Ecological site F116AY032MO
Loamy Footslope Forest

Last updated: 9/24/2020
Accessed: 05/13/2025

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): 116A–Ozark Highland

The Ozark Highland constitutes the Salem Plateau of the Ozark Uplift. Elevation ranges from about 300 feet on the southeast edge of the Ozark escarpment, to about 1,600 feet in the west, adjacent to the Burlington Escarpment of the Springfield Plateau. The underlying bedrock is mainly horizontally bedded Ordovician-aged dolomites and sandstones that dip gently away from the uplift apex in southeast Missouri. Cambrian dolomites are exposed on deeply dissected hillslopes. In some places, Pennsylvanian and Mississipian sediments overlie the plateau. Relief varies, from the gently rolling central plateau areas to deeply dissected hillslopes associated with drainageways such as the Buffalo, Current, Eleven Point and White Rivers.

Classification relationships

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

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):
The reference state for this ecological site is most similar to an Oak-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 is widespread across the Ozark Highlands Section.

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”.

Loamy Footslope Forests are widely distributed throughout the Ozark Highland. Soils are very deep, typically with loamy surfaces and loamy or clayey subsoils. The reference plant community is forest with an overstory dominated by a variety of trees including white oak, sugar maple, northern red oak, bitternut hickory, American elm, walnut and Kentucky coffeetree, an understory dominated by pawpaw, northern spicebush, eastern leatherwood, and Ohio buckeye and a rich herbaceous ground flora.

Associated sites

F116AY011MO	**Chert Upland Woodland** Chert Upland Woodlands, and other upland and backslope ecological sites, are upslope.
F116AY034MO	**Loamy Terrace Forest** Loamy Terrace Forests are adjacent and downslope.
F116AY035MO	**Wet Terrace Forest** Wet Terrace Forests are adjacent and downslope.
F116AY039MO	**Loamy Floodplain Step Forest** Loamy Floodplain Step Forests are adjacent and downslope.
F116AY042MO	**Sandy/Gravelly Floodplain Forest** Sandy/Gravelly Floodplain Forests and other floodplain ecological sites are downslope.

Similar sites

F116AY034MO	**Loamy Terrace Forest** Loamy Terrace Forests are adjacent and downslope.
F116AY039MO	**Loamy Floodplain Step Forest** Loamy Floodplain Step Forests are adjacent and downslope.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus rubra*
Shrub	(1) *Lindera benzoin*
Herbaceous	(1) *Erigenia bulbosa* (2) *Asarum canadense*

Physiographic features

This site is on footslopes and stream terraces, including high, loess-covered terraces, with slopes of 1 to 15 percent. The site receives runoff from adjacent upland sites. This site does not flood.

The following figure (adapted from Larsen, 2002) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “3” on the figure. Loamy Footslope Forest sites may be downslope from a variety of upland sites, such as the Chert Upland and Chert Dolomite Upland sites shown here.

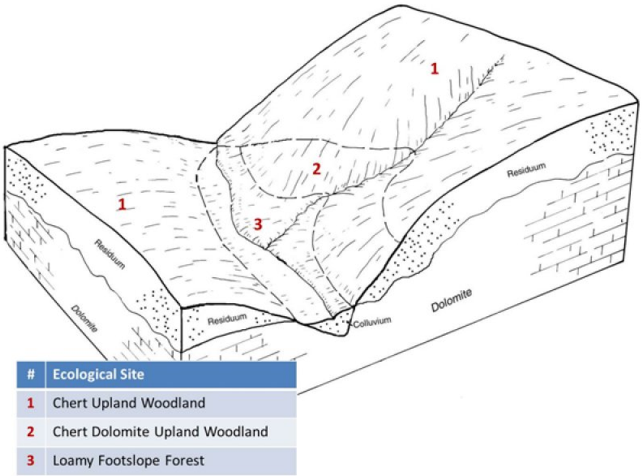


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Stream terrace (3) Strath terrace
Flooding frequency	None
Ponding frequency	None
Slope	1–15%
Water table depth	51–152 cm
Aspect	Aspect is not a significant factor

Climatic features

The Ozark Highland 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 Ozark Highland 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 crossing the MLRA from northwest to southeast.
The average annual precipitation in almost all of this area is 38 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 53 to 60 degrees F. The lower temperatures occur at the higher elevations in the western part of the MLRA. Mean January minimum temperature follows a stronger north-to-south 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 a northwest to southeast gradient. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer.

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

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Deep sinkholes often have a microclimate significantly cooler, moister, and shadier than surrounding surfaces, a phenomenon that may result in a strikingly different ecology. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs.

Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

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

Table 3. Representative climatic features

Frost-free period (characteristic range)	141-146 days
Freeze-free period (characteristic range)	165-186 days
Precipitation total (characteristic range)	1,143-1,219 mm
Frost-free period (actual range)	136-147 days
Freeze-free period (actual range)	164-187 days
Precipitation total (actual range)	1,118-1,270 mm
Frost-free period (average)	143 days
Freeze-free period (average)	177 days
Precipitation total (average)	1,194 mm

Climate stations used

- (1) GRAVETTE [USC00032930], Gravette, AR
- (2) GREENVILLE 6 N [USC00233451], Silva, MO
- (3) EVENING SHADE 1 NNE [USC00032366], Evening Shade, AR
- (4) POTOSI 4 SW [USC00236826], Potosi, MO
- (5) VIENNA 2 WNW [USC00238620], Vienna, MO

Influencing water features

The site receives runoff from adjacent upland sites. This site does not flood. 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 rooting restriction. The soils were formed under forest vegetation, and have thin, light-colored surface horizons. Parent material is alluvium on stream terraces, and colluvium over residuum derived from limestone on footslopes. Loess is present in some soils. Surface horizons are primarily silt loam. Subsurface horizons are loamy or clayey, with few to abundant gravel and cobbles at depth. These soils are not affected by seasonal wetness. Soil series associated with this site include Cotton, Courtois, Crider, Fourche, Gunlock, Lecoma, Peridge, Pomme, Skrainka, and Winnipeg.

The accompanying picture of the Pomme series shows a thin, light-colored silt loam surface horizon over a brown clay loam subsoil. Red very gravelly clay is typically in the lower part of the soil profile, and appears in the lower horizons of this picture. Picture courtesy of John Preston, NRCS.

Figure 9. Pomme series

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Colluvium–limestone (3) Loess
Surface texture	(1) Silt loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow
Soil depth	183 cm
Surface fragment cover <=3"	0–12%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–20.32 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)	1–50%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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.

Loamy Footslope Forests occur along most streams throughout the region. The reference plant community was a well-developed forest dominated by a wide variety of deciduous hardwood tree species including white oak, sugar maple, northern red oak, bitternut hickory, American elm, walnut and Kentucky coffeetree. Trees are generally large and tall forming a dense, closed canopy. Both historically and today, these forests are structurally and compositionally diverse, with occasional tree-fall gaps and natural mortality providing opportunities for regeneration of overstory species. The understory is also complex, with multiple layers of shade tolerant species such as pawpaw, northern spicebush, Ohio buckeye and eastern leatherwood. Grape vine, greenbriar, and Virginia creeper are also present along with a diverse array of ground flora species that carpets the forest floor.

In this region of historic fire-prone savannas and woodlands, Loamy Footslope Forests occur in the protected landscape positions on lower, concave slopes distant from the fire prone uplands. While the upland woodlands had an estimated fire frequency of 3 to 5 years, these sites burned much less frequently (estimated 10 to 25 years) and with lower intensity. In addition, Loamy Footslope Forests are subject to occasional disturbances from wind and ice, which periodically open the canopy up by knocking over trees or breaking substantial branches of canopy trees. Such canopy disturbances allow more light to reach the ground and favor reproduction of the dominant oak species.

Today, these communities have been cleared and converted to pasture, or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50 to 80 years) canopy layer whose composition may have been altered by timber harvesting practices. An increase in hickories over historic conditions is common.

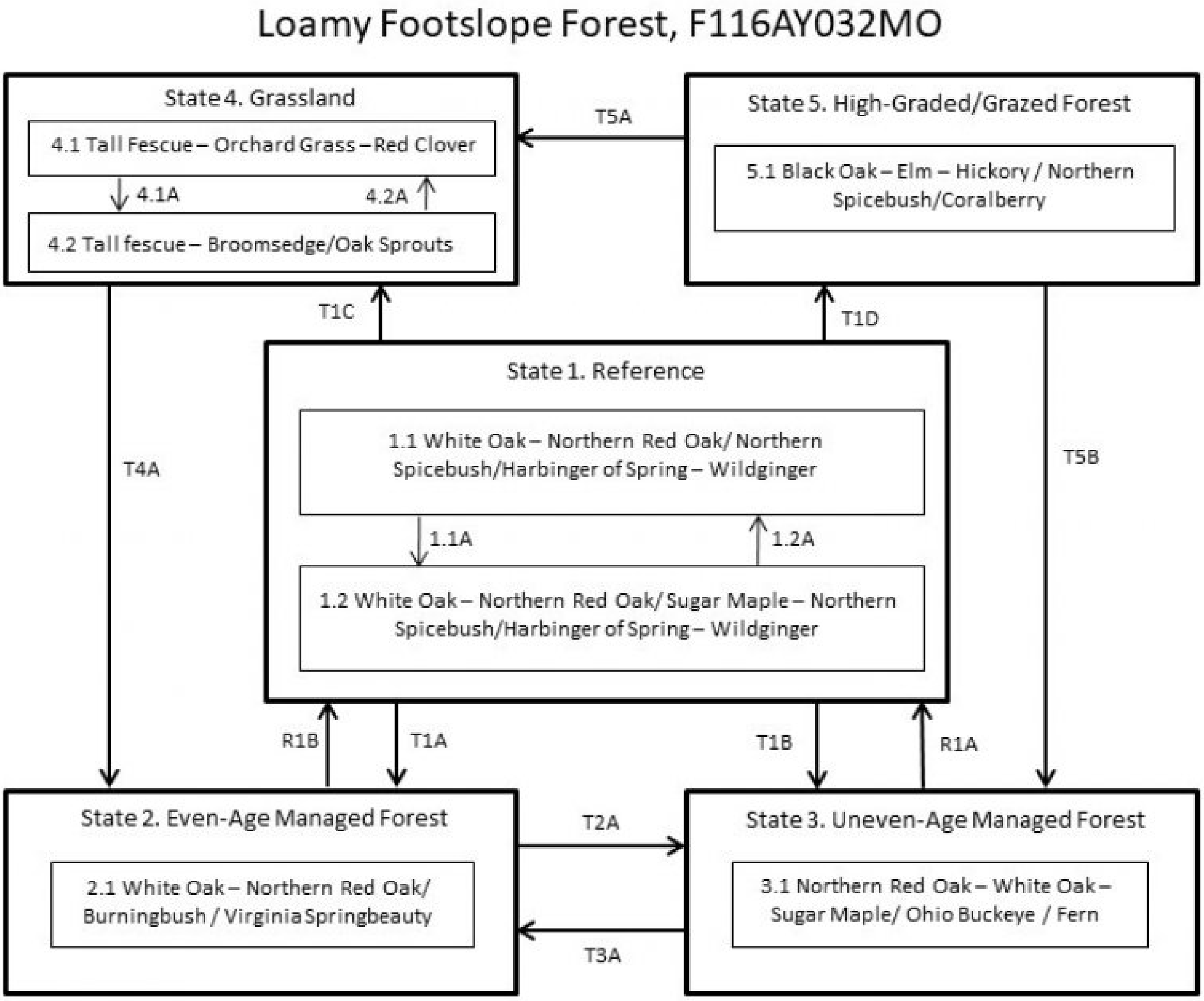
Uncontrolled domestic grazing has also diminished the diversity and cover of woodland ground flora species, and has often introduced weedy species such as gooseberry, coralberry, poison ivy and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and erosion related to grazing can lower site productivity.

Loamy Footslope Forests are productive timber sites. Timber harvest in this region typically is done using single-tree selection, and often results in removal of the most productive trees, or high-grading of the stand. This can result in poorer quality timber and a shift in species composition away from more valuable oak species. Carefully planned single tree selection or the creation of group openings can help regenerate more desirable oak species and increase vigor on the residual trees. Clear-cutting does occur and results in dense, even-aged stands of primarily 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 productivity of the stand may suffer.

Prescribed fire can play a beneficial but limited role in the management of this ecological site. The higher productivity of these sites makes it more challenging than on other forest and woodland sites in the region. Control of woody species will be more difficult. Footslope forests did evolve with some fire, but their composition often reflects more closed, forested conditions, with fewer woodland ground flora species that can respond to fire. Consequently, while having these sites in a burn unit is acceptable, targeting them solely for woodland restoration is not advisable.

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

State and transition model



Code	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 10. State and transition diagram for this ecological site

State 1

Reference

The reference state was dominated by white oak associated with northern red oak and other mixed hardwoods. Periodic disturbances from fire, wind or ice maintained the dominance of white oak by opening 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). 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 – Northern Red Oak/ Northern Spicebush/Harbinger of Spring – Wildginger

Two community phases are recognized in this state, with shifts between phases based on disturbance frequency.

Forest overstory. Forest Overstory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

Forest understory. Forest Understory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

Community 1.2
White Oak – Northern Red Oak/ Sugar Maple – Northern Spicebush/Harbinger of Spring – Wildginger

Two community phases are recognized in this state, with shifts between phases based on disturbance frequency.

Pathway P1.1
Community 1.1 to 1.2

This pathway is a gradual transition that results from extended, disturbance-free periods of roughly 50 years or longer.

Pathway P1.2
Community 1.2 to 1.1

This pathway is a transition that results from extended, disturbance periods returning, such as native fires.

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 – Northern Red Oak/ Burningbush / Virginia Springbeauty

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 and white oak will become less dominant. This state can be restored to a reference state by modifying timber harvests, extending rotations, and incorporating selective thinning.

Community 3.1
Northern Red Oak – White Oak – Sugar Maple/ Ohio Buckeye / 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, broomsedge, annual bluegrass, 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 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, thistle and other weedy species to increase in cover and density reducing overall forage quality and site productivity. Clovers will decrease or go away with no fertilization and overgrazing. Soil pH and bases such as calcium and magnesium are lower, relative to well-managed pastures.

Pathway P4.1A
Community 4.1 to 4.2

This pathway is the result of over grazing and lack of proper grassland management.

Pathway P4.2A
Community 4.2 to 4.1

This pathway is the result of brush management, grassland reseeding and proper grassland management.

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 coralberry, 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. 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 require dynamic and sustained forest stand improvements, cessation of grazing, and selective thinning of overstory and understory canopies.

Community 5.1

Black Oak – Elm – Hickory / Northern Spicebush/Coralberry

Transition T1A
State 1 to 2

This transition typically results from even-age forest management practices, such as clear-cut, seed tree or shelterwood harvests and fire suppression.

Transition T1B
State 1 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvests and fire suppression.

Transition T1C
State 1 to 4

This transition is the result of clearing and conversion to non-native cool season grassland.

Transition T1D
State 1 to 5

This transition is the result of high-grade harvesting and uncontrolled domestic livestock grazing.

Restoration pathway R1B
State 2 to 1

This restoration pathway generally requires uneven-age timber management practices, such as single tree or group selection harvest, with extended rotations that allow mature trees to exceed ages of about 120 years.

Transition T2A
State 2 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest.

Restoration pathway R1A
State 3 to 1

This restoration transition is the result of extended rotations and minimal disturbance and prescribed fire.

Transition T3A
State 3 to 2

This transition typically results from even-age forest management practices, such as clear-cut, seed tree or shelterwood harvests.

Transition T5B
State 5 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest, tree planting and no grazing.

Transition T5A
State 5 to 4

This transition is the result of clearing and conversion to non-native cool season grassland.

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	–	–	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	–	–	–	–
scarlet oak	QUCO2	*Quercus coccinea*	Native	–	–	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	–	–	–
black oak	QUVE	*Quercus velutina*	Native	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–
white ash	FRAM2	*Fraxinus americana*	Native	–	–	–	–
Ohio buckeye	AEGL	*Aesculus glabra*	Native	–	–	–	–
Kentucky coffeetree	GYDI	*Gymnocladus dioicus*	Native	–	–	–	–
black walnut	JUNI	*Juglans nigra*	Native	–	–	–	–
American elm	ULAM	*Ulmus americana*	Native	–	–	–	–
American basswood	TIAM	*Tilia americana*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	–
blue sedge	CAGL6	*Carex glaucodea*	Native	–	–
eastern star sedge	CARA8	*Carex radiata*	Native	–	–
sweet woodreed	CIAR2	*Cinna arundinacea*	Native	–	–
fall panicgrass	PADI	*Panicum dichotomiflorum*	Native	–	–
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	–
Forb/Herb					
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	–
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	–
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	–
Indian-tobacco	LOIN	*Lobelia inflata*	Native	–	–
smallspike false nettle	BOCY	*Boehmeria cylindrica*	Native	–	–
fourleaf yam	DIQU	*Dioscorea quaternata*	Native	–	–
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	–
white snakeroot	AGAL5	*Ageratina altissima*	Native	–	–
beaked agrimony	AGRO3	*Agrimonia rostellata*	Native	–	–
spotted geranium	GEMA	*Geranium maculatum*	Native	–	–
wild blue phlox	PHDI5	*Phlox divaricata*	Native	–	–
green dragon	ARDR3	*Arisaema dracontium*	Native	–	–
spring blue eyed Mary	COVE2	*Collinsia verna*	Native	–	–
lowland bladderfern	CYPR4	*Cystopteris protrusa*	Native	–	–
white fawnlily	ERAL9	*Erythronium albidum*	Native	–	–
Virginia bluebells	MEVI3	*Mertensia virginica*	Native	–	–
Missouri violet	VIMI3	*Viola missouriensis*	Native	–	–
Virginia springbeauty	CLVI3	*Claytonia virginica*	Native	–	–
eastern waterleaf	HYVI	*Hydrophyllum virginianum*	Native	–	–
harbinger of spring	ERBU	*Erigenia bulbosa*	Native	–	–
Canadian wildginger	ASCA	*Asarum canadense*	Native	–	–
cutleaf toothwort	CACO26	*Cardamine concatenata*	Native	–	–
largeflower bellwort	UVGR	*Uvularia grandiflora*	Native	–	–
Fern/fern ally					
rattlesnake fern	BOVI	*Botrychium virginianum*	Native	–	–
broad beechfern	PHHE11	*Phegopteris hexagonoptera*	Native	–	–
Shrub/Subshrub					
northern spicebush	LIBE3	*Lindera benzoin*	Native	–	–
pawpaw	ASTR	*Asimina triloba*	Native	–	–
burningbush	EUAT5	*Euonymus atropurpureus*	Native	–	–
eastern leatherwood	DIPA9	*Dirca palustris*	Native	–	–
Tree					
flowering dogwood	COFL2	*Cornus florida*	Native	–	–
Ohio buckeye	AEGL	*Aesculus glabra*	Native	–	–

Animal community

Wildlife (MDC 2006):

This forest type contains high structural and compositional diversity important for a number of songbirds and amphibians.

Bird species associated with early-successional Footslope Forests are Prairie Warbler, Field Sparrow, Brown Thrasher, Blue-winged Warbler, White-eyed Vireo, Blue-gray Gnatcatcher, Yellow-breasted Chat, Indigo Bunting, and Eastern Towhee.

Birds associated with mid-successional Footslope Forests include Whip-poor-will and Wood Thrush.

Birds associated with late-successional Footslope Forests include Worm-eating warbler, Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Wood Thrush, Red-eyed Vireo, Northern Parula, Louisiana Waterthrush (near streams), and Broad-winged Hawk.

Reptile and amphibian species associated with mature Footslope Forests include: ringed salamander, spotted salamander, marbled salamander, central newt, long-tailed salamander, dark-sided salamander, southern red-backed salamander, three-toed box turtle, western worm snake, western earth snake, and American toad.

Other information

Forestry (NRCS 2002, 2014):

Management: Field measured site index values range from 58 to 68 for oak. Timber management opportunities are good. These groups respond well to management. Create group openings of at least 2 acres. Large clearcuts should be minimized if possible to reduce impacts on wildlife and aesthetics. Uneven-aged management using single tree selection or small group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Using prescribed fire as a management tool could have a negative impact on timber quality, may not be fitting, or should be used with caution on a particular site if timber management is the primary objective.

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

Potential Reference Sites: Loamy Footslope Forest

Plot CASPFS04 - Lecoma soil
Located in Carman Springs NA, MTNF, USFS, Howell County, MO
Latitude: 36.926624
Longitude: -92.080366

Plot ELPOFS02 – Lecoma soil
Located in Eleven Point District, MTNF, USFS, Oregon County, MO
Latitude: 36.715721
Longitude: -91.204917

Plot GIRACA01 – Pomme soil
Located in Gist Ranch CA, Texas County, MO
Latitude: 37.172602
Longitude: -91.793687

Plot MERASP08 – Pomme soil

Located in Meramec State Park, Franklin County, MO
Latitude: 38.235357
Longitude: -91.089787

Other references

Anderson, R.C. 1990. The historic role of fire in North American grasslands. Pp. 8-18 in S.L. Collins and L.L. Wallace (eds.). Fire in North American tallgrass prairies. University of Oklahoma Press, Norman.

Batek, M.J., A.J. Rebertus, W.A. Schroeder, T.L. Haithcoat, E. Compas, and R.P. Guyette. 1999. Reconstruction of early nineteenth-century vegetation and fire regimes in the Missouri Ozarks. Journal of Biogeography 26:397-412.

Harlan, J.D., T.A. Nigh and W.A. Schroeder. 2001. The Missouri original General Land Office survey notes project. University of Missouri, Columbia.

Ladd, D. 1991. Reexamination of the role of fire in Missouri oak woodlands. Pp. 67-80 in G.V. Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Larsen, Scott E. 2002. Soil Survey of Phelps County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

Missouri Department of Conservation. 2010. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.

NatureServe, 2010. Vegetation Associations of Missouri (revised). NatureServe Central Databases. Arlington, VA U.S. NatureServe, St. Paul, Minnesota.

Nelson, Paul W. 2010. The Terrestrial Natural Communities of Missouri. Missouri Department of Conservation, Jefferson City, Missouri. 550p.

Nigh, Timothy A., and Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City, Missouri. 212p.

Schoolcraft, H.R. 1821. Journal of a tour into the interior of Missouri and Arkansas from Potosi, or Mine a Burton, in Missouri territory, in a southwest direction, toward the Rocky Mountains: performed in the years 1818 and 1819. Richard Phillips and Company, London.

Vano, Julie A. 2005. Land Surface Hydrology in Northern Wisconsin: Influences of climatic variability and land cover. University of Wisconsin-Madison.

United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. 682 pgs.

Contributors

Fred Young
Doug Wallace

Approval

Nels Barrett, 9/24/2020

Acknowledgments

Missouri Department of Conservation and Missouri Department of Natural Resources personnel provided significant and helpful field and technical support during this project.

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	05/13/2025
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

---

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

---

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

---

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

---

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

---

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

---

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

---

17. **Perennial plant reproductive capability:**
