimentary Exposed Backslope Woodland** Interbedded Sedimentary Exposed Backslope Woodlands are mapped in complex with this ecological site, on steep southern and western aspects.

Similar sites

F116BY009MO	**Chert Protected Backslope Forest** Chert Protected Backslope Forests are similar in structure and species composition. These sites have deeper soils and are generally more productive.
F116BY036MO	**Interbedded Sedimentary Exposed Backslope Woodland** Interbedded Sedimentary Exposed Backslope Woodlands are mapped in complex with this ecological site, but on steep southern and western aspects. These sites are drier and less productive.

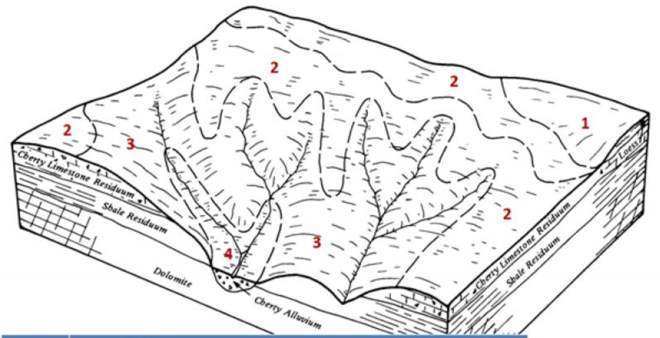
Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus rubra*
Shrub	(1) *Cornus florida*
Herbaceous	(1) *Polystichum acrostichoides* (2) *Podophyllum peltatum*

Physiographic features

This site is on upland backslopes with slopes of 15 to over 50 percent. It is on protected aspects (north, northeast, and east), which receive significantly less solar radiation than the exposed aspects. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Dodd, 1990) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. Interbedded Sedimentary Protected Backslope Forest sites are within the area labeled as “3”, and are typically on lower slopes where the shale crops out downslope from the overlying limestone. Structural benches and upper, less sloping backslopes within this area are in the Interbedded Sedimentary Upland Woodland ecological sites. Low-base Chert Upland Woodland sites are typically upslope, and areas of Low-base Chert Upland sites are shown on upper slopes within the area labeled as “3”. Several soils are included within the Low-base Chert Upland Woodland area labeled as “2”, as indicated by the dashed line within the delineation.



#	Ecological Site
1	Fragipan Upland Woodland
2	Low-base Chert Upland Woodland
3	Interbedded Sedimentary Upland & Backslope Woodlands & Forests
4	Gravelly/Loamy Upland Drainageway Woodland

Figure 1. landscape relationships for this ecological site

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope
Flooding frequency	None
Ponding frequency	None
Slope	15–50%
Water table depth	13–39 in
Aspect	NW, N, NE, E

Climatic features

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

The Springfield Plain experiences few regional differences in climates. The average annual precipitation in this area is 41 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 55 to 58 degrees F. The lower temperatures occur at the higher elevations. Mean July maximum temperatures have a range of only one or two degrees across the area.
Mean annual precipitation varies along a west to east gradient. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer.

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

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Deep sinkholes often have a microclimate significantly cooler, moister, and shadier than surrounding surfaces, a phenomenon that may result in a strikingly different ecology. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

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

Table 3. Representative climatic features

Frost-free period (average)	183 days
Freeze-free period (average)	199 days
Precipitation total (average)	50 in

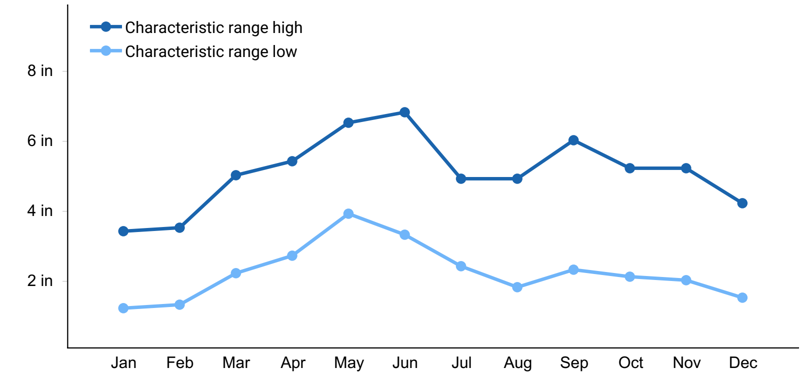


Figure 2. Monthly precipitation range

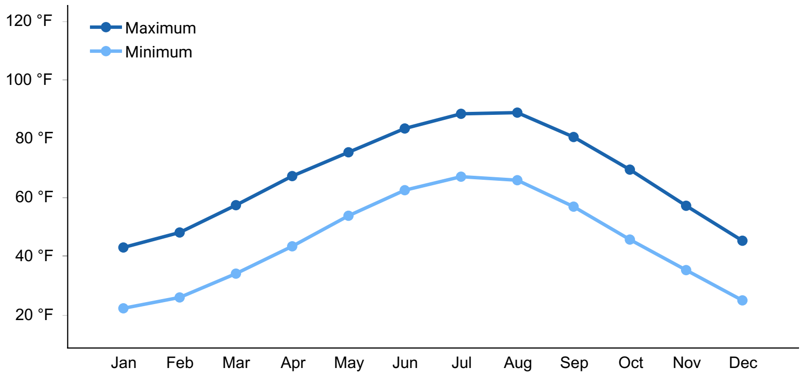


Figure 3. Monthly average minimum and maximum temperature

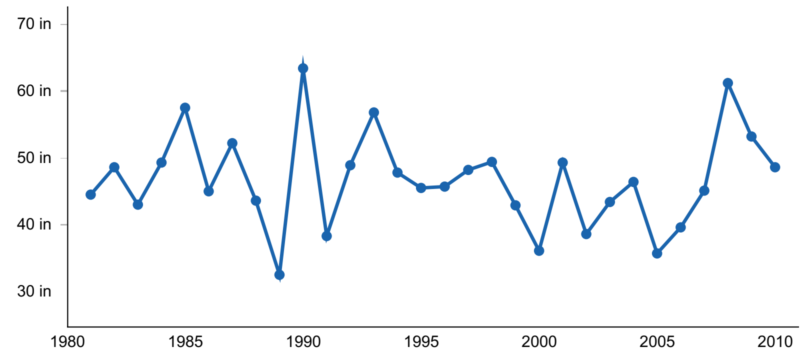


Figure 4. Annual precipitation pattern

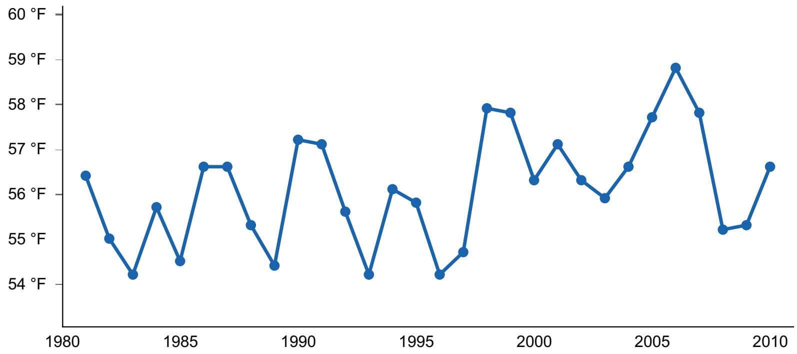


Figure 5. Annual average temperature pattern

Climate stations used

- (1) STOCKTON DAM [USC00238082], Stockton, MO
- (2) SPRINGFIELD [USW00013995], Springfield, MO
- (3) SELIGMAN [USC00237645], Seligman, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. This site generates runoff to adjacent, downslope ecological sites. The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams.

Soil features

These soils are underlain by interbedded shale, mustone and limestone bedrock between 40 and 70 inches, although the site definition allows for soils as shallow as 20 inches. The subsoils are not low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum derived from siltstone and shale. They have silt loam surface horizons that are often gravelly, and clayey subsoils with varying amounts of shale fragments. These soils are not affected by seasonal wetness. Soil series associated with this site include Alsup and Boskydell.

The accompanying picture of the Alsup series shows a thin gravelly silt loam surface horizon over a yellowish brown, clayey subsoil. The olive yellow colors below about 80 cm in this picture are inherited from the shale parent material. Soft shale is below one meter, at the bottom of this picture. Scale is in centimeters. Picture from Henderson (2004).

Figure 6. Alsup series

Table 4. Representative soil features

Parent material	(1) Residuum–shale and siltstone (2) Slope alluvium–limestone and shale
Surface texture	(1) Silt loam (2) Gravelly silty clay loam (3) Very channery
Family particle size	(1) Clayey
Drainage class	Moderately well drained
Permeability class	Very slow
Soil depth	20–60 in
Surface fragment cover <=3"	10–20%
Surface fragment cover >3"	0–30%
Available water capacity (0-40in)	2–5 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)	4.5–7.8
Subsurface fragment volume <=3" (Depth not specified)	5–10%
Subsurface fragment volume >3" (Depth not specified)	0–50%

Ecological dynamics

Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Interbedded Sedimentary Protected Backslope Forests historically occurred in the most protected landscape positions on lower, steep slopes in the deeper valleys furthest from the prairie and savanna uplands. The reference plant community is a forest characterized by a relatively tall, closed canopy dominated by white oak and northern red oak with a well-developed understory of hickory, white ash, dogwood, hophornbeam and haw, providing woody structural diversity not found in many adjacent woody communities. The ground flora has many spring ephemerals and other shade loving herbaceous plant species.

While the upland prairies and savannas in the area may have had a fire frequency of 1 to 3 years, Interbedded Sedimentary Protected Backslope Forests burned less frequently (5 to 20 years) and with lower intensity. Occurrences in landscape positions closer to prairies were more likely to burn, and may have been maintained in a more open, woodland condition.

In addition to periodic fire, these ecological sites were 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, many of these ecological sites have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing forested ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices. An increase in hickories over historic conditions is not uncommon. In addition, in the absence of fire, the canopy, sub-canopy and understory layers are more fully developed. On these protected slopes, the absence of periodic fire has allowed more shade tolerant tree species, such as sugar maple, white ash, and hickories to increase.

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 sites. Oak regeneration is typically problematic. Sugar maple, red elm, hophornbeam, hickory, pawpaw and northern spicebush 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.

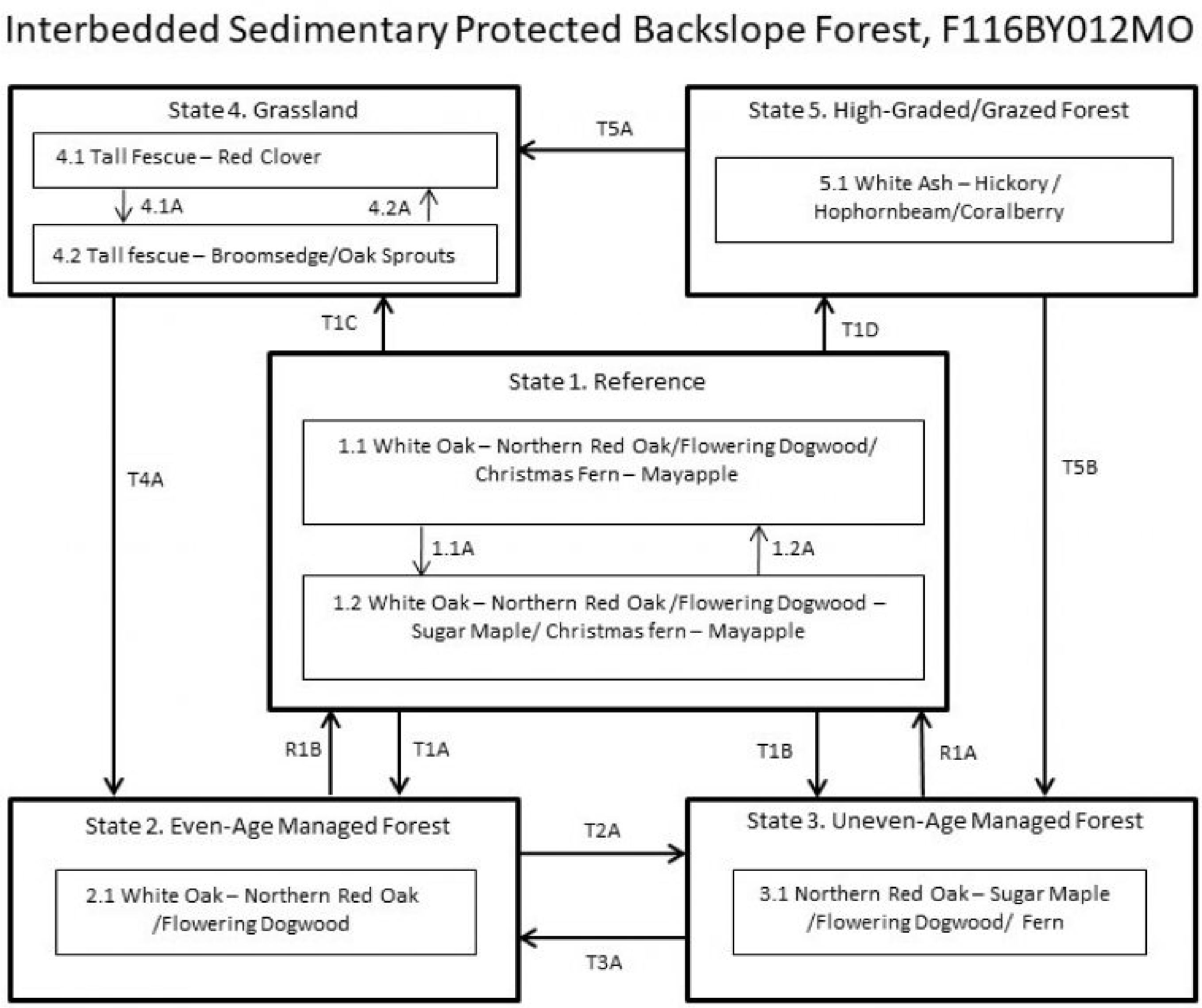
Single tree selection timber harvests are common in this region and often results in removal of the most productive trees (high grading) in the stand leading to poorer quality timber and a shift in species composition away from more valuable oak species. Better planned single tree selection or the creation 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, the ground flora diversity can be shaded out and diversity of the stand may suffer.

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. 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	Activity/Event/Process
T1A	Harvesting; even-aged management
T1B	Harvesting; uneven-age management
T1C, T5A	Clearing; pasture planting
T1D	High-grade harvesting; uncontrolled grazing
T2A	Uneven-age management
T3A	Even-age management
T4A, T5A	Tree planting; long-term succession; no grazing
T5B	Uneven-age management; tree planting; no grazing

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

Code	Activity/Event/Process
R1A	Extended rotations
R1B	Uneven-age mgt, extended rotations

Figure 7. State and transition diagram for this ecological site

State 1

Reference

The reference state was dominated by white oak and northern red oak. Periodic disturbances from fire, wind or ice maintained the dominance of oaks by opening up the canopy and allowing more light for oak reproduction. Long disturbance-free periods allowed an increase in more shade tolerant species such as hickory and sugar maple. Two community phases are recognized in this state, with shifts between phases based on disturbance frequency. The reference state is rare today. Some 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). Fire suppression has also resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many reference sites have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) forests.

Community 1.1
White Oak – Northern Red Oak/Flowering Dogwood/ Christmas Fern – Mayapple

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
White Oak – Northern Red Oak /Flowering Dogwood – Sugar Maple/ Christmas fern – Mayapple

State 2
Even-Age Managed Forest

These forests tend to be rather dense, with an under developed understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. Continual timber management, depending on the practices used, will either maintain this state, or convert the site to uneven-age (State 3) forests.

Dominant resource concerns

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

Community 2.1
White Oak – Northern Red Oak/Flowering Dogwood

State 3
Uneven-Age Managed Forest

Uneven-Age Managed forests can resemble the 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 such as sugar maple and white oak will become less dominant.

Dominant resource concerns

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

Community 3.1
Northern Red Oak – Sugar Maple/Flowering Dogwood/ Fern

State 4
Grassland

Conversion of wooded sites to planted, non-native pasture species such as tall fescue has been common in this MLRA. Steep slopes, surface fragments, low organic matter contents and soil acidity make non-native pastures challenging to maintain in a healthy, productive state on this ecological site. If grazing and active pasture management is discontinued, the site will eventually transition, over time, to State 2 (Even-Age).

Community 4.1
Tall Fescue - Red Clover

Dominant resource concerns

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

Community 4.2
Tall fescue - Broomsedge/Oak Sprouts

Dominant resource concerns

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

State 5
High-Graded/Grazed Forest

Forested sites subjected to repeated, high-graded timber harvests and uncontrolled 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 coralberry, 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 livestock from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

Community 5.1
White Ash – Hickory / Hophornbeam/Coralberry

Transition T1A
State 1 to 2

Harvesting; even-aged management; fire suppression

Transition T1B
State 1 to 3

Harvesting; uneven-age management; fire suppression

Transition T1C
State 1 to 4

Clearing; grassland planting; grassland management

Restoration pathway R1B
State 2 to 1

Uneven-age management; extended rotations; forest stand improvement

Transition T2A
State 2 to 3

Uneven-age management; forest stand improvement

Restoration pathway R1A
State 3 to 1

Extended rotations; forest stand improvement

Transition T3A
State 3 to 2

Even-age management; forest stand improvement

Restoration pathway T4A
State 4 to 2

Tree planting; long-term succession; no grazing; forest stand improvement

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							
white oak	QUAL	*Quercus alba*	Native	–	40–70	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	20–40	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	10–20	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	–	5–20	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	5–20	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	10–20	–	–
white ash	FRAM2	*Fraxinus americana*	Native	–	10–20	–	–
red maple	ACRU	*Acer rubrum*	Native	–	5–10	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–10
Bosc's panicgrass	DIBO2	*Dichanthelium boscii*	Native	–	5–10
Muhlenberg's sedge	CAMU4	*Carex muehlenbergii*	Native	–	5–10
Forb/Herb					
bearded shorthusk	BRER2	*Brachyelytrum erectum*	Native	–	5–10
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	–	5–10
Canadian clearweed	PIPU2	*Pilea pumila*	Native	–	5–10
fourleaf yam	DIQU	*Dioscorea quaternata*	Native	–	5–10
eastern greenviolet	HYCO6	*Hybanthus concolor*	Native	–	5–10
zigzag goldenrod	SOFL2	*Solidago flexicaulis*	Native	–	5–10
early meadow-rue	THDI	*Thalictrum dioicum*	Native	–	5–10
bloody butcher	TRRE5	*Trillium recurvatum*	Native	–	5–10
toadshade	TRSE2	*Trillium sessile*	Native	–	5–10
largeflower bellwort	UVGR	*Uvularia grandiflora*	Native	–	5–10
harbinger of spring	ERBU	*Erigenia bulbosa*	Native	–	5–10
hepatica	HENO2	*Hepatica nobilis*	Native	–	5–10
goldenseal	HYCA	*Hydrastis canadensis*	Native	–	5–10
eastern waterleaf	HYVI	*Hydrophyllum virginianum*	Native	–	5–10
smooth Solomon's seal	POBI2	*Polygonatum biflorum*	Native	–	5–10
bloodroot	SACA13	*Sanguinaria canadensis*	Native	–	5–10
cutleaf toothwort	CACO26	*Cardamine concatenata*	Native	–	5–10
yellow fumewort	COFL3	*Corydalis flavula*	Native	–	5–10
dwarf larkspur	DETR	*Delphinium tricorne*	Native	–	5–10
dutchman's breeches	DICU	*Dicentra cucullaria*	Native	–	5–10
eastern false rue anemone	ENBI	*Enemion biternatum*	Native	–	5–10
white fawnlily	ERAL9	*Erythronium albidum*	Native	–	5–10
white baneberry	ACPA	*Actaea pachypoda*	Native	–	5–10
Jack in the pulpit	ARTR	*Arisaema triphyllum*	Native	–	5–10

Canadian wildginger	ASCA	*Asarum canadense*	Native	–	5–10
Fern/fern ally					
Christmas fern	POAC4	*Polystichum acrostichoides*	Native	–	5–10
northern maidenhair	ADPE	*Adiantum pedatum*	Native	–	5–10
Shrub/Subshrub					
northern spicebush	LIBE3	*Lindera benzoin*	Native	–	5–20
Tree					
pawpaw	ASTR	*Asimina triloba*	Native	–	5–20
hophornbeam	OSVI	*Ostrya virginiana*	Native	–	5–20
flowering dogwood	COFL2	*Cornus florida*	Native	–	5–20
slippery elm	ULRU	*Ulmus rubra*	Native	–	5–20
Vine/Liana					
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	–	10–20
summer grape	VIAE	*Vitis aestivalis*	Native	–	10–20

Table 7. Community 2.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
white oak	QUAL	*Quercus alba*	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 late-successional, mature forests are Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Yellow-billed Cuckoo, Summer Tanager, Wood Thrush, Red-eyed Vireo, Scarlet Tanager, Northern Parula (near streams), and Louisiana Waterthrush (near streams).

Reptiles and amphibians associated with these forests include: ringed salamander, spotted salamander, marbled salamander, central newt, long-tailed salamander, dark-sided salamander, southern red-backed salamander, small-mouthed salamander, three-toed box turtle, ground skink, western worm snake, western earth snake, and American toad.

Other information

Forestry (NRCS 2002; 2014):
Management: Field measured site index values average 78 for northern red oak. Timber management opportunities are 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 could have a negative impact on timber quality and should be used with caution on a site if timber management is the primary objective.

Limitations: Large amounts of coarse fragments throughout profile; bedrock may be within 60 inches. 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: Interbedded Sedimentary Protected Backslope Forest

Plot PLHOCA02 – Alsup soil
Located in Pleasant Hope CA, Polk County, MO
Latitude: 37.42813
Longitude: -93.31715

Plot RORISP04 – Alsup soil
Located in Roaring River State Park, Barry County, MO
Latitude: 36.593538
Longitude: -93.845603

Plot FLSPCA03 – Alsup soil
Located in Flag Spring CA, Barry County, MO
Latitude: 36.59523
Longitude: -94.037837

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Contributors

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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	09/23/2020
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

5. **Number of gullies and erosion associated with gullies:**

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

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

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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:**