USDA Natural Resources Conservation Service

Ecological site F115XB043MO
Deep Loess Exposed Backslope Woodland

Accessed: 05/06/2024

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): 115X–Central Mississippi Valley Wooded Slopes

The Central Mississippi Valley Wooded Slopes, Western Part (area outlined in red on the map) consists mainly of the deeply dissected, loess-covered hills bordering the Missouri and Mississippi Rivers as well as the floodplains and terraces of these rivers. It wraps around the northeast corner of the Ozark Uplift, and constitutes the southern border of the Pre-Illinoisan-aged till plain. Elevation ranges from about 320 feet along the Mississippi River near Cape Girardeau in the south to about 1,020 feet on the highest ridges near Hillsboro, MO in the east. Local relief varies from 10 to 20 feet in the major river floodplains, to 50 to 100 feet in the dissected uplands, with bluffs of 200 to 350 feet along the Mississippi and Missouri Rivers. Underlying bedrock is mainly Ordovician-aged dolomite and sandstone, with Mississippian-aged limestone north of the Missouri River.

Classification relationships

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

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):
The reference state for this ecological site is most similar to a White Oak Loess/Glacial Till Woodland.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus alba - (Carya ovata) / Carex pensylvanica Glaciated Woodland (CEGL002134).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs in many Land Type Associations of the following Subsections:
Inner Ozark Border
Outer Ozark Border
Mississippi 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. After additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Deep Loess 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 Deep Loess Protected Backslope Forest ecological site. These sites are adjacent to the Missouri and Mississippi River Floodplains. In some areas they occupy the entire hillslope. In other areas, Chert or Limestone/Dolomite ecological sites are on lower slopes. Upslope summit areas are typically Deep Loess Upland Woodland ecological sites. Soils are very deep, with no rooting restrictions. The reference plant community is woodland with an overstory dominated by white oak and black oak, with minor amounts of northern red oak, and a ground flora of native grasses and forbs.

Associated sites

F115XB001MO	**Deep Loess Upland Woodland** Deep Loess Upland Woodlands are upslope on summit positions from this ecological site
F115XB003MO	**Deep Loess Protected Backslope Forest** Deep Loess Protected Backslope Forests are mapped in a complex with this ecological site on north and east facing slopes
F115XB045MO	**Loamy Limestone/Dolomite Exposed Backslope Woodland** Loamy Limestone/Dolomite Exposed Backslope Woodlands are on the lower exposed backslopes underlain with limestone and/or dolomite bedrock at 20 to 40 inches.
R115XB019MO	**Limestone/Dolomite Exposed Cliff** Limestone/Dolomite Exposed Cliffs are sometimes present below this ecological site on major floodplains.

Similar sites

F115XB003MO	**Deep Loess Protected Backslope Forest** Deep Loess Protected Backslope Forests are mapped in a complex with this ecological site on north and east facing slopes

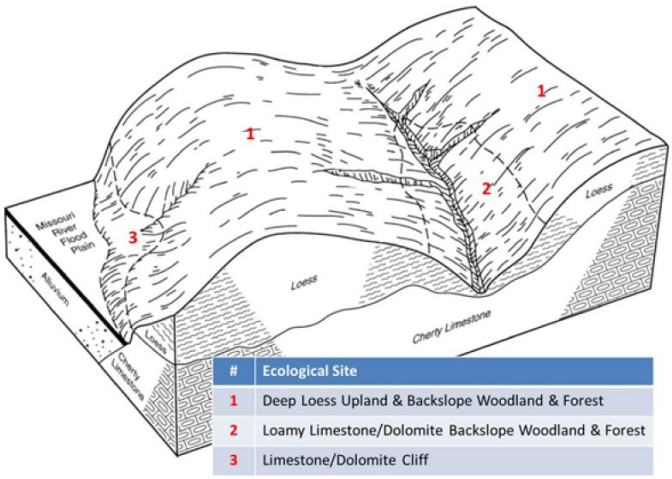
Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Elymus virginicus* (2) *Solidago ulmifolia*

Physiographic features

This site is on upland backslopes, with slopes of 15 to 60 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected aspects. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Young et al., 2003) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites in the uplands adjacent to the Missouri River. The site is within the area labeled “1”, on steep backslopes with southerly and westerly aspects. Deep Loess Upland sites are directly upslope, and are included within the area labeled “1”.



#	Ecological Site
1	Deep Loess Upland & Backslope Woodland & Forest
2	Loamy Limestone/Dolomite Backslope Woodland & Forest
3	Limestone/Dolomite Cliff

Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Slope	15–60%
Water table depth	91–152 cm
Aspect	S, SW, W

Climatic features

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

The Central Mississippi Valley Wooded Slopes, Western Part experiences regional differences in climates, but these differences do not have obvious geographic boundaries. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line diagonally crossing the MLRA from northwest to southeast. Both mean annual temperature and precipitation exhibit gradients along this line.

The average annual precipitation in most of this area is 38 to 48 inches. The average annual temperature is 53 to 57 degrees F. Mean January minimum temperature follows the northwest-to-southeast gradient. However, mean July maximum temperature shows hardly any geographic variation in the MLRA. Mean July maximum temperatures have a range of only two or three degrees across the area.

Mean annual precipitation varies along the same gradient as temperature. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter.

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 affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces create characteristic glade and cliff ecological sites. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest 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)	173 days
Freeze-free period (average)	197 days
Precipitation total (average)	1,194 mm

Climate stations used

- (1) BOONVILLE [USC00230817], Boonville, MO
- (2) UNION [USC00238515], Union, MO
- (3) ANNA 2 NNE [USC00110187], Anna, IL
- (4) WATERLOO [USC00119002], Waterloo, IL
- (5) JACKSON [USC00234226], Jackson, MO
- (6) JEFFERSON CITY WTP [USC00234271], Jefferson City, MO
- (7) PERRYVILLE WTP [USC00236641], Perryville, MO

Influencing water features

The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams (Vano 2005).

Soil features

These soils have no major rooting restriction. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is loess. The soils have silt loam surface horizons. Subsoils are silt loam to silty clay loam. Some soils are slightly affected by seasonal wetness. Soil series associated with this site include Bold, Drury, Menfro, Stookey, Sylvan, and Winfield.

The accompanying picture of the Menfro series shows a thin, light-colored surface horizon to about 7 inches overlying the brown silt loam to silty clay loam subsoil. The excellent rooting characteristics of Menfro and other soils allow for productive, diverse reference vegetation communities on this ecological site. Scale is in feet. Photo courtesy of NRCS.

Figure 7. Menfro series

Table 4. Representative soil features

Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	17.78–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

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 well developed woodland dominated by an overstory of white oak, along with black oak and an occasional northern red oak. The canopy is relatively tall (70 to 90 feet) but less dense (65 to 85 percent closure) and less structurally diverse than nearby protected slopes. Increased light from a more open canopy causes a diversity of woodland ground flora species to flourish. Woodlands are distinguished from forest, by

their relatively open understory, and the presence of sun-loving ground flora species. Characteristic plants in the ground flora can be used to gauge the restoration potential of a stand along with remnant open-grown old-age trees, and tree height growth.

Despite being somewhat distant from prairies, fire played a significant role in the maintenance of these systems. It is likely that these ecological sites burned at least once every 10 to 15 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.

Deep Loess Exposed Backslope Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by large native herbivores, such as bison, elk, and deer, would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and woodland ground flora species.

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.

In the long term absence of fire, woody species, especially hickory, encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means.

Uncontrolled domestic grazing has also impacted 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 to soil compaction and soil erosion problems and lower site productivity.

This ecological site is productive. Oak regeneration is typically problematic. Sugar maple, red elm, and hickories 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 and the application of prescribed fire, the ground flora diversity can be shaded out and diversity of the stand may suffer.

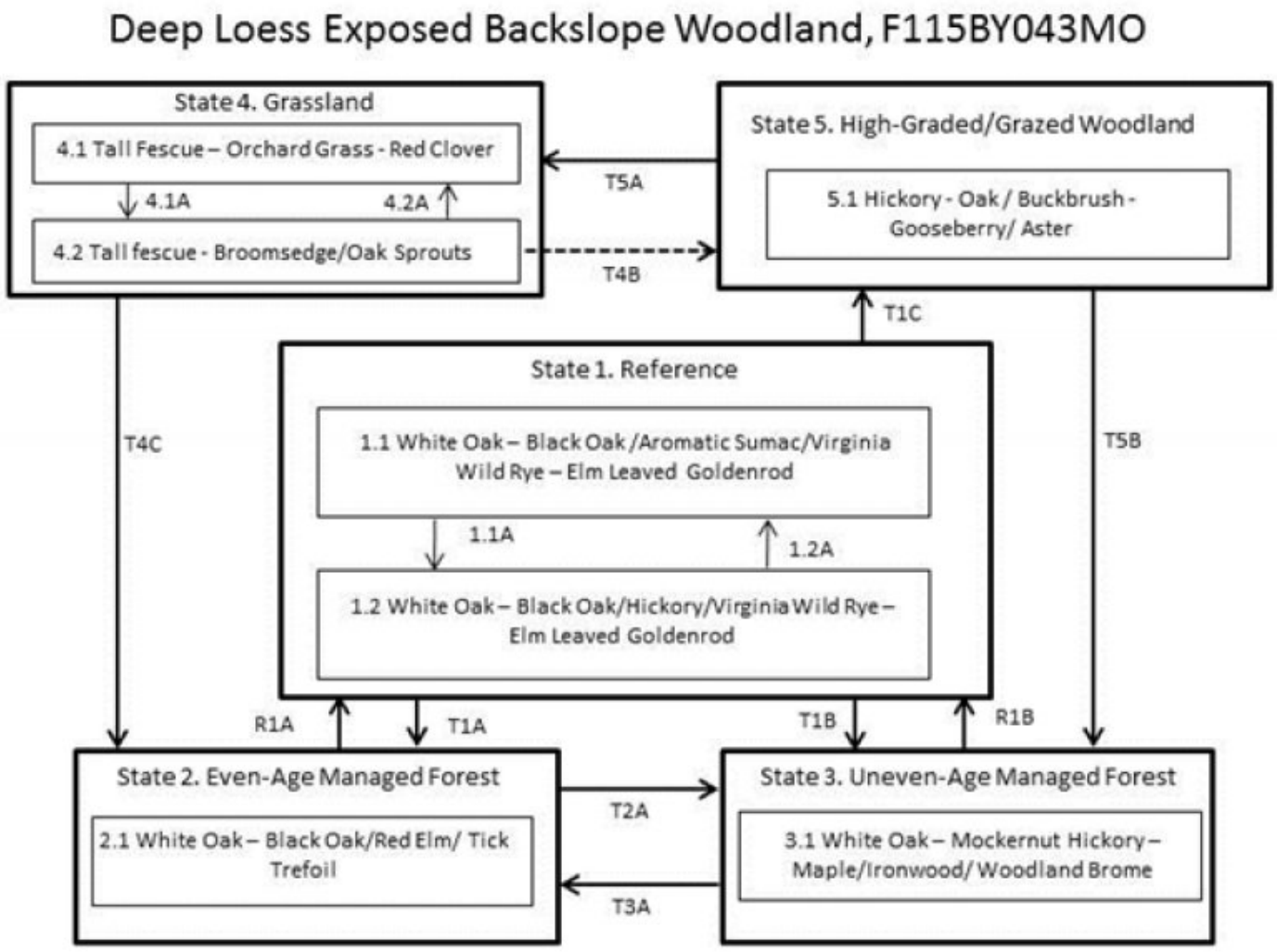
A State and Transition Diagram follows. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Ecological Site Correlation Issues and Questions:

The Illinois NRCS state office staff has requested the Illinois map units that are unique to Illinois (e.g. Sylvan, Bold) have further field investigation. This would include the following ecological sites: F115BY003MO and F115BY043MO

The Deep Loess Backslope ecological sites (F115BY003MO, F115BY043MO) may have some overstory tree species differences related to map units on the Illinois side verses the map units on the Missouri side. Further field review is needed.

State and transition model



Code	Event/Activity/Process
T1A	Fire suppression; even-aged management
T1B	Fire suppression; uneven-age management
T1C	Poorly planned harvest; uncontrolled grazing
T2A	Uneven-age management; extended rotations
T3A	Even-age management; thinning
T4B	Light to no grazing; woody growth; harvesting
T4C	No grazing; woody growth; tree planting
T5A	Clearing; pasture planting; prescribed grazing
T5B	Uneven-age management; tree planting
R1A, R1B	Prescribed fire; extended rotations

Code	Event/Activity/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; prescribed grazing

Figure 8. State and transition diagram for this ecological s

State 1
Reference

The historical reference state for this ecological site was old growth oak woodland. The woodland was dominated by white oak and black oak. Maximum tree age was likely 150 to 300 years. Periodic disturbances from fire, wind or ice as well as grazing by native large herbivores maintained the woodland structure and diverse ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are very rare today. Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Most, if not all, reference states are currently altered because of fire suppression, timber harvesting, domestic grazing or clearing and conversion to grassland or cropland.

Community 1.1
White Oak – Black Oak /Aromatic Sumac/Virginia Wild Rye – Elm Leaved Goldenrod

This phase has an old growth 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. It is likely that this phase burned at least once every 10 years.

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

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

Community 1.2
White Oak – Black Oak/Hickory/Virginia Wild Rye – Elm Leaved Goldenrod

Figure 9. A phased reference site at Hart Creek Conservation Area, near Hartsburg, Missouri. (Photo credit MDC)

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 Forest

An even-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, these sites will slowly increase in more shade tolerant species such as sugar maple and white oak will become less dominant along with increases in structural diversity. 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 – Black Oak/Red Elm/ Tick Trefoil

This is an even-aged forest management phase. Logging activities are removing higher volumes of white oak causing a decrease in white oak in the canopy and an increase in northern red oak. Large group, shelterwood or clearcut harvests create a more uniform age class structure throughout the canopy layer while also opening up the understory and allowing more sunlight to reach the forest floor.

State 3
Uneven-Age Managed Forest

Due to selective single tree harvesting canopy densities have increased. Composition is likely altered from the Reference State depending on tree selection during harvest. This state will slowly increase in more shade tolerant species and white oak will become less dominant and is also denser because of fire suppression. Without periodic

canopy disturbance, stem density and fire intolerant species, like hickory and maple will increase in abundance. 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 3.1
White Oak – Mockernut Hickory – Maple/Ironwood/ Woodland Brome

This is an uneven-aged forest management phase. Selective logging activities are removing higher volumes of white oak causing a decrease in white oak in the canopy and an increase in hickory and sugar maple. Densities numbers, especially more shade tolerant species, are increasing in the lower size-class levels.

State 4
Grassland

Conversion of other states to non-native cool season species such as tall fescue, orchard grass, and red clover has been common. Occasionally, these pastures will have scattered oaks. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may be impossible, requiring a very long term series of management options. 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 4.2 that shows an increase in oak sprouting and increases in broomsedge densities. If oak sprouting is left unchecked and grazing is eliminated or reduced then over time this state will transition to an even-age managed woodland (livestock controlled and woodland management initiated) or to a high-graded/grazed woodland (continued grazing, high graded harvesting, and no woodland management).

Community 4.1
Tall Fescue – Orchard Grass - 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 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. Oak sprouts, oak saplings, and invasive species are increasing as a result of poor management.

State 5
High Graded/Grazed Woodland

States that were subjected to repeated, high-grading timber harvests and uncontrolled domestic grazing will transition 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.

Community 5.1
Hickory - Oak / Buckbrush - Gooseberry/ Aster

This is the only phase associated with this state at this time. See the corresponding state narrative for details.

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							
white oak	QUAL	*Quercus alba*	Native	–	5–75	–	–
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	–	10–50	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	2–10	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	0.1–10	–	–
black oak	QUVE	*Quercus velutina*	Native	–	2–10	–	–
post oak	QUST	*Quercus stellata*	Native	–	2–5	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	2–5	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	10–30
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–20
big bluestem	ANGE	*Andropogon gerardii*	Native	–	5–20
parasol sedge	CAUM4	*Carex umbellata*	Native	–	10–20
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	5–20
Pennsylvania sedge	CAPE6	*Carex pensylvanica*	Native	–	10–20
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	5–20
eastern bottlebrush grass	ELHY	*Elymus hystrix*	Native	–	1–10
eastern woodland sedge	CABL	*Carex blanda*	Native	–	2–5
whitegrass	LEVI2	*Leersia virginica*	Native	–	0.1–5
Forb/Herb					
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	10–30
eastern purple coneflower	ECPU	*Echinacea purpurea*	Native	–	5–20
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	10–20
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
American lopseed	PHLE5	*Phryma leptostachya*	Native	–	5–10
bluejacket	TROH	*Tradescantia ohiensis*	Native	–	5–10
common blue wood aster	SYCO4	*Symphyotrichum cordifolium*	Native	–	2–5
Nuttall's ticktrefoil	DENU5	*Desmodium nuttallii*	Native	–	2–5
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	2–5
Shrub/Subshrub					
northern spicebush	LIBE3	*Lindera benzoin*	Native	–	2–50
New Jersey tea	CEAM	*Ceanothus americanus*	Native	–	5–20
American hazelnut	COAM3	*Corylus americana*	Native	–	10–20
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	5–10

Animal community

Wildlife Species (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 (NRCS 2002, 2014):

Management: Field collected site index values average 62 for white oak and 73 for black oak. Timber management opportunities are excellent. 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. Uneven-aged management will slowly cause an increase in more shade tolerant species such as sugar maple. Using prescribed fire as a management tool could have a negative impact on timber quality and should be used with caution on a particular site if timber management is the primary objective. Where possible, favor white oak, black walnut, and northern red oak.

Limitations: No major equipment restrictions or limitations exist. 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

Deep Loess Exposed Backslope Woodland – Potential Reference – F115BY043MO

Plot HACRCA_JK09 – Menfro soil
Located in Hart Creek CA, Boone County, MO
Latitude: 38.71113
Longitude: -92.33187

Plot HACRCA_JK10 – Menfro soil
Located in Hart Creek CA, Boone County, MO
Latitude: 38.710194
Longitude: -92.33222

Plot HACRCA_JK11 – Menfro soil
Located in Hart Creek CA, Boone County, MO
Latitude: 38.710053
Longitude: -92.33276

Plot HACRCA_KS05 – Menfro soil – no veg cover
Located in Hart Creek CA, Boone County, MO
Latitude: 38.707605
Longitude: -92.328525

Plot SCWOUM_JK01 – Menfro soil
Located in Schnabel Woods, UMC, Boone County, MO
Latitude: 38.867915
Longitude: -92.42733

Plot SCWOUM01 – Menfro soil – no veg
Located in Schnabel Woods, UMC, Boone County, MO
Latitude: 38.869069
Longitude: -92.423535

Plot TRTESP_KS04 – Winfield soil – no veg cover

Located in Trail of Tears SP, Cape Girardeau County, MO
Latitude: 37.467443
Longitude: -89.490562

Other references

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

Natural Resources Conservation Service. 2002. Woodland Suitability Groups. Missouri FOTG, Section II, Soil Interpretations and Reports. 30 pgs.

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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:**

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:

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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:**
