

Ecological site F134XY004MO Fragipan Upland 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.



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 an Upland Flatwoods.

Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006):

The reference state for this ecological site is most similar to an Upland Woodland.

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

The reference state for this ecological site is most similar to a *Quercus stellata* - *Quercus falcata* / *Ostrya virginiana* Forest (CEGL004064).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):

This Ecological Site occurs throughout the Crowley's Ridge Subsection, and in the Black River Ozark Border Subsection.

Ecological site concept

Fragipan Upland Woodlands are within the green areas on the map (Missouri portion only; distributions farther south are currently under review). These sites are widespread in the uplands of Crowley's Ridge in Stoddard and Dunklin counties, Missouri, and in the southeastern edge of the Ozark Highlands in Butler and Ripley counties, Missouri. Soils have root-restricting fragipans. The reference plant community is woodland with an overstory dominated by post oak and black oak, and a ground flora of native grasses and forbs.

Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Quercus velutina</i>
Shrub	(1) <i>Rhus aromatica</i>
Herbaceous	(1) <i>Elymus hystrix</i> (2) <i>Helianthus</i>

Physiographic features

This site is on convex upland summit crests and shoulders with slopes of 1 to 15%. The

site generates runoff to adjacent, downslope ecological sites. This site does not flood. 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 “2” on the figure, on upland summit crests, shoulders, and gently sloping backslopes. Deep Loess Upland and Deep Loess Backslope sites, labeled “1” on the figure, are closely associated with the Fragipan Upland Woodland sites. Footslope ecological sites, labeled “3” on the figure, are often downslope.

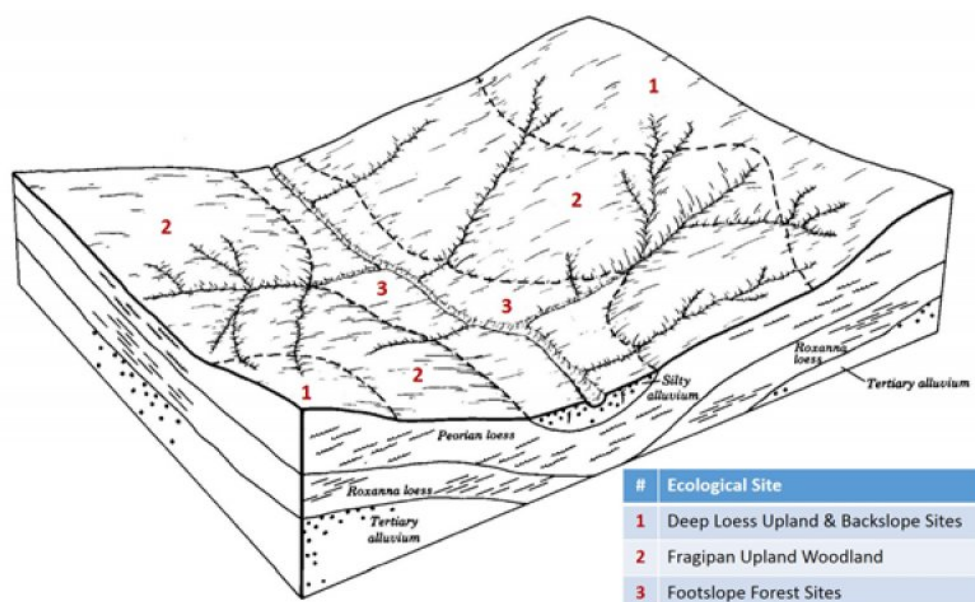


Figure 2. Typical landscape relationships for this ecological

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Interfluvium (3) Divide
Flooding frequency	None
Ponding frequency	None
Slope	1–15%
Water table depth	61–122 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)	185-191 days
Freeze-free period (characteristic range)	212-220 days
Precipitation total (characteristic range)	1,219-1,245 mm
Frost-free period (actual range)	184-193 days

Freeze-free period (actual range)	210-222 days
Precipitation total (actual range)	1,219-1,245 mm
Frost-free period (average)	188 days
Freeze-free period (average)	216 days
Precipitation total (average)	1,219 mm

Climate stations used

- (1) POPLAR BLUFF [USC00236791], Poplar Bluff, MO
- (2) POPLAR BLUFF MUNI AP [USW00003975], Poplar Bluff, MO
- (3) WAPPAPELLO DAM [USC00238700], Wappapello, MO

Influencing water features

Soil features

These soils have a root-restricting fragipan at about 24 inches. They were formed under woodland vegetation, and have thin, light-colored surface horizons. They have silt loam surface horizons, and loamy subsoils. Parent material is loess. A seasonal high water table is perched above the fragipan during the spring months, but has little effect on native vegetation. Soil series associated with this site include Loring.

The accompanying picture of the Loring series shows a thin surface horizon and a light-colored albic horizon over a brown silt loam subsoil at about 20 cm. A fragipan is below about 55 cm in this picture. The fragipan is a barrier to roots. Picture courtesy of Kevin Godsey and Dan Childress; scale is in centimeters.



Figure 9. Loring series

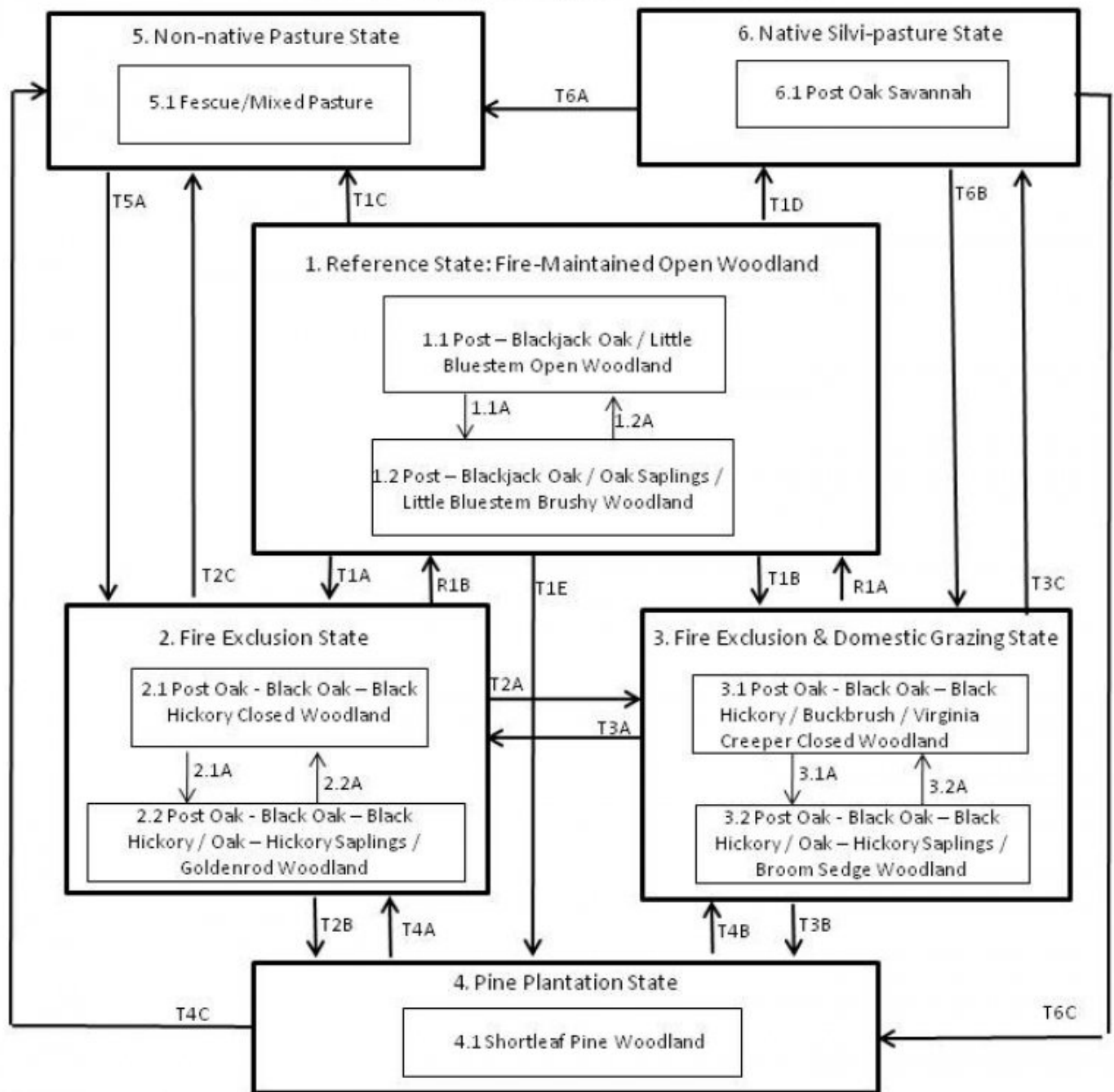
Table 4. Representative soil features

Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained
Permeability class	Not specified
Soil depth	36–76 cm
Surface fragment cover $\leq 3''$	0%
Surface fragment cover $> 3''$	0%
Available water capacity (0-101.6cm)	15.24–17.78 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)	4.5–6
Subsurface fragment volume $\leq 3''$ (Depth not specified)	0%
Subsurface fragment volume $> 3''$ (Depth not specified)	0%

Ecological dynamics

State and transition model

Loess Fragipan Upland Flatwoods



Code	Transition Practice
T1A	Fire suppression; single tree selection timber harvest
T1B	Fire suppression; single tree selection timber harvest; domestic grazing
T1C, T2C, T4C, T6A	Clearing & pasture planting
T1D, T3C	Thinning; prescribed fire; managed grazing
T1E, T2B, T3B	Clearcut & pine planting
T2A	Domestic grazing
T3A	Exclude domestic grazing
T4A	Pine harvest; fire exclusion
T4B	Pine harvest; fire exclusion; domestic grazing
T5A	Tree planting; long-term succession
T6B	Fire suppression
T6C	Pine planting

Code	Community Practice
1.1A	Fire-free interval 3-10 yrs
1.2A	Fire; Native grazers
2.1A, 3.1A	Single tree selection timber harvest
2.2A, 3.2A	No timber harvest 10-30 yrs

Code	Restoration Practice
R1A	Exclude domestic grazing; thinning; prescribed fire 2-5 yrs
R1B	Thinning; prescribed fire 2-5 yrs

Figure 10. Loess Fragipan Upland Flatwoods

State 1
Upland Flatwoods

Community 1.1
Post Oak-Blackjack Oak//Little Bluestem Flatwoods



Figure 11. St. Francois State Park, MDNR, St. Francois Co.

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							
post oak	QUST	Quercus stellata	Native	—	—	—	—
blackjack oak	QUMA3	Quercus marilandica	Native	—	—	—	—
black hickory	CATE9	Carya texana	Native	—	—	—	—

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	<i>Schizachyrium scoparium</i>	Native	—	—
fuzzy wuzzy sedge	CAHI6	<i>Carex hirsutella</i>	Native	—	—
limestone meadow sedge	CAGR3	<i>Carex granularis</i>	Native	—	—
eastern star sedge	CARA8	<i>Carex radiata</i>	Native	—	—
blue sedge	CAGL6	<i>Carex glaucoidea</i>	Native	—	—
oval-leaf sedge	CACE	<i>Carex cephalophora</i>	Native	—	—
sweet woodreed	CIAR2	<i>Cinna arundinacea</i>	Native	—	—
inland rush	JUIN2	<i>Juncus interior</i>	Native	—	—
Forb/Herb					
American ipecac	GIST5	<i>Gillenia stipulata</i>	Native	—	—
hairy bedstraw	GAPI2	<i>Galium pilosum</i>	Native	—	—
elmleaf goldenrod	SOUL2	<i>Solidago ulmifolia</i>	Native	—	—
hairy sunflower	HEHI2	<i>Helianthus hirsutus</i>	Native	—	—
arrowleaf violet	VISA2	<i>Viola sagittata</i>	Native	—	—
late purple aster	SYAP2	<i>Symphyotrichum patens</i> var. <i>patens</i>	Native	—	—
smooth violet prairie aster	SYTU2	<i>Symphyotrichum turbinellum</i>	Native	—	—
Shrub/Subshrub					
St. Andrew's cross	HYHYM	<i>Hypericum hypericoides</i> ssp. <i>multicaule</i>	Native	—	—
blackberry	RUBUS	<i>Rubus</i>	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

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	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:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

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

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

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

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

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

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

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

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

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

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

17. **Perennial plant reproductive capability:**
-