USDA Natural Resources
Conservation Service

Ecological site F134XY014MO
Wet Footslope Forest

Last updated: 3/20/2025
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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): 134X–Southern Mississippi Valley Loess

The Southern Mississippi Valley Loess (outlined in red on the map; northern portion only) is a relatively narrow strip of the coastal plain bordering the Mississippi River valley, that is

blanketed with loess. The northern part of this MLRA, discussed here, is locally referred to as Crowley's Ridge. Elevation ranges from about 300 feet on the footslopes to nearly 600 feet on the highest ridges. Loess caps the summits and upper slopes, and Pliocene-aged sand and gravel deposits of the coastal plain influence soils on lower, steeper slopes.

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 (Missouri Department of Conservation, 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 occurs primarily in the Crowley's Ridge Subsection, and in the Benton Loess Woodland/Forest Hills Land Type Association of the Ozark Outer Border Subsection.

Ecological site concept

Wet Footslope Forests are within the green areas on the map (Missouri portion only; distributions farther south are currently under review). These sites are extensive on footslopes and drainageways on Crowley's Ridge and adjacent areas. Soils are very deep, with a seasonal high water table. The reference plant community is forest with an overstory dominated by a variety of trees including bur oak, cherrybark oak, willow oak, sweetgum, pin oak, Nuttall oak, water oak, American elm, sugarberry, and green ash, an understory dominated by blue beech, spicebush, and Ohio buckeye, and a rich herbaceous ground flora.

Table 1. Dominant plant species

Tree	(1) *Quercus macrocarpa* (2) *Fraxinus pennsylvanica*
Shrub	(1) *Vitis* (2) *Cornus foemina*
Herbaceous	(1) *Boehmeria cylindrica* (2) *Cardamine concatenata*

Physiographic features

This site is on footslopes and drainageways with slopes of less than 3%. The site receives runoff from adjacent upland sites. Some areas are subject to flooding.
The adjacent figure (adapted from Butler, 1985) 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, on footslopes and stream terraces along upland drainageways. Fragipan Upland Woodland sites and Deep Loess Backslope sites are typically upslope.

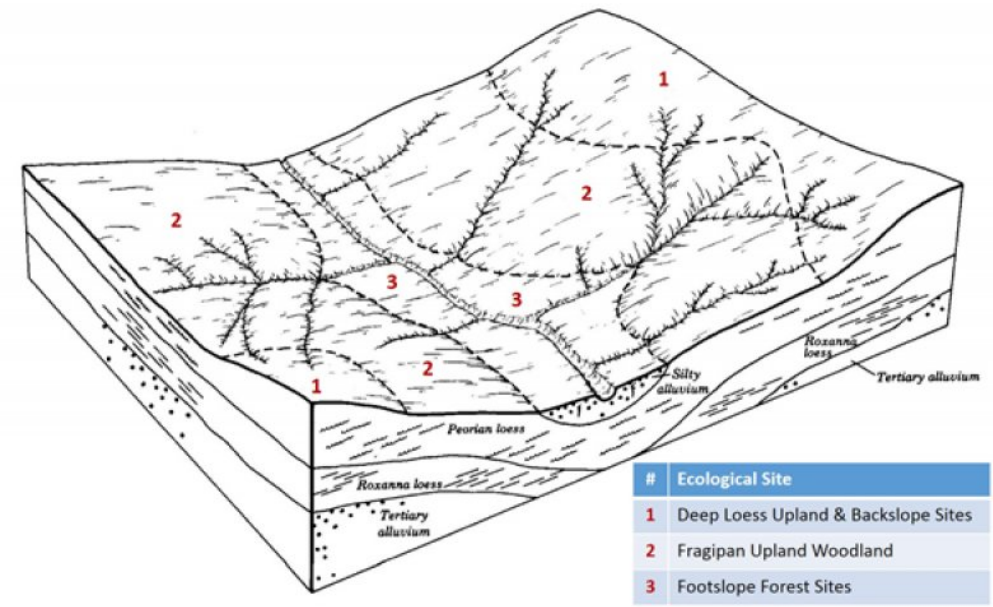

Figure 2. Typical landscape relationships for this ecologica

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Stream terrace (3) Drainageway
Flooding frequency	None
Ponding frequency	None
Slope	0–3%
Water table depth	15–61 cm
Aspect	Aspect is not a significant factor

Climatic features

The Crowley’s Ridge subsection of the Southern Mississippi Valley Loess MLRA has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In

summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of America 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 Crowley's Ridge subsection experiences regional differences in climates, but these differences do not have obvious geographic boundaries or major climatic variations. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line from north to south. Both mean annual temperature and precipitation exhibit minor gradients along this line.

The average annual precipitation in Crowley's Ridge subsection is 48 to 50 inches. The average annual temperature is 53 to 57 degrees F. Mean January minimum temperature follows the north-to-south gradient. Mean July maximum temperatures show little variation across the area.

Mean annual precipitation varies along the same gradient as temperature. The precipitation decreases gradually throughout the summer, except for a moderate increase in midsummer as high-intensity, convective thunderstorms. Minor amounts of snow fall occur nearly every winter, but the snow cover lasts for only a few days.

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 subsection 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. Slope orientation is an important topographic influence on microclimate. 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)	164-172 days
Freeze-free period (characteristic range)	197-211 days

Precipitation total (characteristic range)	1,219-1,245 mm
Frost-free period (actual range)	163-173 days
Freeze-free period (actual range)	193-215 days
Precipitation total (actual range)	1,219-1,245 mm
Frost-free period (average)	168 days
Freeze-free period (average)	204 days
Precipitation total (average)	1,219 mm

Climate stations used

- (1) KENNETT RADIO KBOA [USC00234417], Kennett, MO
- (2) ADVANCE 1 S [USW00093825], Advance, MO

Influencing water features

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 colluvium or local alluvium from loess. They have silt loam surface horizons, with loamy to clayey subsoils. They are affected by a seasonal high water table during the spring months. Soil series associated with this site include Calhoun, Dundee, Falaya, Overcup, and Zachary.
The accompanying picture of the Overcup series shows a thin silt loam surface horizon over a light-colored leached layer called an albic horizon at about 20 cm. Below this is the claypan, a clay horizon that impedes water movement and root penetration. Indicators of seasonal wetness (redoximorphic features) are visible in the lower part of the profile. Picture courtesy of Kevin Godsey and Dan Childress; scale is in centimeters.

Figure 9. Overcup series

Table 4. Representative soil features

Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to slow
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.24–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

State and transition model

Ecosystem states

1. Mesic Bottomland Forest

State 1 submodel, plant communities

1.1. Sugar Maple-Red Oak-Bitternut Hickory/PawPaw Forest

State 1
Mesic Bottomland Forest

Community 1.1
Sugar Maple-Red Oak-Bitternut Hickory/PawPaw Forest

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							
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
Kentucky coffeetree	GYDI	*Gymnocladus dioicus*	Native	–	–	–	–
black walnut	JUNI	*Juglans nigra*	Native	–	–	–	–
white oak	QUAL	*Quercus alba*	Native	–	–	–	–
American elm	ULAM	*Ulmus americana*	Native	–	–	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	–	–	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Forb/Herb					
northern spicebush	LIBE3	*Lindera benzoin*	Native	–	–
Virginia bluebells	MEVI3	*Mertensia virginica*	Native	–	–
Shumard's oak	QUSH	*Quercus shumardii*	–	–	–
American basswood	TIAM	*Tilia americana*	Native	–	–
zigzag spiderwort	TRSU2	*Tradescantia subaspera*	Native	–	–
Missouri violet	VIMI3	*Viola missouriensis*	Native	–	–
lowland bladderfern	CYPR4	*Cystopteris protrusa*	Native	–	–
common persimmon	DIVI5	*Diospyros virginiana*	Native	–	–
white fawnlily	ERAL9	*Erythronium albidum*	Native	–	–
common cowparsnip	HEMA80	*Heracleum maximum*	Native	–	–
zigzag iris	IRBR2	*Iris brevicaulis*	Native	–	–
butternut	JUCI	*Juglans cinerea*	Native	–	–
striped cream violet	VIST3	*Viola striata*	Native	–	–
Adam and Eve	APHY	*Aplectrum hyemale*	Native	–	–
green dragon	ARDR3	*Arisaema dracontium*	Native	–	–
spring blue eyed Mary	COVE2	*Collinsia verna*	Native	–	–
Shrub/Subshrub					
Greek valerian	PORE2	*Polemonium reptans*	Native	–	–
Tree					
pawpaw	ASTR	*Asimina triloba*	Native	–	–

Other references

Butler, E. Rex. 1985. Soil Survey of Stoddard County, Missouri. U.S. Dept. of Agric. Soil Conservation Service.

MDC, 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.

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

Nigh, Timothy A., & Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri

Department of Conservation, Jefferson City, Missouri.

Contributors

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Approval

Matthew Duvall, 3/20/2025

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	05/21/2025
Approved by	Matthew Duvall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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:**