USDA Natural Resources
Conservation Service

Ecological site F116AY040MO
Wet Floodplain Step Forest

Last updated: 9/24/2020
Accessed: 05/11/2025

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.

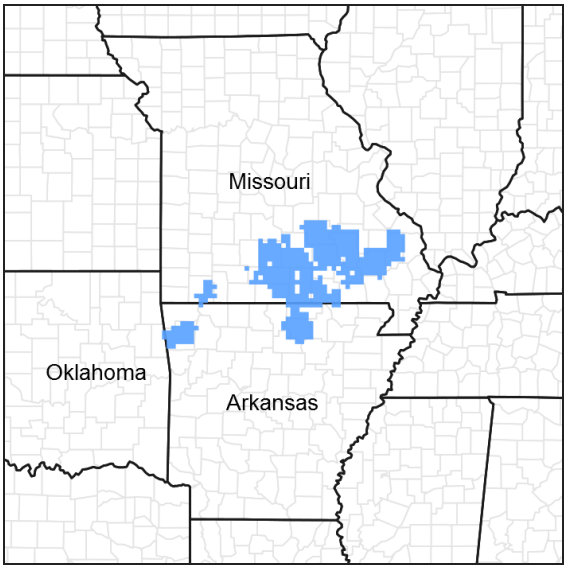


Figure 1. Mapped extent

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 Wet-Mesic Bottomland Forest.

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):
The reference state for this ecological site is most similar to a Wet Bottomland Forest.

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

The reference state for this ecological site is most similar to a Quercus macrocarpa – Quercus shumardii – Carya cordiformis / Chasmanthium latifolium Forest (CEGL004544).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site is scattered across numerous Subsections in the southern portion of 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”.

Wet Floodplain Step Forests occur along narrow streams primarily in the southern part of the Ozark Highland. Soils are very deep and loamy with seasonal high water tables, and are subject to flooding. The reference plant community is forest with an overstory dominated by a variety of trees including bur oak, Shumard oak, swamp white oak, American elm, and black cherry, an understory dominated by American hornbeam, northern spicebush and Ohio buckeye with 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 upslope.
F116AY035MO	**Wet Terrace Forest** Wet Terrace Forests are upslope.
F116AY042MO	**Sandy/Gravelly Floodplain Forest** Sandy/Gravelly Floodplain Forests and other floodplain ecological sites are downslope.

Similar sites

F116AY035MO	**Wet Terrace Forest** Wet Terrace Forests are upslope but have similar species composition.

Table 1. Dominant plant species

Tree	(1) *Quercus macrocarpa* (2) *Quercus bicolor*
Shrub	(1) *Ilex decidua*
Herbaceous	(1) *Chasmanthium latifolium* (2) *Carex*

Physiographic features

This site is on floodplain steps, with slopes of 0 to 3 percent. The site generates some runoff to adjacent lower floodplain sites, and receives some runoff from higher stream terraces and uplands. This site is subject to occasional flooding.

The following figure (adapted from Holbrook and Childress, 2006) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “4” on the figure. Loamy Floodplain Step Forest sites are typically below Terrace Forest sites, labeled “2” and “3”. The Floodplain Step Forest sites are slightly above the Floodplain Forest sites, which are adjacent to the active stream channel.

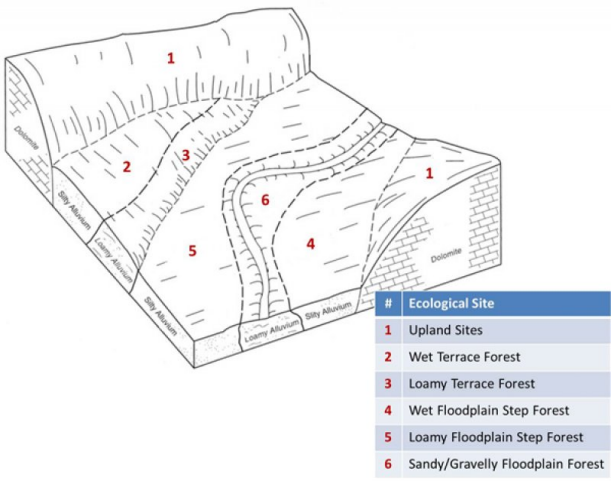


Figure 2. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Flood-plain step
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare to frequent
Ponding frequency	None
Slope	0–3%
Water table depth	8–72 in
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)	145-157 days
Freeze-free period (characteristic range)	173-185 days
Precipitation total (characteristic range)	46-49 in
Frost-free period (actual range)	143-161 days
Freeze-free period (actual range)	172-190 days
Precipitation total (actual range)	45-50 in
Frost-free period (average)	151 days
Freeze-free period (average)	180 days
Precipitation total (average)	48 in

Climate stations used

- (1) HOUSTON [USC00234019], Houston, MO
- (2) MARBLE HILL [USC00235253], Marble Hill, MO
- (3) WEST PLAINS [USC00238880], West Plains, MO

Influencing water features

This ecological site is influenced by a seasonal high water table from high groundwater levels. The water table is typically near the surface in late fall through spring, receding in the summer. This ecological site is on stream terraces and floodplain steps of perennial streams. They are not adjacent to the current stream channel. Areas are subject to flooding, typically of short duration and low intensity. The site generates some runoff to adjacent lower floodplain sites, and receives some runoff from higher stream terraces and uplands.

This site is in the RIVERINE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993), and are Forested Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils have no rooting restriction. They were formed under forest vegetation, with periodic depositional flood events. Organic matter content is variable. Parent material is alluvium. They have silt loam surface horizons that may have gravelly and loamy subsoils that may be skeletal with depth. They are affected by seasonal wetness. Soil series associated with this site include Atkins, Farewell, Stultz, Wakeland, and Westerville.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow
Soil depth	72 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	7 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	20–35%
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.

Wet Floodplain Step Forests occur sparingly along streams throughout the region on somewhat poorly drained, alluvial soils. These occasionally flooded units occur below upland cherty, shale and dolomitic woodlands and forests, and above frequently flooded low floodplains. They often are in a complex at the same level with Moist Floodplain Forests.

The reference plant community is dominated by a wide variety of deciduous hardwood tree species, tolerant of seasonally wet conditions including bur oak, Shumard oak, swamp white oak, American elm, black cherry. 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 American hornbeam, northern spicebush, and Ohio buckeye. Grape vine, greenbriar, and trumpet creeper are also present along with a diverse array of ground flora species that carpets the forest floor.

Wet Floodplain Step Forests occasionally flood once every 5 years. It is likely that the hydrology of Ozark streams has changed since pre-settlement because of changes in land use. Current flooding is likely more frequent, and flood stages are higher, with more catastrophic floods occurring than historically.

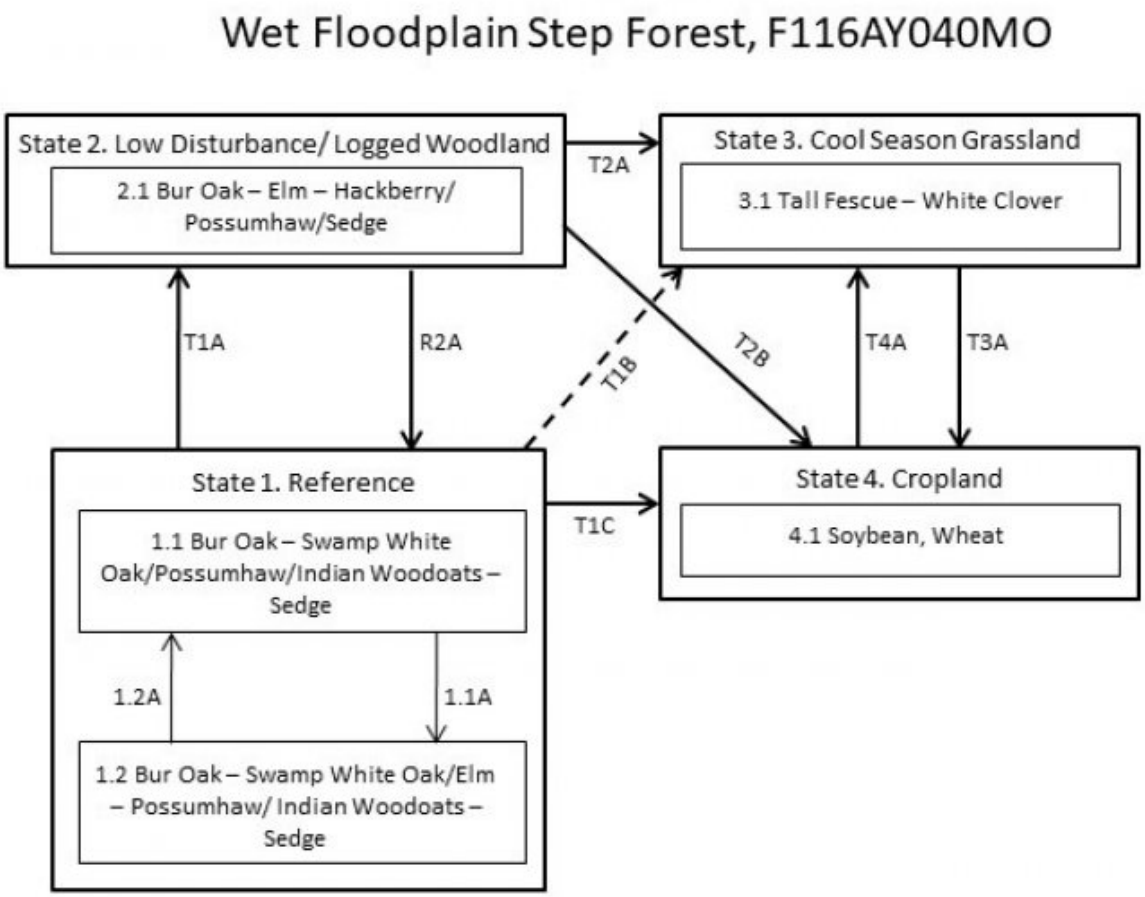
Today, the Wet Floodplain Step Forests are largely converted to pasture and cropland. Where they do still occur, they often occur as a rather narrow band of forest traversing the riverfront or stream edge. These bands of forest play an important role as a source of food and shelter for migrating birds. In addition, they are very important in stream bank stabilization.

Uncontrolled grazing by domestic livestock in these remaining strips of forest damages and kills smaller trees and removes the ground cover. Carefully planned timber harvests can be tolerated on these sites, but high grading of the timber will ultimately degrade the sites.

Re-establishment of these floodplain forests is important for stream quality and stream health, and as critical habitat for migratory birds. Planting of later successional species on the appropriate landscape position and soils has proven to be an effective means for restoration.

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/Activity/Process
T1A	Lack of disturbance events >20 years; repeated timber harvests
T3A	Conservation tillage; conservation cropping system
T1B,T2A	Woody removal; tillage; vegetative seeding; grassland management
T1C, T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding ; grassland management
1.1A	Lack of disturbance events 10+ years
1.2A	Disturbance events 2-5 years
R2A	Forest stand improvement;

Figure 9. State and transition diagram for this ecological site

State 1

Reference

The historical reference state for this ecological site was old growth oak forest. The forest was dominated by a wide variety of deciduous hardwood tree species, tolerant of seasonally wet conditions. Periodic disturbances from flooding, 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 and altered drainage have resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Most reference states are currently altered because of timber harvesting, clearing and conversion to grassland or cropland.

Community 1.1
Bur Oak – Swamp White Oak/Possumhaw/Indian Woodoats – Sedge

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

Forest overstory. The 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. The 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
Bur Oak – Swamp White Oak/Elm – Possumhaw/ Indian Woodoats – Sedge

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

Pathway P1.1A
Community 1.1 to 1.2

Lack of disturbance events - 10 plus years

Pathway P1.2A
Community 1.2 to 1.1

Disturbance event 2-5 years.

State 2
Low Disturbance/ Logged Forest

Composition is altered from the reference state depending on tree selection during harvest. This state will slowly increase in more shade tolerant species and swamp white oak and bur oak will become less dominant. Without periodic canopy disturbance, stem density and fire intolerant species, like hackberry, will increase in abundance. Some periodic grazing may be occurring.

Community 2.1
Bur Oak – Elm – Hackberry/ Possumhaw/Sedge

State 3
Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue, orchard grass, and white 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 and transitions.

Community 3.1
Tall Fescue – White Clover

State 4
Cropland

This is a state that exists currently with intensive cropping of soybeans and wheat. Some conversion to non-native cool season hay land occurs, but when commodity prices are high, these states transition back to cropland.

Community 4.1
Soybean, Wheat

Transition T1A
State 1 to 2

Lack of disturbance events greater than 20 years ; repeated timber harvests.

Transition T1B
State 1 to 3

Woody removal; tillage; vegetative seeding; grassland management.

Transition T1C
State 1 to 4

Woody removal; tillage; conservation cropping system.

Restoration pathway R2A
State 2 to 1

Forest stand improvement.

Transition T2A
State 2 to 3

Woody removal; tillage; vegetative seeding; grassland management.

Transition T2B
State 2 to 4

Woody removal; tillage; conservation cropping system.

Transition T3A
State 3 to 4

Conservation tillage; conservation cropping system.

Transition T4A
State 4 to 3

Vegetative seeding; grassland management.

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
bur oak	QUMA2	*Quercus macrocarpa*	Native	–	–	–	–
Shumard's oak	QUSH	*Quercus shumardii*	Native	–	–	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
American hornbeam	CACA18	*Carpinus caroliniana*	Native	–	–	–	–
pecan	CAIL2	*Carya illinoinensis*	Native	–	–	–	–
shellbark hickory	CALA21	*Carya laciniosa*	Native	–	–	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	–	–	–	–
sugarberry	CELA	*Celtis laevigata*	Native	–	–	–	–
green ash	FRPE	*Fraxinus pennsylvanica*	Native	–	–	–	–
possumhaw	ILDE	*Ilex decidua*	Native	–	–	–	–
eastern cottonwood	PODE3	*Populus deltoides*	Native	–	–	–	–
swamp white oak	QUBI	*Quercus bicolor*	Native	–	–	–	–
pin oak	QUPA2	*Quercus palustris*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Indian woodoats	CHLA5	*Chasmanthium latifolium*	Native	–	–
soft fox sedge	CACO13	*Carex conjuncta*	Native	–	–
Gray's sedge	CAGR5	*Carex grayi*	Native	–	–
false hop sedge	CALU3	*Carex lupuliformis*	Native	–	–
hop sedge	CALU4	*Carex lupulina*	Native	–	–
Muskingum sedge	CAMU9	*Carex muskingumensis*	Native	–	–
squarrose sedge	CASQ2	*Carex squarrosa*	Native	–	–
fowl mannagrass	GLST	*Glyceria striata*	Native	–	–
Forb/Herb					
smallspike false nettle	BOCY	*Boehmeria cylindrica*	Native	–	–
jewelweed	IMCA	*Impatiens capensis*	Native	–	–
pale touch-me-not	IMPA	*Impatiens pallida*	Native	–	–
foxglove beardtongue	PEDI	*Penstemon digitalis*	Native	–	–
cutleaf coneflower	RULA3	*Rudbeckia laciniata*	Native	–	–
wingstem	VEAL	*Verbesina alternifolia*	Native	–	–
shoestring fern	VILI2	*Vittaria lineata*	Native	–	–
Canadian clearweed	PIPU2	*Pilea pumila*	Native	–	–
bristly buttercup	RAHI	*Ranunculus hispidus*	Native	–	–
limestone wild petunia	RUST2	*Ruellia strepens*	Native	–	–
blue skullcap	SCLA2	*Scutellaria lateriflora*	Native	–	–
giant goldenrod	SOGI	*Solidago gigantea*	Native	–	–
calico aster	SYLAA	*Symphyotrichum lateriflorum var. angustifolium*	Native	–	–
eastern greenviolet	HYCO6	*Hybanthus concolor*	Native	–	–
lizard's tail	SACE	*Saururus cernuus*	Native	–	–
Fern/fern ally					
shoestring fern	VILI2	*Vittaria lineata*	Native	–	–
sensitive fern	ONSE	*Onoclea sensibilis*	Native	–	–
Shrub/Subshrub					
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	–	–
possumhaw	ILDE	*Ilex decidua*	Native	–	–
northern spicebush	LIBE3	*Lindera benzoin*	Native	–	–
Tree					
Ohio buckeye	AEGL	*Aesculus glabra*	Native	–	–
American hornbeam	CACA18	*Carpinus caroliniana*	Native	–	–
Vine/Liana					
heartleaf peppervine	AMCO2	*Ampelopsis cordata*	Native	–	–
trumpet creeper	CARA2	*Campsis radicans*	Native	–	–
catbird grape	VIPA7	*Vitis palmata*	Native	–	–
riverbank grape	VIRI	*Vitis riparia*	Native	–	–
frost grape	VIVU	*Vitis vulpina*	Native	–	–

Animal community

Wildlife (MDC 2006):

Moist conditions with abundant coarse woody debris make this type of ecological site important for many herptiles.

Ephemeral pools provide important amphibian breeding habitat. Periodic inundation and acorns provide important habitat and food for migrating ducks (especially mallards) and breeding ducks including wood ducks and hooded mergansers.

Tall emergent trees along with an uneven canopy structure and canopy gaps are important for heron colonies, eagle nesting, Mississippi kites, cerulean warblers and other bird species.

Birds associated with late-successional to mature forests are Wood Duck, Hooded Merganser, Barred Owl, Cerulean Warbler, Yellow-throated Warbler, Prothonotary Warbler, Pileated Woodpecker, Yellow-throated Vireo, Brown Creeper, and Yellow-crowned Night Heron.

Reptiles and amphibians associated with ecological site include: small-mouthed salamander, central newt, midland brown snake, gray treefrog, northern spring peeper, Blanchard's cricket frog, southern leopard frog, western painted turtle, and red-eared slider.

Other information

Forestry (NRCS 2002, 20014):

Management: Field measured site index values range from 73 to 98. On the wettest sites, timber management opportunities may be limited. Management of these groups is often difficult because of the great variation in species, age, stocking levels and seasonal wetness. Use seed-tree, group selection, or clear cutting regeneration methods. Harvest favoring reproduction of the less-shade tolerant species such as bur oak, swamp white oak, sycamore, and cottonwood. Maintain adequate riparian buffer areas.

Limitations: Wetness from flooding; high water table. Use of equipment may be restricted in spring and other excessively wet periods. Restrict activities to dry periods or surfaced areas. Equipment use when wet may compact soil and damage tree roots. Unsurfaced roads and traffic areas tend to be slippery and form ruts easily. Access to forests is easiest during periods in late summer or winter when soils are frozen or dry. Planting is extremely difficult during spring periods. Seedling mortality may be high due to excess wetness. Unsurfaced roads and skid trails may be impassable during rainy periods.

Inventory data references

Potential Reference Sites: Wet Floodplain Step Forest

Plot TRTESP_KS08 – Westerville soil
Located in Trail of Tears SP, Ste. Genevieve County, MO
Latitude: 37.477601
Longitude: -89.506218

Plot ELPOFS06– Farewell soil
Located in Eleven Point Forest Service, Oregon County, MO
Latitude: 36.651198
Longitude: -91.180861

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.

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

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Dept. of Interior, Fish & Wildlife Service, Office of Biological Services, Washington DC.

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

Holbrook, Donald, and J. Daniel Childress. 2006. Soil Survey of Bollinger County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

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.

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, St. Paul, Minnesota.

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

Natural Resources Conservation Service. Site Index Reports. Accessed May 2014. https://esi.sc.egov.usda.gov/ESI_Forestland/pgFSWelcome.aspx

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.

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

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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	05/11/2025
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:

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**
