Ecological site F109XY011MO
Interbedded Sedimentary Upland 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.

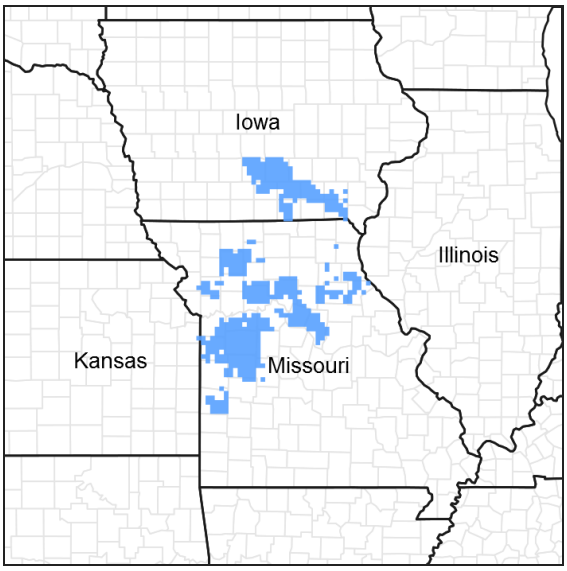


Figure 1. Mapped extent

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 muehlenbergii - Fraxinus (quadrangulata, americana) / Schizachyrium scoparium Woodland (CEGL002143).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs in many Land Type Associations, primarily within the Grand River Hills Subsection.

Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Interbedded Sedimentary Upland Woodlands are within the green areas on the map. This ecological site is on Pennsylvanian aged sediments that are typically interbedded shale, sandstone, siltstone and limestone. Soils are moderately deep to 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

F109XY004MO	**Loamy Upland Drainageway Woodland** Loamy Upland Drainageway Woodlands, and other floodplain sites, are downslope.
F109XY007MO	**Till Upland Woodland** Till Upland Woodlands are upslope in most places, on upper backslopes and shoulders.
F109XY013MO	**Interbedded Sedimentary Protected Backslope Forest** Interbedded Sedimentary Protected Backslope Forests are downslope in places, on steep backslopes with northern to eastern aspects.
F109XY025MO	**Interbedded Sedimentary Exposed Backslope Woodland** Interbedded Sedimentary Exposed Backslope Woodlands are downslope in places, on steep backslopes with southern to western aspects.
R109XY002MO	**Loess Upland Prairie** Loess Upland Prairies are upslope in some places, on summits and shoulders.

Similar sites

F109XY007MO	**Till Upland Woodland** Till Upland Woodlands are similar in composition, landscape position and also have clayey subsoils but are deeper than Shale Upland Woodlands and more productive.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Carex pensylvanica*

Physiographic features

This site is on upland summits, shoulders and backslopes with slopes of 5 to 14 percent. The site 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. The site is within the area labeled “5”, and is typically downslope from Till Upland Woodland or, less commonly, Loess Upland Prairie ecological sites. In most areas, Upland Drainageway or Floodplain ecological sites are directly downslope.

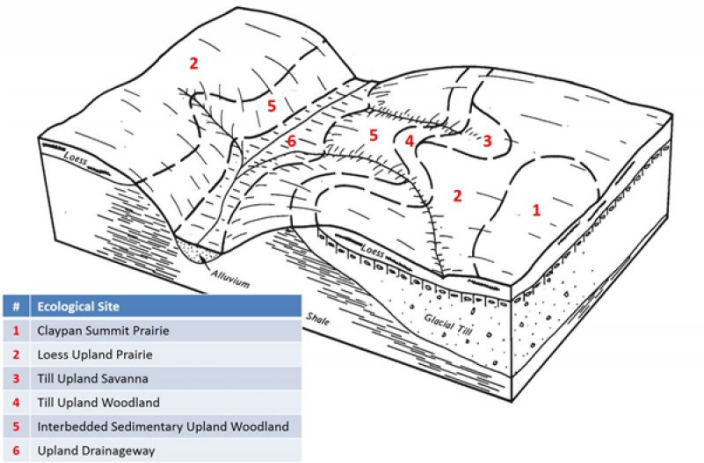


Figure 2. Landscape relationships for this ecological site

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hill (3) Interfluve
Flooding frequency	None
Ponding frequency	None
Slope	2–14%
Water table depth	24–72 in
Aspect	Aspect is not a significant factor

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 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 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 cooler microclimate within a canopied forest is measurably different from the climate of a more open and warmer grassland or savanna area.

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)	165 days
Freeze-free period (average)	187 days
Precipitation total (average)	42 in

Climate stations used

- (1) BLOOMFIELD 1 WNW [USC00130753], Bloomfield, IA
- (2) AMITY 4 NE [USC00230143], Maysville, MO
- (3) BRUNSWICK [USC00231037], De Witt, MO
- (4) CENTERVILLE [USC00131354], Centerville, IA
- (5) CHARITON 1 E [USC00131394], Chariton, IA
- (6) CHILLICOTHE 2S [USC00231580], Chillicothe, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. However, seeps may occur in headslope positions, particularly in the spring, and following heavy rainfall events. These seeps are source areas for first-order ephemeral streams, typically within Upland Drainageway ecological sites downslope. Where present, these headslope seeps are in the SLOPE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993).

Soil features

These soils are underlain with interbedded sedimentary bedrock at 20 to 60 inches deep. 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. In most areas the shale strata are acidic, but some areas are calcareous. They have silty clay loam or silt loam surface layers. Subsoils are silty clay loam to silty clay. A few of these soils are slightly affected by seasonal wetness. Soil series associated with this site include Gosport, Mandeville, Munterville, 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) Silty clay loam (2) Silt loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to slow
Soil depth	20–60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	4–6 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. This woodland

type has a moderate canopy closure (50 to 80 percent), with an open understory and a dense, diverse herbaceous ground flora. Historically, white oak dominated the canopy, along with black oak and occasional hickories, bur oak and post oak. Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species including the dominant prairie grasses. 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.

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 cropland, 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 considerable 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, hornbeam and gooseberry encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels greatly diminishing the ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools.

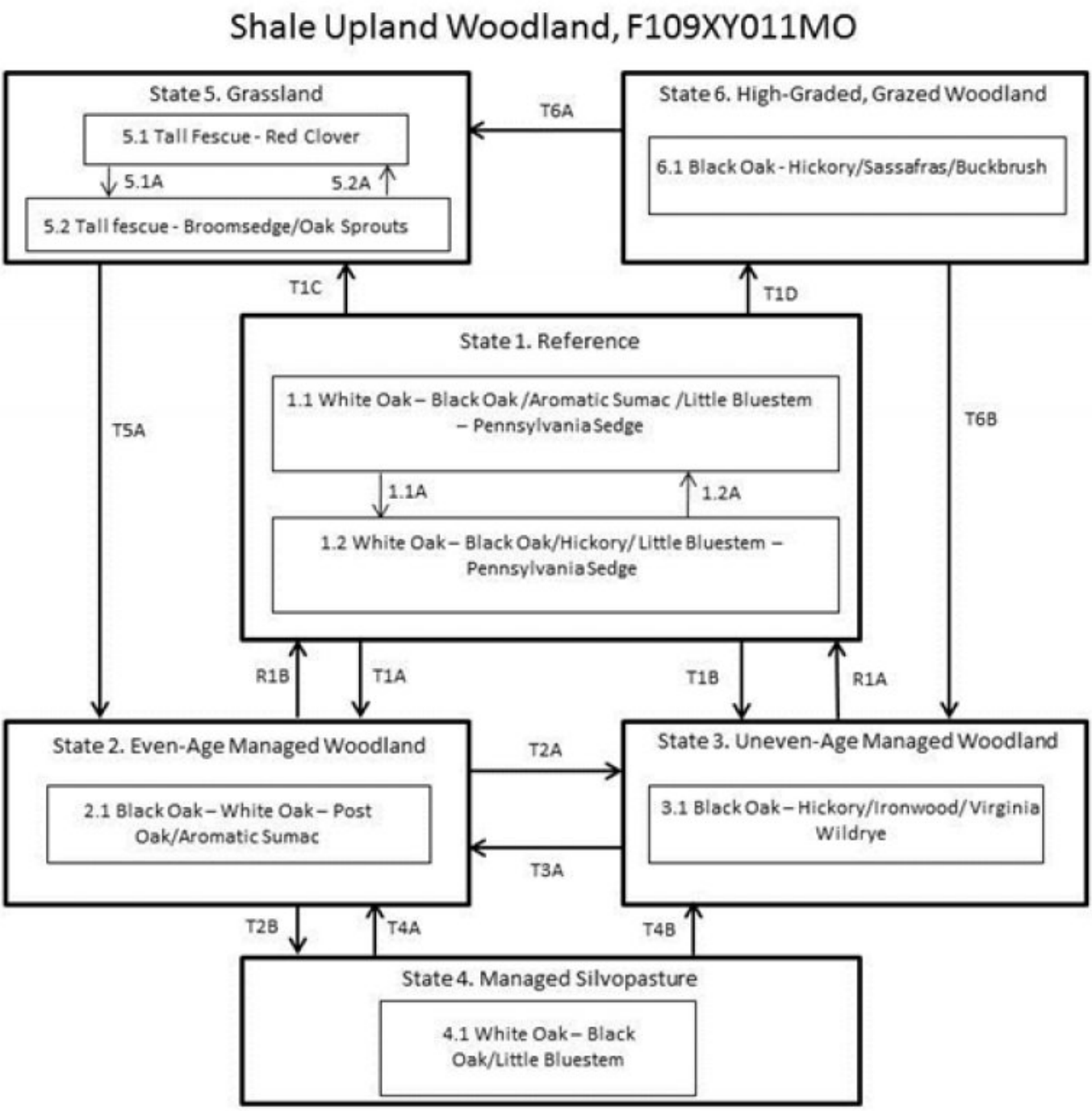
Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, on grazed sites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

This ecological site, if managed properly, can be a source for timber products especially white oak. 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. Thinning and/or occasional partial cuts, using an uneven-age management system can provide sunlight to the woodland floor, stimulating native woodland ground flora.

However, in the absence of fire and continual cultural treatments, oak sprouting creates a dense stand, again shading out the sun-loving ground flora. Partial cutting and prescribed fire can restore the more open structure and diversity of ground flora species. This type of site with proper management can provide timber products, wildlife habitat, and potential native forage.

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
T1B	Fire suppression; uneven-age management
T2B	Prescribed fire; thinning; grazing management
T1C, T6A	Clearing; pasture planting
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; tree planting; no grazing
T4A	Uneven-age management; no grazing
T4B	Even-age management; no grazing

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

Code	Event/Process
R1A	Prescribed fire, extended rotations
R1B	Uneven-age management, extended rotations

Figure 8. Shale Upland Woodland

State 1

Reference

Community 1.1
White Oak-Black Oak/Aromatic Sumac/Little Bluestem-Pennsylvania Sedge

This phase has an overstory that is dominated by white oak and black oak with hickory 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.

Forest overstory. The Forest Overstory Species list is based on commonly occurring species listed in Nelson (2010).

Forest understory. The Forest Understory list is based on commonly occurring species listed in Nelson (2010).

Community 1.2
White Oak-Black Oak/Hickory/Little Bluestem-Pennsylvania Sedge

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

These woodlands tend to be rather dense, with a sparse understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. However, in the absence of fire, the diversity and cover of the ground flora is diminished. 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-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 60 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. Without periodic canopy disturbance, stem density and fire intolerant species, like hickory, will increase in abundance.

Community 3.1
Black Oak-Hickory/Ironwood/Virginia Wildrye

State 4
Managed Silvopasture

The Managed Silvopasture state results from managing woodland communities (States 2 or 3) with prescribed fire, canopy thinning, and controlled grazing. This state can resemble the reference state, but with younger maximum tree ages, more open canopies and lower ground flora diversity. Sensation of grazing and controlled harvesting will allow transition to various managed woodland states.

Community 4.1
White Oak-Black Oak/Little Bluestem

State 5
Grassland

Conversion of woodlands to planted, non-native grassland species such as tall fescue has been common for this region. Steep slopes, surface fragments, low organic matter contents and soil acidity make grasslands harder to maintain in a healthy, productive state on this ecological site. Two community phases are recognized in the Grassland state, with shifts between phases based on types of management. Poor management will result in a shift to community 5.1A that shows an increase in oak sprouting and increases in broomsedge densities. If grazing and active pasture management is discontinued, the site will eventually transition to State 2 from this phase.

Community 5.1
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 5.2) and to woodland communities (where liming is not practiced).

Community 5.2
Tall Fescue-Broomsedge/Oak Sprouts

This phase is the result of over use, poor grassland and grazing management and lack of adequate nutrient application. Woody encroachment is common.

State 6
High-Graded, Grazed Woodland

States that were subjected to repeated, high-grading timber harvests and uncontrolled domestic grazing transitioned to a High-Graded, Grazed Woodland state. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as buckbrush, gooseberry, poison ivy and Virginia creeper. The existing vegetation offers little nutritional value for cattle, and excessive cattle stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Two common transitions from this state are woody clearing and conversion to State 5, Grassland or removing livestock, limited harvesting, and allowing long term succession to occur to some other woodland state.

Community 6.1
Black Oak-Hickory/Sassafras/Buckbrush

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	–	30–50	–	–
black oak	QUVE	*Quercus velutina*	Native	–	20–40	–	–
bur oak	QUMA2	*Quercus macrocarpa*	Native	–	0–10	–	–
post oak	QUST	*Quercus stellata*	Native	–	0–10	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	0–10	–	–
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	–	0–10	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	10–30
parasol sedge	CAUM4	*Carex umbellata*	Native	–	10–20
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	5–20
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	10–20
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–20
big bluestem	ANGE	*Andropogon gerardii*	Native	–	5–20
Pennsylvania sedge	CAPE6	*Carex pensylvanica*	Native	–	5–20
Forb/Herb					
smooth blue aster	SYLAC	*Symphyotrichum laeve var. concinnum*	Native	–	10–30
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	5–30
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	10–30
eastern purple coneflower	ECPU	*Echinacea purpurea*	Native	–	5–20
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	10–20
slender lespedeza	LEVI7	*Lespedeza virginica*	Native	–	10–20
Canadian blacksnakeroot	SACA15	*Sanicula canadensis*	Native	–	10–20
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	10–20
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	Native	–	10–20
Culver's root	VEVI4	*Veronicastrum virginicum*	Native	–	5–10
bluejacket	TROH	*Tradescantia ohiensis*	Native	–	5–10
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	10–30
New Jersey tea	CEAM	*Ceanothus americanus*	Native	–	5–20
American hazelnut	COAM3	*Corylus americana*	Native	–	10–20

Animal community

Wildlife
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 this site 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. (MDC 2006)

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 to 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 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 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

Plot BOFEGR01 – Mandeville soil (reference - fire-free phase)
Located in Bonne Femme Grove, Howard County, MO
(private land)

Plot MAWONA03 – Vanmeter soil (reference - fire-free phase)
Located in Maple Woods NA, Clay County, MO
Latitude: 39.229996
Longitude: -94.544173

Plot KNNOSP01 – Mandeville soil (reference - burned phase)
Located in Knob Noster State Park, Johnson County, MO
Latitude: 38.744056
Longitude: -93.582628

Plot MOMOCA01 – Gosport soil (altered state)
Located in Monkey Mountain CA, Holt County, MO
Latitude: 39.91016
Longitude: -95.014327

Other references

Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4, U.S. Army Corps of Engineers, Engineer Waterways Experiment Station, Vicksburg, MS.

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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:**

17. **Perennial plant reproductive capability:**