Ecological site F134XY012MO
Sandy Exposed Backslope Woodland

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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.

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 Dry Sand Woodland. 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 Mixed Oak Woodland. National Vegetation Classification System Vegetation Association (NatureServe, 2010): The reference state for this ecological site is most similar to a Quercus stellata - Quercus marilandica - Quercus falcata / Schizachyrium scoparium Sand Woodland (CEGL002417). Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002): This Ecological Site occurs in the Crowley's Ridge Subsection.

Ecological site concept

Sandy Exposed Backslope Woodlands are within the green areas on the map (Missouri portion only; distributions farther south are currently under review). They occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Sandy Protected Backslope Forest ecological site. These sites are on the easternmost uplands of Crowley's Ridge in Stoddard and Dunklin counties, Missouri. They are directly downslope from Loess Backslope ecological sites, and are mapped in complex with them. Soils are very deep and sandy. The reference plant community is woodland with an overstory dominated by black oak, white oak, and southern red oak, and a ground flora of native grasses and forbs.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus falcata*
Shrub	(1) *Cornus florida* (2) *Aralia spinosa*
Herbaceous	(1) *Helianthus microcephalus* (2) *Carex*

Physiographic features

This site is on upland backslopes, with slopes of 15 to 35%. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected aspects. The site receives runoff from upslope summit and shoulder sites, and

generates runoff to adjacent, downslope ecological sites. This site does not flood.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Slope	20 – 40 %
Aspect	S, SW, W

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)	170-180 days
Freeze-free period (characteristic range)	200-220 days

Precipitation total (characteristic range)	1,170-1,190 mm
Frost-free period (actual range)	160-190 days
Freeze-free period (actual range)	190-220 days
Precipitation total (actual range)	1,140-1,190 mm
Frost-free period (average)	180 days
Freeze-free period (average)	210 days
Precipitation total (average)	1,170 mm

- (1) ADVANCE 1 S [USW00093825], Advance, MO
- (2) MALDEN MUNI AP [USC00235207], Malden, MO

Influencing water features

Soil features

These soils have acidic subsoils that are low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is coastal plain sediments. They are sandy throughout. These soils are not affected by seasonal wetness. Soil series associated with this site include Eustis.

Table 4. Representative soil features

Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 cm

Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 5.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

In this region dominated by historic fire-prone prairies, savannas and open woodlands, Alfic Chert Protected Backslope Woodlands occur in relatively protected landscape positions on lower, steep slopes in the deeper valleys furthest from the prairie uplands. While the upland prairies and savannas had an estimated fire frequency of 1-3 years, Alfic Chert Exposed Backslope Woodlands burned less frequently (estimated 5-20 years) and with lower intensity.

The composition and structure of the Alfic Chert Backslopes varies in relation to slope aspect. Exposed, south and west facing slopes are more droughty and fire-prone than are the protected north and east facing slopes, which are relatively cool and moist. Consequently, a separate Ecological Site is recognized on the protected aspects (Alfic Chert Protected Backslope Forests), which forms a complex with the Exposed Backslope Forests. These two ecological sites intergrade on neutral, northwest and southeast exposures.

The south and west facing slopes of the Alfic Chert Exposed Backslope Woodlands have an open woodland structure with 70-80% canopy closure, a sparse subcanopy layer and an abundant woodland ground flora. Canopy tree species tolerant of drought and fire, such as black oak and post oak, share dominance with white oak.

Historically, grazing by native herbivores and periodic fires kept understory conditions more open. In addition, Alfic Chert Exposed Backslope Woodlands 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. The role of wind and ice in this region has been apparent during the early 2000s. Such canopy disturbances allow more light to reach the ground and favor reproduction of the dominant oak species.

Today, these communities have either been cleared and converted to pasture, or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50-80 years) canopy layer whose composition may have been altered by timber harvesting practices. An increase in hickories over historic conditions is common. In addition, in the absence of fire, the canopy, sub-canopy and woody understory layers are better developed. The diversity and cover of woodland ground flora has diminished in the more shaded conditions.

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

Alfic Chert Exposed Backslope Woodlands 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 also play a beneficial role in the management of this ecological site. While woodland restoration using fire is a viable option, the higher productivity of these sites makes it more challenging than on the other woodland sites in the region. Control of woody species will be more difficult. Excellent woodland restoration on these steep exposed aspects has been achieved.

State and transition model

Figure 7. Alfic Chert Exposed Backslope Woodlands

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
post oak	QUST	*Quercus stellata*	Native	–	–	–	–
black oak	QUVE	*Quercus velutina*	Native	–	–	–	–
shortleaf pine	PIEC2	*Pinus echinata*	–	–	–	–	–
scarlet oak	QUCO2	*Quercus coccinea*	–	–	–	–	–
white oak	QUAL	*Quercus alba*	Native	–	–	–	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	–
Bosc's panicgrass	DIBO2	*Dichanthelium boscii*	–	–	–
hairy woodland brome	BRPU6	*Bromus pubescens*	–	–	–
whitetinge sedge	CAAL25	*Carex albicans*	–	–	–
little bluestem	SCSC	*Schizachyrium scoparium*	–	–	–
Forb/Herb					
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	–	–	–
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	–	–	–
smooth small-leaf ticktrefoil	DEMA2	*Desmodium marilandicum*	–	–	–
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	–	–	–
hairy sunflower	HEHI2	*Helianthus hirsutus*	–	–	–
Arkansas bedstraw	GAAR4	*Galium arkansanum*	–	–	–
eastern beebalm	MOBR2	*Monarda bradburiana*	–	–	–
feathery false lily of the valley	MARA7	*Maianthemum racemosum*	–	–	–
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	–	–	–
bristly buttercup	RAHI	*Ranunculus hispidus*	–	–	–
fire pink	SIVI4	*Silene virginica*	–	–	–
rue anemone	THTH2	*Thalictrum thalictroides*	–	–	–
manyray aster	SYAN2	*Symphyotrichum anomalum*	–	–	–
American ipecac	GIST5	*Gillenia stipulata*	–	–	–
spotted geranium	GEMA	*Geranium maculatum*	–	–	–
Shrub/Subshrub					
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	–	–	–

fragrant sumac	RHAR4	*Rhus aromatica*	–	–	–
leadplant	AMCA6	*Amorpha canescens*	–	–	–
Vine/Liana					
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	–	–	–
summer grape	VIAE	*Vitis aestivalis*	–	–	–

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 15. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Contributors

Fred Young

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	08/23/2026

Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

    _____

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

    _____

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**
