USDA Natural Resources Conservation Service

Ecological site F109XY013MO
Interbedded Sedimentary Protected Backslope Forest

Accessed: 05/17/2024

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-Mesic Limestone/Dolomite 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 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 Protected Backslope Forests are within the green areas on the map. They occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Interbedded Sedimentary Exposed Backslope Woodland 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 forest dominated by white and northern red oaks, with a well-developed understory and a rich herbaceous ground flora.

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.
F109XY025MO	**Interbedded Sedimentary Exposed Backslope Woodland** Interbedded Sedimentary Exposed Backslope Woodlands 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

F109XY009MO	**Till Protected Backslope Forest** Till Protected Backslope Forests are similar in composition and protected landscape positions but are deeper and somewhat more productive.
F109XY015MO	**Loamy Backslope Woodland** Loamy Protected Backslope Forests are similar in composition, protected landscape positions, and effective rooting depths.

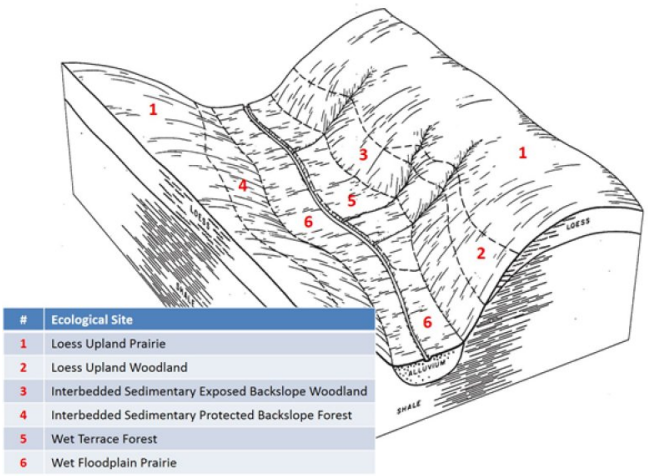
Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus rubra*
Shrub	(1) *Ostrya virginiana*
Herbaceous	(1) *Erigenia bulbosa* (2) *Cardamine concatenata*

Physiographic features

This site is on upland backslopes with slopes of 10 to 50%. 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 “4”, on northerly and easterly aspects. This site is typically downslope from Loess or Till Upland ecological sites. Upland Drainageway or Floodplain ecological sites are directly downslope.



#	Ecological Site
1	Loess Upland Prairie
2	Loess Upland Woodland
3	Interbedded Sedimentary Exposed Backslope Woodland
4	Interbedded Sedimentary Protected Backslope Forest
5	Wet Terrace Forest
6	Wet Floodplain Prairie

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	61–183 cm
Aspect	N, NE, E

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)	164 days
Freeze-free period (average)	186 days
Precipitation total (average)	1,092 mm

Climate stations used

- (1) CHARITON 1 E [USC00131394], Chariton, IA
- (2) GALLATIN 1W [USC00233102], Gallatin, MO
- (3) KEARNEY 3E [USC00234382], Kearney, MO
- (4) LONG BRANCH RSVR [USC00235050], Macon, MO
- (5) BLOOMFIELD 1 WNW [USC00130753], Bloomfield, IA
- (6) KEOSAUQUA [USC00134389], Keosauqua, IA
- (7) AMITY 4 NE [USC00230143], Maysville, MO
- (8) SALISBURY [USC00237514], Salisbury, 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, 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	25–102 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	7.62–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	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.

Interbedded Sedimentary Protected Backslope Forests historically occurred in protected landscape positions on

lower, steep slopes in the deeper valleys. The reference plant community is a forest characterized by a moderately tall (70 to 80 feet), closed canopy (80 to 100 percent) dominated by white oak, with a well-developed understory of oaks, hickories, white ash, eastern hop hornbeam and haws, 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 deer. Grazing by native large herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees.

Today, 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.

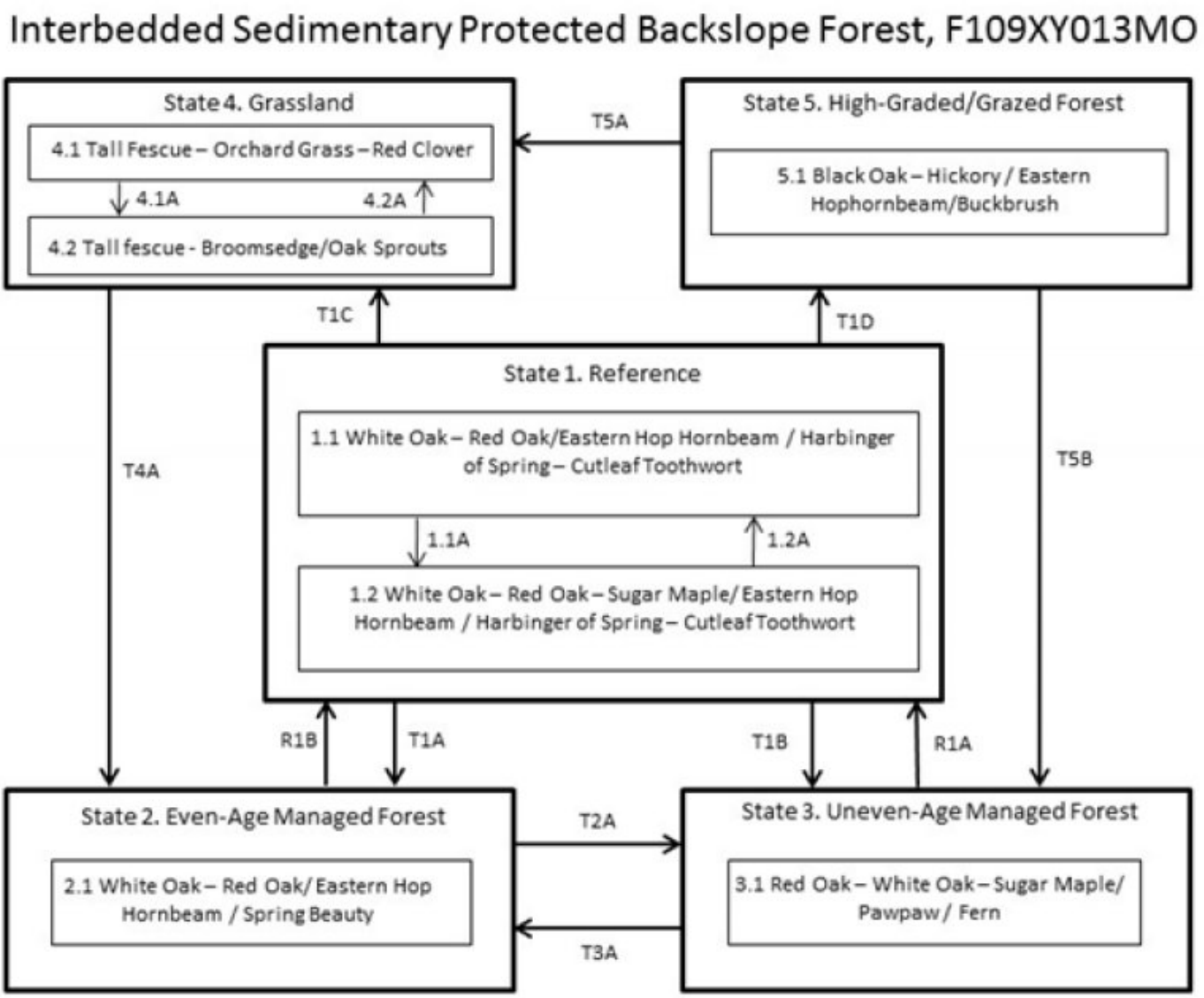
Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction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

These ecological sites are productive sites in the region. Oak regeneration is typically problematic. Sugar maple, red elm, ironwood, hickories, pawpaw and 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.

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

Figure 8. State and transition diagram for this ecological s

State 1

Reference

The reference state was dominated by white oak associated with red oak and other mixed hardwoods. Maximum tree age was likely 150 to 300 years. Periodic disturbances from fire, wind or ice maintained the dominance of white oak by opening up the canopy and allowing more light for white oak reproduction. Long disturbance-free periods allowed an increase in more shade tolerant species such as northern red oak and sugar maple. Two community phases are recognized in this state, with shifts between phases based on disturbance frequency. The reference state can be found in scattered locations throughout the MLRA. Some sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvests coupled with uncontrolled domestic livestock grazing (State 5). Fire suppression throughout the region has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many reference sites have been effectively managed for timber harvesting, resulting in either even-age (State 2) or uneven-age (State 3) managed forests depending upon the removal intensity and the species selection.

Community 1.1
White Oak-Red Oak/Eastern hop Hornbeam/Harbinger of Spring-Cutleaf Toothwort

Figure 9. Dark Hollow Conservation Area showing northern red oak in the canopy. (Photo credit MDC)

This phase has a multi-tiered structure, and a canopy that is 65 to 80 feet tall with 80 to 95 percent closure. The sub-canopy and understory are well developed, with eastern hop hornbeam and Ohio buckeye (Iowa) as a dominant understory species. A moderate abundance of shade tolerant forest generalists, such as May apple, ferns, tick trefoils and white snakeroot cover the ground.

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-Red Oak-Sugar Maple/Eastern Hop Hornbeam/Harbinger of Spring-Cutleaf Toothwort

This phase but sugar maple and hickory densities are increasing due to longer periods of fire suppression (>20 years) and lack of natural disturbances such as ice and wind. Displacement of some less shade tolerant grasses and forbs such as nodding fescue and goldenrods along with lower densities of most species may be occurring due to shading and competition from the increased densities of oak, sugar maple and hickory saplings in the mid-story.

State 2
Even-Age Managed Forest

This forest tends to be rather dense with an even-aged overstory and an under developed understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. Continual timber harvesting, depending on the practices used and age classes removed, will either maintain this state, or convert the site to uneven-age (State 3) forests. This state can be restored to a reference state by modifying or eliminating timber harvests, extending rotations, incorporating selective thinning, and re-introducing prescribed fire.

Community 2.1
White Oak-Red Oak/Eastern Hop Hornbeam/Spring Beauty

State 3
Uneven-Age Managed Forest

An uneven-age managed forest can resemble the reference state. The primary 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 harvests and disturbance activities. 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 (black maple in Iowa) and white oak will become less dominant. This state can be restored to a reference state by modifying timber harvests, extending rotations, incorporating selective thinning, and re-introducing prescribed fire.

Community 3.1
Red Oak-White Oak-Sugar Maple/Pawpaw/Fern

State 4
Grassland

Conversion of forests to planted, non-native cool season grasses and legumes has been common. Without proper grassland management these ecological sites are challenging to maintain in a healthy, productive state. With over grazing and cessation of active pasture management, tall fescue, white clover and multi-flora rose will increase in density.

Community 4.1
Tall Fescue-Orchard Grass-Red Clover

This phase is a 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 poor grassland management. Over grazing and inadequate or no fertility application has

allowed tall fescue, multi-flora rose, broomsedge, thistle and other weedy species to increase in cover and density reducing overall forage quality and site productivity. White clovers such as ladino and alsike will decrease or go away with no fertilization and overgrazing although Dutch white clover will leave last. Soil pH and bases such as calcium and magnesium are lower, relative to well-managed pastures (Phase 4.1).

State 5
High-Graded/Grazed Forest

Reference or managed forested states subjected to repeated, high-grading timber harvests and uncontrolled cattle grazing transition to this degraded state. This state exhibits an over-abundance of hickory and other less economically desirable tree species and weedy understory species such as buckbrush, gooseberry, poison ivy and multi-flora rose. The vegetation offers little nutritional value for cattle, and excessive livestock stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Browsing by goats using good rotational management can open up the shrub layer, eliminate many of the weedy species and increase both native herbaceous vegetation and may induce regeneration of oak and hickory species. Cessation of active logging and exclusion of livestock from sites in this state will create an idle phase that experiences an increase in black cherry and Ohio buckeye in the understory layer. Transition back to either an even-age managed or uneven-age managed forest will required dynamic and sustained forest stand improvements, cessation of grazing, and selective thinning of overstory and understory canopies.

Community 5.1
Black Oak-Hickory/Eastern Hophornbeam/Buckbrush

Figure 10. A high-graded backslope site at Mineral Hills Conservation Area near Unionville, Missouri with past grazing (Photo credit MDC)

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
northern red oak	QURU	*Quercus rubra*	Native	12.2–30.5	10–95	–	–
white oak	QUAL	*Quercus alba*	Native	12.2–30.5	2–25	–	–
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	18.3–30.5	5–10	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	12.2–19.8	2–5	–	–
American basswood	TIAM	*Tilia americana*	Native	12.2–19.8	2–5	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	12.2–19.8	1–2	–	–
blackhaw	VIPR	*Viburnum prunifolium*	Native	–	–	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	–	–	–	–
pawpaw	ASTR	*Asimina triloba*	Native	–	–	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
white ash	FRAM2	*Fraxinus americana*	Native	–	–	–	–
hophornbeam	OSVI	*Ostrya virginiana*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Pennsylvania sedge	CAPE6	*Carex pensylvanica*	Native	0.1–0.6	0.1–1
eastern woodland sedge	CABL	*Carex blanda*	Native	0.1–0.6	0.1–1
Forb/Herb					
soft agrimony	AGPU	*Agrimonia pubescens*	Native	0.1–0.6	2–50
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	0.1–0.6	2–50
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	0.1–0.6	0.1–25
clustered blacksnakeroot	SAOD	*Sanicula odorata*	Native	0.1–0.6	5–10
largeflower bellwort	UVGR	*Uvularia grandiflora*	Native	0.1–0.6	0.1–2
hepatica	HENO2	*Hepatica nobilis*	Native	0.1–0.6	1–2
white snakeroot	AGAL5	*Ageratina altissima*	Native	0.1–0.6	0.1–1
Greek valerian	PORE2	*Polemonium reptans*	Native	0.1–0.6	0.1–1
jumpseed	POVI2	*Polygonum virginianum*	Native	0.1–0.6	0.1–1
aster	SYMPH4	*Symphyotrichum*	Native	0.1–0.6	0.1–1
spotted geranium	GEMA	*Geranium maculatum*	Native	0.1–0.6	0.1–1
white avens	GECA7	*Geum canadense*	Native	0.1–0.6	0.1–1
touch-me-not	IMPAT	*Impatiens*	Native	0.1–0.6	0.1–1
Clayton's sweetroot	OSCL	*Osmorhiza claytonii*	Native	0.1–0.6	0.1–1
American lopseed	PHLE5	*Phryma leptostachya*	Native	0.1–0.6	0.1–1
Canadian clearweed	PIPU2	*Pilea pumila*	Native	0.1–0.6	0.1–1
shining bedstraw	GACO3	*Galium concinnum*	Native	0.1–0.6	0.1–1
fragrant bedstraw	GATR3	*Galium triflorum*	Native	0.1–0.6	0.1–1

broadleaf enchanter's nightshade	CILU	*Circaea lutetiana*	Native	0.1–0.6	0.1–1
Virginia snakeroot	ARSE3	*Aristolochia serpentaria*	Native	–	–
mayapple	POPE	*Podophyllum peltatum*	Native	–	–
toadshade	TRSE2	*Trillium sessile*	Native	–	–
cutleaf toothwort	CACO26	*Cardamine concatenata*	Native	–	–
Virginia springbeauty	CLVI3	*Claytonia virginica*	Native	–	–
white fawnlily	ERAL9	*Erythronium albidum*	Native	–	–
harbinger of spring	ERBU	*Erigenia bulbosa*	Native	–	–
goldenseal	HYCA	*Hydrastis canadensis*	Native	–	–
wild blue phlox	PHDI5	*Phlox divaricata*	Native	–	–
Fern/fern ally					
sensitive fern	ONSE	*Onoclea sensibilis*	Native	0.1–0.6	25–50
marginal woodfern	DRMA4	*Dryopteris marginalis*	Native	0.1–0.6	10–25
northern maidenhair	ADPE	*Adiantum pedatum*	Native	0.1–0.6	1–2
Shrub/Subshrub					
coralberry	SYOR	*Symphoricarpos orbiculatus*	Native	0.6–1.8	2–5
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0.1–0.6	0.1–2
Missouri gooseberry	RIMI	*Ribes missouriense*	Native	0.1–1.8	1–2
black raspberry	RUOC	*Rubus occidentalis*	Native	0.1–0.6	0.1–1
burningbush	EUAT5	*Euonymus atropurpureus*	Native	0.1–0.6	0.1–1
American hazelnut	COAM3	*Corylus americana*	Native	–	–
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	–
Tree					
hophornbeam	OSVI	*Ostrya virginiana*	Native	0.6–9.1	5–25
American basswood	TIAM	*Tilia americana*	Native	3–9.1	10–25
common hackberry	CEOC	*Celtis occidentalis*	Native	0.6–9.1	2–25
slippery elm	ULRU	*Ulmus rubra*	Native	3–9.1	2–5
white ash	FRAM2	*Fraxinus americana*	Native	0.6–9.1	2–5
eastern redbud	CECA4	*Cercis canadensis*	Native	0.6–1.8	0.1–1
common serviceberry	AMAR3	*Amelanchier arborea*	Native	0.1–0.6	0.1–1
bitternut hickory	CACO15	*Carya cordiformis*	Native	0.1–1.8	0.1–1
shagbark hickory	CAOV2	*Carya ovata*	Native	0.1–0.6	0.1–1
Vine/Liana					
common moonseed	MECA3	*Menispermum canadense*	Native	0.1–0.6	1–2
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	0.1–0.6	0.1–2
fourleaf yam	DIQU	*Dioscorea quaternata*	Native	0.1–0.6	0.1–1
summer grape	VIAE	*Vitis aestivalis*	Native	–	–

Table 7. Community 2.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
post oak	QUST	*Quercus stellata*	Native	–	–	–	–
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 (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	–

Animal community

Wildlife
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. (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 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. Favor white oak and northern red oak.

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%, traction problems increase and equipment use is not recommended.

Inventory data references

Tier II Reconnaissance plots:
Potential Reference:

Plot DAHOCA04 - Mandeville soil
Dark Hollow Cons Area, Sullivan County, MO
Latitude: 40.324753
Longitude: -92.924589

Plot POOSCA01 - Locksprings soil
Poosey Cons Area, Livingston County, MO
Latitude: 39.951488
Longitude: - 93.703339

Alternate State (not included in data summaries)

Plot MIHICA07 – Vanmeter soil – high graded, grazed
Mineral Hills Cons Area, Putnam County, MO
Latitude: 40.42163
Longitude: - 92.94825

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

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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	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
