USDA Natural Resources Conservation Service

Ecological site F116AY031MO
Dry 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 Dry-Mesic Chert Forest.

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):
The reference state for this ecological site is most similar to Mixed Oak-Hickory Forest.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):

The reference state for this ecological site is most similar to Quercus alba - Quercus rubra - Carya (alba, ovata) / Cornus florida Acid Forest (CEGL002067).

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”.

Dry Footslope Forests are widely distributed in the central and southwestern Ozark Highland. Soils have low plant-available water capacity, due to either an abundance of coarse fragments or the presence of a fragipan. The reference plant community is forest dominated by white oak and black oak.

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.
F116AY039MO	**Loamy Floodplain Step Forest** Loamy Floodplain Step Forests are adjacent and downslope.
F116AY042MO	**Sandy/Gravelly Floodplain Forest** Sandy/Gravelly Floodplain Forests are downslope.

Similar sites

F116AY034MO	**Loamy Terrace Forest** Loamy Terrace Forests are adjacent and downslope.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Cornus florida*
Herbaceous	(1) *Elymus hystrix*

Physiographic features

This site is on footslopes, high stream terraces and strath terraces with slopes of 3 to 15 percent. The site receives runoff from adjacent upland sites. This site does not flood.

The following figure (adapted from Simmons et al, 2006) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “2” on the figure. Dry Footslope Forest sites are downslope from a variety of upland sites, particularly ones with high amounts of chert fragments. They often grade downslope into Loamy Terrace Forest sites.

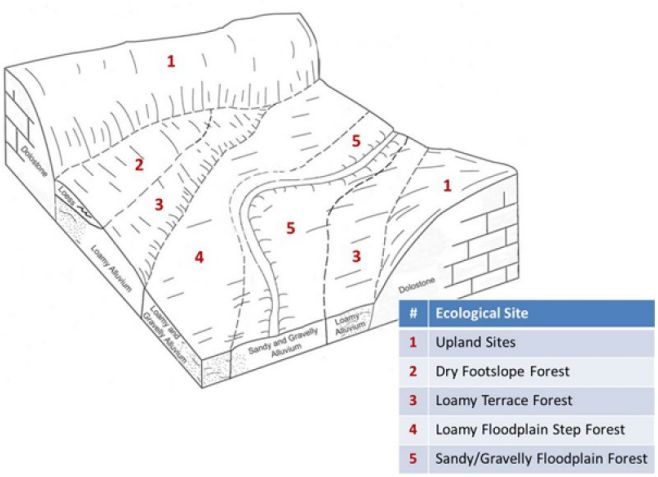


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Stream terrace (3) Strath terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding frequency	None
Slope	3–15%
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)	145-161 days
Freeze-free period (characteristic range)	175-195 days
Precipitation total (characteristic range)	1,219-1,270 mm
Frost-free period (actual range)	137-162 days
Freeze-free period (actual range)	167-196 days
Precipitation total (actual range)	1,194-1,295 mm
Frost-free period (average)	152 days
Freeze-free period (average)	184 days
Precipitation total (average)	1,245 mm

Climate stations used

- (1) WEST PLAINS [USC00238880], West Plains, MO
- (2) STILWELL 5 NNW [USC00348506], Stilwell, OK
- (3) GREENVILLE 6 N [USC00233451], Silva, 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 low plant-available water capacity, due to either an abundance of coarse fragments or the presence of a fragipan. 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, and are generally skeletal with abundant gravel and cobbles at depth. These soils are not affected by seasonal wetness. Soil series associated with this site include Aslinger, Hobson, Marquand, Roselle, Taterhill, Tonti, Topazmill, Townhole, Viraton, and Waben.

The accompanying picture of the Waben series shows the abundant gravel and cobble content that characterizes these skeletal soils. Scale is in feet. Picture courtesy of Dennis Meinert, Missouri Department of Natural Resources.

Figure 9. Waben series

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Colluvium–cherty limestone (3) Residuum–limestone
Surface texture	(1) Gravelly silt loam (2) 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"	0–20%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–22.86 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)	0–45%
Subsurface fragment volume >3" (Depth not specified)	0–20%

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.

Dry Footslope Forests occur at the base of slopes between the uplands and stream terraces. The reference plant community is well developed forest dominated by an overstory of white oak and black oak. The canopy is moderately tall (60 to 75 feet) but more dense (70 to 90 percent canopy) than exposed slopes.

Fire played a moderate role in the maintenance of these systems. It is likely that these ecological sites burned at least once every 10 to 20 years. These periodic fires kept the forest somewhat 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.

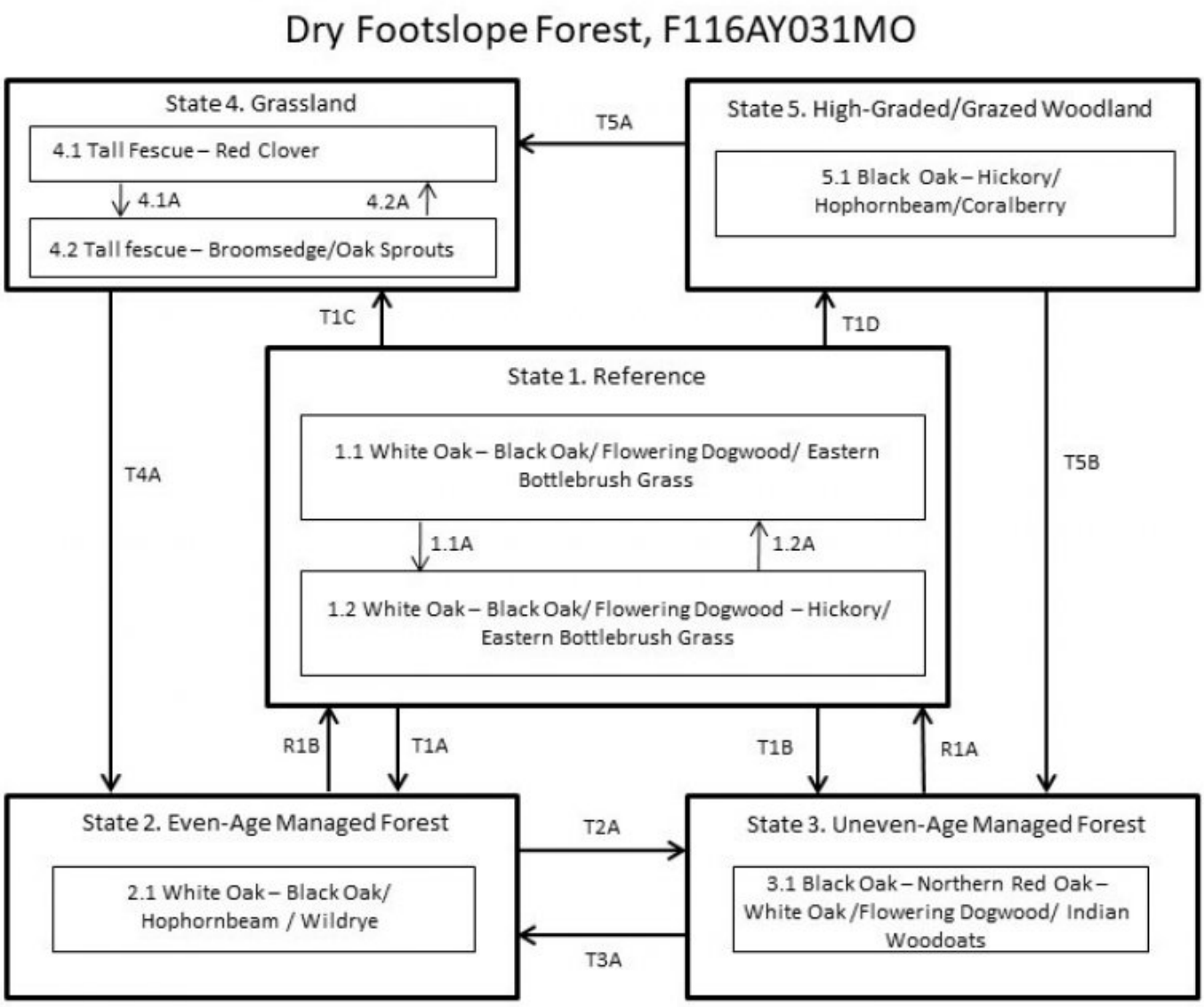
Dry Footslope Forests were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by large native herbivores, such as bison, elk, and white-tailed deer, would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and sun-loving 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 coralberry, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion can be a problem and lower productivity. Prescribed fire can play a beneficial but limited role in the management of this ecological site. 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	Activity/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; thinning
T4A, T5A	Tree planting; long-term succession; no grazing
T5B	Uneven-age management; tree planting; no grazing

Code	Activity/Event/Process
1.1A	No disturbance (10+ years)
1.2A	Disturbance (fire, wind, ice) 3-5 years
4.1A	Over grazing; no fertilization
4.2A	Brush management; grassland seeding; grassland management

Code	Activity/Event/Process
R1A	Extended rotations; prescribed fire
R1B	Uneven-age mgt, extended rotations; prescribed fire

Figure 10. State and transition diagram for this ecological site

State 1

Reference

The reference state was dominated by white oak and black oak. Periodic disturbances from fire, wind or ice maintained the dominance of oaks by opening up the canopy and allowing more light for oak reproduction. Long disturbance-free periods allowed an increase in more shade tolerant species such as hickory and sugar maple. Two community phases are recognized in this state, with shifts between phases based on disturbance frequency. The reference state is rare today. Some sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvest coupled with uncontrolled domestic livestock grazing (State 5). Fire suppression has also resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many reference sites have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) forests.

Community 1.1
White Oak – Black Oak/ Flowering Dogwood/ Eastern Bottlebrush Grass

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 – Black Oak/ Flowering Dogwood – Hickory/ Eastern Bottlebrush Grass

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

Pathway P1.1A
Community 1.1 to 1.2

This pathway is a gradual transition that results from extended, disturbance-free periods.

Pathway P1.2A
Community 1.2 to 1.1

This pathway is a transition that results from extended, disturbance periods returning, such as native fire, wind, and ice storms.

State 2
Even-Age Managed Forest

These former woodland are now rather dense, with an under developed understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. Continual timber management, depending on the practices used, will either maintain this state, or convert the site to uneven-age (State 3) forests.

Community 2.1
White Oak – Black Oak/ Hophornbeam / Wildrye

State 3
Uneven-Age Managed Forest

Uneven-Age Managed forests can resemble the reference state but are denser. The biggest differences are tree age, most being only 50 to 90 years old, and canopy closure. Composition is also likely altered from the reference state depending on tree selection during harvest. In addition, without a regular 15 to 20 year harvest re-entry into these stands, they will slowly increase in more shade tolerant species such as hickory and white oak will become less dominant.

Community 3.1
Black Oak – Northern Red Oak – White Oak /Flowering Dogwood/ Indian Woodoats

State 4
Grassland

Conversion of forests to planted, non-native pasture species such as tall fescue has been common in this MLRA. Fragipans, surface fragments, low organic matter contents and soil acidity make non-native pastures challenging to maintain in a healthy, productive state on this ecological site. If grazing and active pasture management is discontinued, the site will eventually transition, over time, to State 2 (Even-Age).

Community 4.1
Tall Fescue - Red Clover

Community 4.2
Tall fescue - Broomsedge/Oak Sprouts

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 Woodland

Woodland sites subjected to repeated, high-graded timber harvests and uncontrolled domestic grazing transition to this state. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as coralberry, gooseberry, poison ivy and Virginia creeper. The vegetation offers little nutritional value for cattle, and excessive stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Exclusion of livestock from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

Community 5.1
Black Oak – Hickory/ Hophornbeam/Coralberry

Transition T1A
State 1 to 2

This transition typically results from even-aged management, younger canopy ages, and prescribed fire.

Transition T1B
State 1 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest 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 transition generally requires extended rotations that allow mature trees to exceed ages of about 120 years along with prescribed fire.

Transition T2A
State 2 to 3

This transition typically results with initial uneven-age management and eventual cessation of any management.

Restoration pathway R1A
State 3 to 1

This restoration transition generally requires extended rotations that allow mature trees to exceed ages of about 120 years along with prescribed fire.

Transition T3A
State 3 to 2

This transition typically results from active even-age management.

Transition T4A
State 4 to 2

This transition typically results with tree planting, long-term succession, and no grazing.

Transition T5B
State 5 to 3

This transition typically results with uneven-age management, tree planting and livestock exclusion.

Restoration pathway 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	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	–	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	–	–	–	–
red maple	ACRU	*Acer rubrum*	Native	–	–	–	–
shortleaf pine	PIEC2	*Pinus echinata*	Native	–	–	–	–
mockernut hickory	CATO6	*Carya tomentosa*	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	–	–
oval-leaf sedge	CACE	*Carex cephalophora*	Native	–	–
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	–
eastern bottlebrush grass	ELHY	*Elymus hystrix*	Native	–	–
Forb/Herb					
Virginia snakeroot	ARSE3	*Aristolochia serpentaria*	Native	–	–
Missouri violet	VIMI3	*Viola missouriensis*	Native	–	–
Adam and Eve	APHY	*Aplectrum hyemale*	Native	–	–
wild blue phlox	PHDI5	*Phlox divaricata*	Native	–	–
goldenseal	HYCA	*Hydrastis canadensis*	Native	–	–
feathery false lily of the valley	MARA7	*Maianthemum racemosum*	Native	–	–
Virginia springbeauty	CLVI3	*Claytonia virginica*	Native	–	–
celandine poppy	STDI3	*Stylophorum diphyllum*	Native	–	–
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	–
Tree					
common serviceberry	AMAR3	*Amelanchier arborea*	Native	–	–
hophornbeam	OSVI	*Ostrya virginiana*	Native	–	–
blackgum	NYSY	*Nyssa sylvatica*	Native	–	–
flowering dogwood	COFL2	*Cornus florida*	Native	–	–
pawpaw	ASTR	*Asimina triloba*	Native	–	–

Animal community

Wildlife (MDC 2006):

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

Bird species associated with early-successional 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 Forests are Whip-poor-will, Ovenbird, and Yellow- billed Cuckoo.

Birds associated with late-successional Forests are Worm-eating warbler, Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Yellow-billed Cuckoo, Summer Tanager, Red-eyed Vireo, Scarlet Tanager, Black-and-white Warbler, and Broad-winged Hawk.

Reptiles and amphibians associated with mature Forests include: long-tailed salamander, dark-sided salamander, southern red-backed salamander, three-toed box turtle, ground skink, western worm snake, western earth snake, American toad, and timber rattlesnake.

Other information

Forestry (NRCS 2002, 2014):

Management: Field measured site index values average 50 for white oak, 64 for black oak, and 54 for shortleaf pine. Timber management opportunities are moderate. 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 should be used with caution on a site if timber management is the primary objective.

Limitations: Large amounts of coarse fragments throughout profile; presence of a fragipan may be within 30 inches. Surface stones and rocks are problems for efficient and safe equipment operation and will make equipment use somewhat difficult. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which leaves a greater amount of coarse fragments on the surface. Hand planting or direct seeding may be necessary. Seedling mortality due to low available water capacity may be high. Mulching or providing shade can improve seedling survival. Mechanical tree planting will be limited. 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: Dry Footslope Forest

Plot BIBAFS01 – Taterhill soil
Located in Big Barren Creek NA - USFS, Carter County, Missouri
Latitude: 36.849914
Longitude: -91.062949

Plot CURINP11 – Waben soil
Located in Current River NPS, Shannon County, Missouri
Latitude: 37.123938
Longitude: -91.130957

Plot TWRINP01 – Waben soil
Located in Two Rivers area, NP, Shannon County, Missouri
Latitude: 37.186708
Longitude: -91.268378

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Contributors

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Approval

Nels Barrett, 9/24/2020

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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:

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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:**
