Ecological site F109XY025MO
Interbedded Sedimentary Exposed Backslope Woodland

Accessed: 04/20/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 109X–Iowa and Missouri Heavy Till Plain

The Iowa and Missouri Heavy Till Plain (area outlined in red on the map) is an area of rolling hills interspersed with interfluve divides and alluvial valleys. Elevation ranges from about 660 feet along the lower reaches of rivers, to about 980 feet on stable interfluve summits in southern Iowa. Relief is about 80 to 160 feet between major streams and adjacent interfluve summits. Most of the till plain drains south to the Missouri River via the Grand and Chariton River systems, but the northeastern portion drains southeast to the Mississippi River. Loess caps the pre-Illinoisan aged till on interfluves, whereas the till is exposed on side slopes. Mississippian aged limestone and Pennsylvanian aged sandstone and shale crop out on lower slopes in some areas.

Classification relationships

Terrestrial Natural Community Type in Missouri (Nelson, 2010):
The reference state for this ecological site is most similar to a Dry Limestone/Dolomite 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 stellata - Quercus marilandica - Quercus velutina - Carya texana / Schizachyrium scoparium Woodland (CEGL002149).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs in many Land Type Associations, primarily within the following Subsections:
Chariton River Hills
Grand River 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. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Interbedded Sedimentary Exposed Backslope Woodlands are within the green areas on the map. They occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Interbedded Sedimentary Protected Backslope Forest ecological site. Sites are scattered throughout the MLRA, on Pennsylvanian aged sediments that are typically interbedded shale, sandstone, siltstone and limestone. Soils are moderately deep over interbedded sedimentary bedrock, and typically have sedimentary fragments in clayey subsoils. The reference plant community is woodland with an overstory dominated by white oak and black oak, and a ground flora of native grasses and forbs.

Associated sites

F109XY003MO	**Loess Upland Woodland** Loess Upland Woodlands are upslope from the shale sites, on upper backslopes and shoulders.
F109XY004MO	**Loamy Upland Drainageway Woodland** Loamy Upland Drainageway Woodlands, and other floodplain sites, are downslope.
F109XY007MO	**Till Upland Woodland** Till Upland Woodlands are upslope from the shale sites, on upper backslopes and shoulders.
F109XY011MO	**Interbedded Sedimentary Upland Woodland** Interbedded Sedimentary Upland Woodlands are upslope, on upper backslopes and shoulders.
F109XY013MO	**Interbedded Sedimentary Protected Backslope Forest** Interbedded Sedimentary Protected Backslope Forests are mapped in complex with this ecological site, on steep backslopes with southern to western aspects.
R109XY002MO	**Loess Upland Prairie** Loess Upland Prairies are upslope in prairie areas, on summits and shoulders.

Similar sites

F109XY022MO	**Till Exposed Backslope Woodland** Till Exposed Backslope Woodlands have similar overstory compositions but are somewhat more productive.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Helianthus hirsutus*

Physiographic features

This site is on upland backslopes with slopes of 10 to 50 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected 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 Oelmann,1984) shows the typical landscape position of this ecological site, and landscape relationships among the major ecological sites in the uplands and adjacent floodplains. Assuming that north is towards the top of the diagram, the site is within the area labeled “3”, on southerly and westerly aspects. This site is typically downslope from Loess or Till Upland ecological sites. Upland Drainageway or Floodplain ecological sites are directly downslope.

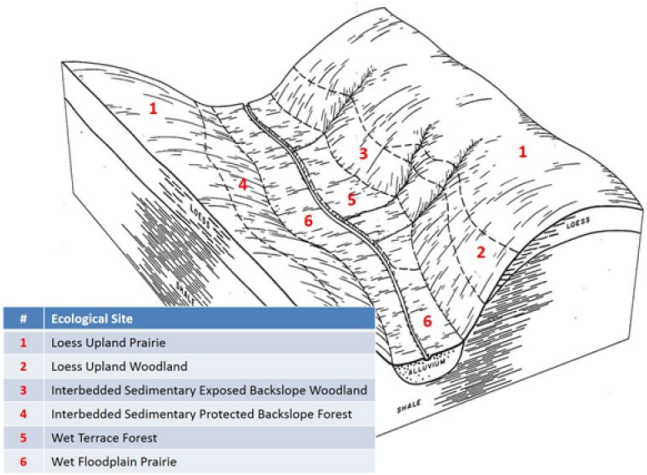


Figure 2. Landscape relationships for this ecological site

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Slope	10–50%
Water table depth	24–72 in
Aspect	S, SW, W

Climatic features

The Iowa and Missouri Heavy Till Plain MLRA 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. This MLRA experiences small regional differences in climates that grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line from north to south. Both mean annual temperature and precipitation exhibit fairly minor gradients along this line. Mean January minimum temperature follows the north-to-south gradient. However, mean July maximum temperature shows hardly any geographic variation in the region. Mean July maximum temperatures have a range of only two to three degrees across the region. Mean annual precipitation varies along the same gradient as temperature – lower annual precipitation in the north, higher in the south. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages four to five times greater than January precipitation. During years when precipitation is normal, moisture is stored in the soil profile 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 influences ecological communities by limiting water supplies, especially at times of high temperatures and high evaporation rates. Drought indirectly affects ecological communities by increasing plant and animal susceptibility to the probability and severity of fire.

Frequent fires encourage the development of grass/forb dominated communities and understories. Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. 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. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier, supporting more grass dominated communities than adjacent north- and-east-facing slopes that are cooler and moister that support more woody dominated communities. Finally, the climate within a canopied forest ecological site is measurably different from the climate of the more open grassland or savanna ecological sites. 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)	161 days
Freeze-free period (average)	184 days
Precipitation total (average)	42 in

Climate stations used

- (1) LONG BRANCH RSVR [USC00235050], Macon, MO
- (2) ALBIA 3 NNE [USC00130112], Albia, IA
- (3) CHARITON 1 E [USC00131394], Chariton, IA
- (4) KEARNEY 3E [USC00234382], Kearney, MO
- (5) KEOSAUQUA [USC00134389], Keosauqua, IA
- (6) AMITY 4 NE [USC00230143], Maysville, MO
- (7) GALLATIN 1W [USC00233102], Gallatin, MO

Influencing water features

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

Soil features

These soils are underlain with interbedded sedimentary bedrock at 20 to 40 inches deep. Some areas are underlain by soft shale at shallower depths. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium and residuum weathered from interbedded shale, sandstone, siltstone and limestone, overlying sedimentary bedrock. They have silty clay loam or silt loam surface layers. Subsoils are silty clay loam to silty clay, with low to moderate amounts of sedimentary fragments. Some soils are slightly affected by seasonal wetness. Soil series associated with this site include Gosport, Locksprings, Mandeville, Munterville, Norris, Reger, and Vanmeter.

The accompanying picture of a roadcut in the Vanmeter series illustrates the variable depth to sedimentary bedrock typical of the soils in this ecological site. Photo courtesy of Kim Worth, NRCS.

Figure 7. Vanmeter series

Table 4. Representative soil features

Parent material	(1) Residuum–limestone, sandstone, and shale
Surface texture	(1) Silt loam (2) Loam (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to slow
Soil depth	10–40 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	3–5 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.5–8.2
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

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

The reference plant community is woodland dominated by an overstory of white oak and black oak and occasional hickories, bur oak and post oak. This woodland type has a moderate canopy closure (50 to 80 percent), with an open understory and a dense, diverse herbaceous ground flora. Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species.

Fire played an important role in the maintenance of these systems. Because these sites normally occur next to the prairie edge, it is likely that these ecological sites burned at least once every 3 to 5 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open the woodlands up again and stimulate the abundant ground flora.

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. Black oak and hickory now share dominance with white oak and there are considerably more saplings in the understory. 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.

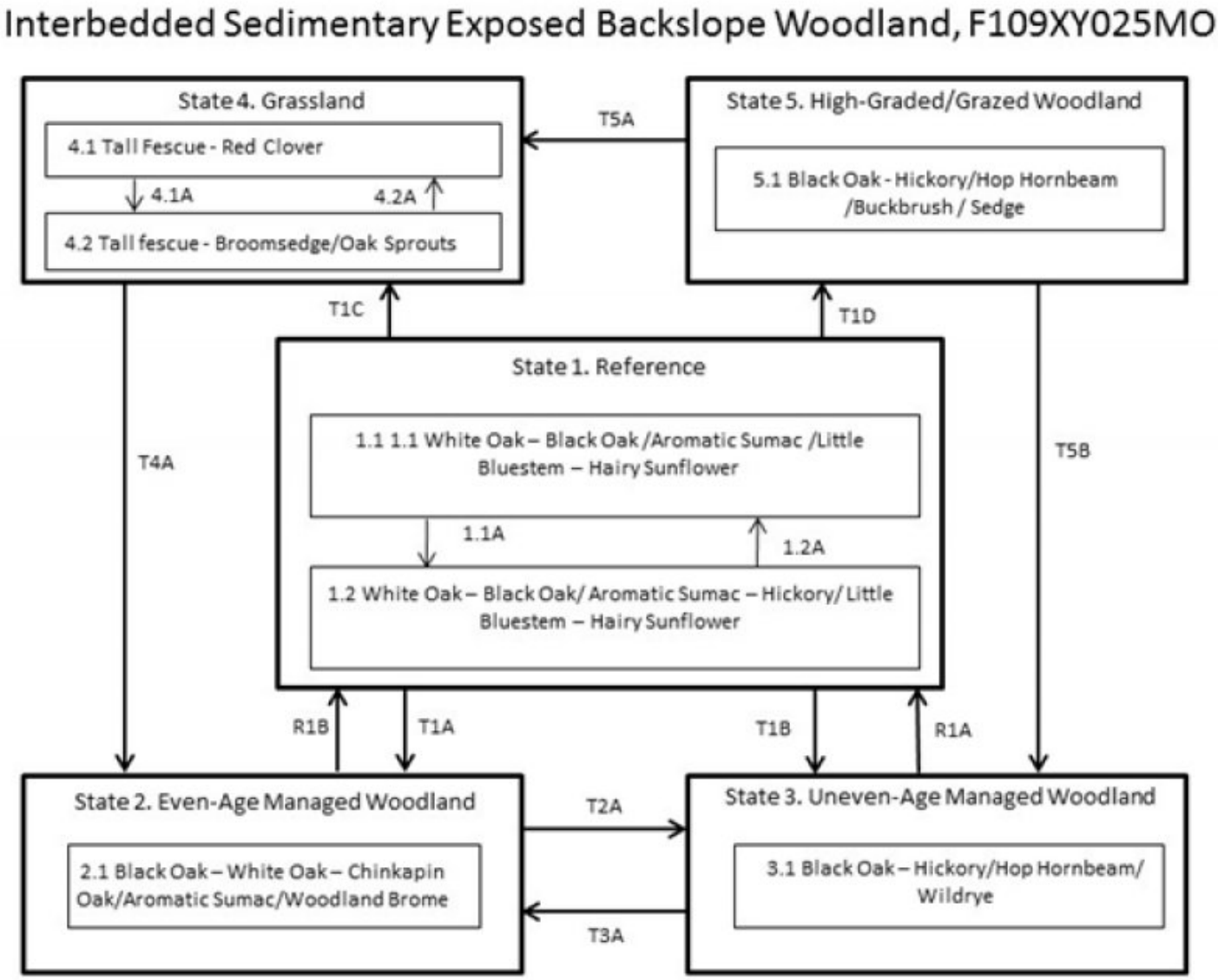
In the long term absence of fire, woody species, especially hickory, hophornbeam and gooseberry encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels, greatly diminishing ground flora. Opening the canopy, removing the younger understory and applying prescribed fire have proven to be effective restoration means.

Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, 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, if managed properly, can be a source for timber products. Most areas on this ecological site have been repeatedly logged and high graded. Even-age management, using clearcut, or shelterwood and seed tree harvest systems without fire will perpetuate the overly dense, shaded conditions of current stands. Partial selective cutting and prescribed fire can, however, restore the more open structure and diversity of ground flora species. Managed areas show an exceptional resiliency and production. 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. This type of management can provide timber products, wildlife habitat, and potential native forage.

A state-and-transition model 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
T1B	Fire suppression; uneven-age management
T1C, T5A	Clearing & pasture planting
T1D	Poorly planned harvest & uncontrolled grazing
T2A	Uneven-age management
T3A	Even-age management
T4A, T5A	Tree planting; long-term succession; no grazing
T4B	Uneven-age management; no grazing; forest stand improvement

Code	Event/Process
1.1A	No disturbance (10+ years)
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
R1A	Prescribed fire & extended rotations
R1B	Uneven-age mgt, extended rotations

Figure 8. State and transition diagram for this ecological s

State 1

Reference

The reference state for this ecological site was old growth oak woodland dominated by black oak, and white oak. Maximum tree age was likely 150 to 300 years. 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. This reference state is uncommon today. Some sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvest coupled with domestic livestock grazing (State 5). Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many reference sites have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) forests.

Community 1.1
White Oak-Black Oak/Aromatic Sumac/Little Bluestem-Hairy Sunflower

Figure 9. Dark Hollow Conservation Area near Green City, Missouri

This phase has an overstory that is dominated by white oak and black oak with hickory and and post oak also present. This woodland community has a two-tiered structure with an open understory and a dense, diverse herbaceous ground flora. Periodic disturbances including fire, ice and wind create canopy gaps, allowing white oak and black oak to successfully reproduce and remain in the canopy and sunlight to reach the woodland floor to maintain native grasses and forbs.

Forest overstory. The Forest Overstory Species list is based on reconnaissance-level plots, as well as commonly occurring species listed in Nelson (2010). Species identified from plot data include cover percentages and canopy heights. Species not found in plots, but listed in Nelson, do not include cover and canopy data.

Forest understory. The Forest Understory list is based on reconnaissance-level plots, as well as commonly occurring species listed in Nelson (2010). Species identified from plot data include cover percentages and canopy heights. Species not found in plots, but listed in Nelson, do not include cover and canopy data. Note that plot data for canopy heights are by height class, not actual species heights.

Community 1.2
White Oak-Black Oak/Aromatic Sumac-Hickory/Little Bluestem-Hairy Sunflower

This phase is similar to community phase 1.1 but oak and hickory understory densities are increasing due to longer periods of fire suppression. Displacement of some grasses and forbs may be occurring due to shading and competition from the increased densities of oak and hickory saplings in the understory.

State 2
Even-Age Managed Woodland

This state starts with a sequence of early seral white oak woodlands, which mature over time. These woodlands 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) woodlands.

Community 2.1
Black Oak-White Oak-Chinkapin Oak/Aromatic Sumac/Woodland Brome

State 3
Uneven-Age Managed Woodland

Uneven-Age Managed woodlands 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.

Community 3.1
Black Oak-Hickory/Hophornbeam/Wildrye

State 4
Grassland

State 4: Grassland Type conversion of woodlands to planted, non-native pasture species such as tall fescue has been common in this MLRA. Steep slopes, abundant 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 to State 2 (Even-Age).

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 (phase 4.2) and to woodland communities (where liming is not practiced).

Community 4.2
Tall Fescue-Broomsedge/Oak Sprouts

This phase is the result of over use, poor grassland and grazing management and lack of adequate nutrient application. Forage production and quality are generally lower than phase 4.1.

State 5
High-Graded/Grazed Woodland

Ecological 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 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 livestock from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

Community 5.1
Black Oak-Hickory/Hophornbeam/Buckbrush/Sedge

Figure 10. A previously grazed and logged site on Mineral Hills Conservation Area

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							
northern red oak	QURU	*Quercus rubra*	Native	35–80	10–75	–	–
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	60–80	25–50	–	–
black oak	QUVE	*Quercus velutina*	Native	60–80	10–25	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	35–55	10–25	–	–
white oak	QUAL	*Quercus alba*	Native	35–80	10–25	–	–
pignut hickory	CAGL8	*Carya glabra*	Native	35–55	10–25	–	–
hophornbeam	OSVI	*Ostrya virginiana*	Native	35–55	1–2	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	–	–	–
post oak	QUST	*Quercus stellata*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	0.3–2	1–2
hairgrass	AIRA	*Aira*	Native	0.3–2	1–2
rosette grass	DICHA2	*Dichanthelium*	Native	0.3–2	0.1–1
eastern bottlebrush grass	ELHY	*Elymus hystrix*	Native	–	–
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	–
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	–

big bluestem	ANGE	*Andropogon gerardii*	Native	–	–
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	–
Pennsylvania sedge	CAPE6	*Carex pensylvanica*	Native	–	–
parasol sedge	CAUM4	*Carex umbellata*	Native	–	–
Forb/Herb					
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	0.3–2	10–25
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	0.3–2	2–25
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	0.3–2	2–25
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	0.3–2	5–10
clustered blacksnakeroot	SAOD	*Sanicula odorata*	Native	0.3–2	5–10
white snakeroot	AGAL5	*Ageratina altissima*	Native	0.3–2	1–5
soft agrimony	AGPU	*Agrimonia pubescens*	Native	0.3–2	1–2
largeflower bellwort	UVGR	*Uvularia grandiflora*	Native	0.3–2	1–2
American lopseed	PHLE5	*Phryma leptostachya*	Native	0.3–2	1–2
jumpseed	POVI2	*Polygonum virginianum*	Native	0.3–2	0.1–1
beaked agrimony	AGRO3	*Agrimonia rostellata*	Native	0.3–2	0.1–1
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	0.3–2	0.1–1
widowsfrill	SIST	*Silene stellata*	Native	0.3–2	0.1–1
aster	SYMPH4	*Symphyotrichum*	Native	0.3–2	0.1–1
shining bedstraw	GACO3	*Galium concinnum*	Native	0.3–2	0.1–1
white avens	GECA7	*Geum canadense*	Native	0.3–2	0.1–1
queendevil	HIGR3	*Hieracium gronovii*	Native	0.3–2	0.1–1
pinweed	LECHE	*Lechea*	Native	0.3–2	0.1–1
broadleaf enchanter's nightshade	CILU	*Circaea lutetiana*	Native	0.3–2	0.1–1
largebract ticktrefoil	DECU	*Desmodium cuspidatum*	Native	0.3–2	0.1–1
flowering spurge	EUCO10	*Euphorbia corollata*	Native	0.3–2	0.1–1
Virginia threeseed mercury	ACVI	*Acalypha virginica*	Native	0.3–2	0.1–1
narrowleaf mountainmint	PYTE	*Pycnanthemum tenuifolium*	Native	0.3–2	0.1–1
littleleaf buttercup	RAAB	*Ranunculus abortivus*	Native	0.3–2	0.1–1
stalked wild petunia	RUPE4	*Ruellia pedunculata*	Native	0.3–2	0.1–1
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	Native	0.3–2	0.1–1
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	–
eastern purple coneflower	ECPU	*Echinacea purpurea*	Native	–	–
slender lespedeza	LEVI7	*Lespedeza virginica*	Native	–	–
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	–
Canadian blacksnakeroot	SACA15	*Sanicula canadensis*	Native	–	–
smooth blue aster	SYLAC	*Symphyotrichum laeve var. concinnum*	Native	–	–
bluejacket	TROH	*Tradescantia ohiensis*	Native	–	–
Culver's root	VEVI4	*Veronicastrum virginicum*	Native	–	–
Fern/fern ally					
northern maidenhair	ADPE	*Adiantum pedatum*	Native	0.3–2	0.1–1
Shrub/Subshrub					
blackberry	RUBUS	*Rubus*	Native	0.3–5	2–10
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0.3–2	0.1–2

eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0.3–2	0.1–2
fragrant sumac	RHAR4	*Rhus aromatica*	Native	2–5	1–2
gray dogwood	CORA6	*Cornus racemosa*	Native	0.3–2	0.1–1
Missouri gooseberry	RIMI	*Ribes missouriense*	Native	0.3–5	0.1–1
American hazelnut	COAM3	*Corylus americana*	Native	–	–
New Jersey tea	CEAM	*Ceanothus americanus*	Native	–	–
Tree					
hophornbeam	OSVI	*Ostrya virginiana*	Native	2–25	1–50
common serviceberry	AMAR3	*Amelanchier arborea*	Native	2–25	2–25
black maple	ACNI5	*Acer nigrum*	Native	6–25	10–25
white ash	FRAM2	*Fraxinus americana*	Native	2–5	0.1–10
sugar maple	ACSA3	*Acer saccharum*	Native	2–5	2–5
eastern redbud	CECA4	*Cercis canadensis*	Native	2–25	1–5
common hackberry	CEOC	*Celtis occidentalis*	Native	0.3–2	1–2
red mulberry	MORU2	*Morus rubra*	Native	0.3–2	0.1–1
American basswood	TIAM	*Tilia americana*	Native	0.3–2	0.1–1
winged elm	ULAL	*Ulmus alata*	Native	0.3–2	0.1–1
slippery elm	ULRU	*Ulmus rubra*	Native	0.3–2	0.1–1
bitternut hickory	CACO15	*Carya cordiformis*	Native	2–5	0.1–1
black cherry	PRSE2	*Prunus serotina*	Native	0.3–2	0.1–1
Vine/Liana					
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	0.3–2	0.1–1
frost grape	VIVU	*Vitis vulpina*	Native	0.3–2	0.1–1

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							
post oak	QUST	*Quercus stellata*	Native	–	–	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	–	–	–
black oak	QUVE	*Quercus velutina*	Native	–	–	–	–
black hickory	CATE9	*Carya texana*	Native	–	–	–	–

Table 8. Community 2.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	–

Animal community

Wildlife (MDC, 2006)
Wild turkey, white-tailed deer, and eastern gray squirrel depend on hard and soft mast food sources and are typical upland game species of this type.

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

Sedges and native cool-season grasses provide green browse; patchy 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 mature communities include Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Eastern Wood-Pewee, Broad-winged Hawk, Great-Crested Flycatcher, Summer Tanager, and Red-eyed Vireo.

Reptile and amphibian species associated with the Loess Upland Woodland include tiger salamander, small-mouthed salamander, ornate box turtle, northern fence lizard, five-lined skink, broad-headed skink, flat-headed snake, and rough earth snake.

Other information

Forestry
Management: Site index values for oak range from 51 for post oak, 62 for red oak and 54 for white oak. 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. These sites respond well to prescribed fire as a management tool.

Limitations: Clay in upper portion of soil profile; seasonal wetness. Clayey soils have reduced traction and compact easily when wet. Unsurfaced roads and skid trails may be impassable during rainy periods. Restrict activities to dry periods or surfaced areas. Seedling mortality may be high during the summer because of lack of adequate soil moisture, especially on south facing slopes. The use of equipment is restricted in spring and other wet periods. The surface layer is firm when dry and sticky when wet and becomes cloddy if tilled. 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

Reconnaissance Plots - Reference communities

Plot DAHOCA05 - Mandeville soil
Dark Hollow CA, Sullivan County, MO.
Latitude: 40.325896
Longitude: -92.923299

Plot DAHOCA06 – Gosport soil
(red oak-black maple-redbud) – not yet sampled (3/15)
Dark Hollow CA, Sullivan County, MO.
Latitude: 40.32682
Longitude: - 92.933903

Plot POOSCA02 - Locksprings soil
Poosey CA, Sullivan County, MO.
Latitude: 39.954128
Longitude: - 93.702634

Alternate State (not included in data summaries)

•Plot CROWSP04 – Vanmeter soil - grazed
Crowder State Park, Grundy County, MO.
Latitude: 40.091696
Longitude: -93.667508

Plot MIHICA05 – Vanmeter soil – high graded, grazed

Mineral Hills CA, Putnam County, MO.
Latitude: 40.42178
Longitude: - 92.933903

Other references

Missouri Department of Conservation. 2006. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.

NatureServe, 2010. Vegetation Associations of Missouri (revised). NatureServe, St. Paul, Minnesota.

Nelson, Paul W. 2010. The Terrestrial Natural Communities of Missouri. Missouri Department of Conservation, Jefferson City, Missouri.

Nigh, Timothy A., & Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City, Missouri.

Oelmann, Douglas B. 1984. Soil Survey of Monroe County, Iowa. U.S. Dept. of Agric. Soil Conservation Service.

Contributors

Doug Wallace
Fred Young

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	
Approved by	
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:**

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17. **Perennial plant reproductive capability:**
