Ecological site F134XY209AL
Western Moderately Wet Terrace

Last updated: 3/24/2025
Accessed: 08/31/2026

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 (MLRA 134) extends some 500 miles from the southern tip of Illinois to southern Louisiana. This MLRA occurs in Mississippi (39 percent), Tennessee (23 percent), Louisiana (15 percent), Arkansas (11 percent), Kentucky (9 percent), Missouri (2 percent), and Illinois (1 percent). It makes up about 26,520 square miles. Landscapes consist of highly dissected uplands, level to undulating plains, and broad terraces that are covered with a mantle of loess. Underlying the loess are Tertiary deposits of unconsolidated sand, silt, clay, gravel, and lignite. The soils, mainly Alfisols, formed in the loess mantle. Stream systems of the MLRA typically originate as low-gradient drainageways in the upper reaches that broaden rapidly downstream to wide, level floodplains with highly meandering channels. Alluvial soils, mostly Entisols and Inceptisols, are predominantly silty where loess thickness of the uplands are deepest but grade to loamy textures in watersheds covered by thin loess. Crowley’s Ridge, Macon Ridge, and Lafayette Loess Plains are discontinuous, erosional remnants that run north to south in southeastern Missouri - eastern Arkansas, northeastern Louisiana, and south-central Louisiana, respectively. Elevations range from around 100 feet on terraces in southern Louisiana to over 600 feet on uplands in western Kentucky. The steep, dissected uplands are mainly in hardwood forests while less sloping areas are used for crop, pasture, and forage production (USDA-NRCS, 2006). This site primarily occurs on the loess-capped terraces of the Western Lowlands Pleistocene Valley Trains (EPA Level IV Ecoregion: 73g; Woods et al., 2004), although the soils of the site have been mapped on adjoining areas, such as the Grand Prairie ecoregion (EPA 73e).

Classification relationships

All or portions of the geographic range of this site falls within a number of ecological/land classifications including: -NRCS Major Land Resource Area (MLRA) 134 – Southern Mississippi Valley Loess -NRCS Major Land Resource Area (MLRA) 131A – Southern Mississippi River Alluvium -Environmental Protection Agency’s Level IV Ecoregion: Western Lowlands Pleistocene Valley Trains: 73g (Woods et al., 2004); Pleistocene Valley Trains: 73b (Chapman et al., 2002) -234A – Southern Mississippi Alluvial Plain section of the USDA Forest Service Ecological Subregion (McNab et al., 2005) -LANDFIRE Biophysical Setting 4515130 and NatureServe Ecological System CES203.193 Lower Mississippi River Flatwoods, respectively (LANDFIRE, 2008; NatureServe, 2009) -Hardwood Flats, Early Wisconsin Valley Train and Deweyville Terraces (dry phase) (Klimas et al., 2012) -Bottomland Flatwoods (Nelson, 2005)

Ecological site concept

The Western Moderately Wet Terrace is characterized by very deep, somewhat poorly drained soils that formed in loess or water reworked loess. This site primarily occurs on broad, level to nearly level Pleistocene-age terraces of the Western Lowlands with slopes ranging from 0 to 3 percent. The principal soil of this site has a seasonally high water table from winter to mid-spring in most years that can become quite droughty by late summer. This extreme alteration between saturated and droughty conditions is attributed to a slowly permeable fragipan. The site sometimes occurs in complex or association with seasonally ponded depressions and poorly drained flatwoods (wet phase). The slightly better drainage of this site coupled with a slightly higher position on the landscape supports a drier plant association than its wetter counterpart, the Western Wet Loess Terrace. The natural vegetation of these broad flats possess characteristics that are suggestive of hydroxeric flatwoods; that is, they have seasonally saturated soils, a relatively open understory, and support droughty woodland species on a low, flat landscape. Common to dominant species of many stands include post oak, southern red oak, and shagbark hickory whereas the shallow depressions of this site may be dominated by willow and water oak. Of note, considerable variation in the plant community may occur among and between stands.

Associated sites

F134XY201AL	**Western Loess Terrace**
F134XY202AL	**Western Wet Loess Terrace** This site occurs in fairly close association with the Western Moderately Wet Terrace. The latter is slightly drier than the wet terrace site.
F134XY206AL	**Western Fragipan Terrace**

Similar sites

F134XY008AL	**Northern Moderately Wet Loess Terrace** This site is the eastern counterpart of the Western Moderately Wet Terrace.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Western Moderately Wet Terrace ecological site occurs primarily within the Western Lowlands ecoregion, although there are a few instances where the soils of this site have been mapped in adjoining physiographic areas (e.g., Crowley's Ridge). Overall, the core concepts of this site are best defined where these somewhat poorly drained soils occur on level to nearly level, loess-capped Pleistocene terraces of the Western Lowlands.

The Western Lowlands border Crowley's Ridge to the west and extends over a north-south distance of approximately 225 miles from Cape Girardeau, Missouri to the vicinity of Helena, Arkansas (Saucier, 1994). An irregular and sometimes ill-defined boundary of two MLRAs, 134 and 131A, converge within the Lowlands. Soils that formed in loess (considered soils of MLRA 134) mainly occur along the eastern edge of the Lowlands and along the western interface with Crowley's Ridge. However, loessal soils of the terraces often occur in intricate, complex patterns with soils that formed in alluvium and eolian loamy and sandy deposits (i.e., soils of MLRA 131A).

Much of these complexities were borne from past events, generally attributed to various glacial outwash episodes that occurred as a result from cyclical continental glaciation. Tremendous amounts of meltwater streamed through the area forming a highly dendritic network of braided stream channels. A culmination of these events helped to create one of the region's most characteristic landscapes, a series of ancient fluvial terraces sometimes referred to as "valley train" terraces. Each terrace was established at different time periods with the oldest feature occurring along the western margin of Crowley's Ridge. Proceeding westward, the age of each successive terrace becomes progressively younger, and each terrace is distinguished by a drop of several feet in elevation. The oldest terrace is at least 30 feet higher than the modern floodplain of active streams on the Western Lowlands (Klimas et al., 2012).

Most modern stream systems enter the Lowlands from the Ozark Plateau or arise within the basin (Klimas et al., 2009), including a few minor systems originating on Crowley's Ridge. Some of the ancestral braided streams that had once formed from glacial outwash now supports modern tributaries and local drainageways, which have since formed narrow valleys and floodplains (Saucier, 1994). Another feature of the historic stream braids are a series of swales or what is locally referred to as "slashes". Such features tend to hold water for very long periods throughout the year and are essentially remnant channel braids or scours (T. Foti, personal communication). Superimposed on this backdrop of complex physiographic features are low ridges, mounds, and relict dunes that are of eolian origin – consisting of loess (e.g., loessal ridges) and sand or sandy loam (e.g., dunes).

The core concepts of this site are primarily associated with the Early Wisconsin Terraces of the Western Lowlands. Embedded within this site are occasional, shallow depressions that pond during the wetter times of the year, generally late winter to spring (typically referred to as vernal pools).

Table 2. Representative physiographic features

Landforms	(1) Valley train (2) Terrace (3) Flat
Flooding frequency	None
Ponding frequency	None
Elevation	70 – 90 m
Slope	0 %
Water table depth	30 – 50 cm
Aspect	Aspect is not a significant factor

Climatic features

This site falls under the Humid Subtropical Climate Classification (Koppen System). The mean annual precipitation for this site from 1980 through 2010 was approximately 52 inches with a range from 35 to roughly 73 inches. Maximum precipitation occurs in spring (April and May) and late fall (November and December) and typically decreases throughout the summer. Rainfall often occurs as high-intensity, convective thunderstorms during warmer periods but moderate-intensity frontal systems can produce large amounts of rainfall during winter. Snowfall generally occurs in most years but duration is often brief (USDA-NRCS, 2006). The average annual maximum and minimum air temperature is 72 (range 48 to 91) and 51 (range 30 to 72) degrees F, respectively. The average frost free and freeze free periods are 206 and 236 days, respectively.

Table 3 Representative climatic features

Frost-free period (average)	210 days
Freeze-free period (average)	240 days
Precipitation total (average)	1,320 mm

- (1) HELENA [USC00033242], Helena, AR
- (2) MARIANNA 2 S [USC00034638], Marianna, AR
- (3) CLARENDON [USC00031442], Clarendon, AR
- (4) NEWPORT [USC00035186], Newport, AR
- (5) PARAGOULD 1S [USC00035563], Paragould, AR
- (6) SAINT CHARLES [USC00036376], Clarendon, AR

- (7) BRINKLEY [USC00030936], Brinkley, AR

Influencing water features

The somewhat poorly drained soils of this site are noted for supporting a high water table (perched) during periods of high rainfall and low evapotranspiration, typically from winter to spring. Instances where water has the greatest influence are closed and open (or connected) depressions that seasonally pond and in areas where the site is positioned adjacent to small drainageways. Such instances are typically influenced by precipitation and not from overbank flooding. Wetland or hydrophytic vegetation occurs mainly in these closed depressions. Vegetation of the non-ponded flats consists predominantly of upland species, although some facultative wetland species may occur.

Soil features

Please note that the soils listed in this section of the description may not be all inclusive. There may be additional soils that fit the site's concepts. Additionally, the soils that provisionally form the concepts of this site may occur elsewhere, either within or outside of the MLRA and may or "may not" have the same geomorphic characteristics or support similar vegetation. Some soil map units and soil series included in this "provisional" ecological site were used as a "best fit" for a particular soil – landform catena during a specific era of soil mapping, regardless of the origin of parent material or the location of MLRA boundaries. Therefore, the listed soils may not be typical for MLRA 134 or a specific location, and the associated soil map units may warrant further investigation in a joint ecological site inventory – soil survey project. When utilizing this provisional description, the user is encouraged to verify that the area of interest meets the appropriate ecological site concepts by reviewing the soils, landform, vegetation, and physical location. If the site concepts do not match the attributes of the area of interest, please review the Similar or Associated Sites listed in the Supporting Information section of this description to determine if another site may be a better fit for your area of interest.

Calloway (Fine-silty, mixed, active, thermic Aquic Fraglossudalfs) is the principal soil of this site. Calloway soils are deep, somewhat poorly drained, and formed in a mantle of loess, or "water reworked" loess, on broad, Pleistocene-age terraces. They have a seasonally high water table perched over a thick fragipan. Depth to the fragipan ranges from 14 to 38 inches. Slope gradients of this soil on the Western Lowlands ranges from 0 to 3 percent, though many areas are less than 1 percent. Reaction is very strongly acid through moderately acid in the upper part of the solum. The lower part of the solum ranges from strongly acid through slightly alkaline (USDA-NRCS, 2016).

Table 4. Representative soil features

Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Permeability class	Slow to moderate
Soil depth	50 – 80 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	16.26 – 19.3 cm

Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.3 – 6.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

This ecological site is distributed across broad expanses of level to nearly level flats on Early Wisconsin Terraces (Klimas et al., 2012). A key characteristic of this site is the propensity of these somewhat poorly drained soils to perch water during wetter times of the year. Low surface runoff and slow permeability through a dense fragipan contribute to saturated conditions from winter through spring in most years. This extreme wet condition through the first part of the year is reversed by mid- to late summer when evapotranspiration essentially removes moisture above the soils' perching layer. This leads to very droughty conditions during summer and fall. The alternating wet – dry pattern of this site characteristically occurs in other "flatwoods" communities in the eastern United States (see Taft et al., 1995; Fralish et al., 1999). This moisture regime is often referred to as "hydroxeric". It is important to note that this site occurs above the modern floodplain of larger streams and rivers of the Western Lowlands and receives very little, if any, overland flow (NatureServe, 2009). Interspersed across the broad flats of this site are surface irregularities that include occasional, subtle mounds or microhighs and distinct, shallow depressions. These microreliefs contribute to species and site diversity, overall.

Because of the moisture regime and surface complexities, plant communities of this site are highly variable. Species characteristic of uplands and lowlands are often seen co-occurring within a small area. Positions or spots that remain wetter for longer periods, such as shallow depressions, may support a greater abundance of willow oak and water oak (Klimas et al., 2012). Conversely, areas that tend to dry more quickly support a preponderance of post oak and other upland species.

An important characteristic of this site is that it often occurs in complex or close association with lower, poorly drained flatwoods. The slightly better drained soils and higher position of this site support conditions conducive for a "drier association" of plants. Although many of the same species occur on both the poorly drained flats (wet phase) and this site (i.e., better drained flats or "dry phase"), there appears to be a greater concentration of upland species on this particular site (dry phase). Klimas et al. (2012) distinguishes this suite of associated sites as "Hardwood flats, dry phase" and "Hardwood flats, wet phase." These sites correspond with the Western Moderately Wet Terrace and Western Wet Loess Terrace ecological sites, respectively.

Historically, fire was probably a key factor or influence on this site. Low-intensity fires would occur when adjacent systems burned, and since some of the tree species on this site are fire sensitive, fire-caused root death likely contributed to an open canopy. Stand replacement fires, although rare, would have occurred during extreme, prolonged droughts (LANDFIRE, 2008). These key disturbance factors would have contributed to varying habitats or community types. Where trees occurred, conditions probably ranged from savanna to open flatwoods. Meadows or small prairies likely occurred in a patchwork pattern that were interspersed among the woodlands and/or savannas. This mosaic likely persisted as a "physiognomic gradient" with meadows grading to savannas and savannas grading to woodland. Overall, the dominant or prevailing physiognomic characteristic of the site may have been open woodland - rather, flatwoods (T. Foti, personal communication).

The predominant land use activity on this site today is agriculture production with principal crops being soybean, corn, cotton, winter small grains, and grain sorghum (USDA-NRCS, 2006b). A minor use on this site is reportedly pasture or hayland with principal forage of bermudagrass, bahiagrass, and tall fescue. This site has some limitations for forest production, mainly due to seasonal wetness. (Forest production is a very minor use on this site as the vast majority of the site's distribution is cropland. Therefore, forest or timber management as a state is not represented in the accompanied State and Transition Model.)

Following this narrative, a "provisional" state and transition model is provided that includes the "perceived" reference state and several alternative (or altered) vegetation states that have been observed and/or projected for the Western Moderately Wet Terrace ecological site. This model is based on limited reconnaissance, literature, expert knowledge, and interpretations. Plant communities will differ across MLRA 134 due to natural variability in climate, soils, and physiography. Depending on objectives, the reference plant community may not necessarily be the management goal.

The environmental and biological characteristics of this site are complex and dynamic. As such, the following diagram suggests pathways that the vegetation on this site might take, given that the modal concepts of climate and soils are met within an area of interest. Specific locations with unique soils and disturbance histories may have alternate pathways that are not represented in the model. This information is intended to show the possibilities within a given set of circumstances and represents the initial steps toward developing a defensible description and model. The model and associated information are subject to change as knowledge increases and new information is garnered. This is an iterative process. Most importantly, local and/or state professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Figure 5. STM - Western Moderately Wet Terrace

Figure 6. Legend - Western Moderately Wet Terrace

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 3.1 plant community composition

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

Table 9. Community 4.1 plant community composition

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

Other references

Chapman, S.S., J.M. Omernik, G.E. Griffith, W.A. Schroeder, T.A. Nigh, and T.F. Wilton. 2002. Ecoregions of Iowa and Missouri (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,800,000).

Foti, T.L. personal communication. Arkansas Natural Heritage Commission. Little Rock, AR.

Fralish, J.S., S.B. Franklin, and D.D. Close. 1999. Open woodland communities of southern Illinois, western Kentucky, and Middle Tennessee. In: Anderson, R.C., J.S. Fralish, and J.M. Baskin (eds.). Savannas, Barrens, and Rock Outcrop Plant Communities of North America. Cambridge University Press, New York. 470 p.

Green, Jonathan D., W.W. Witt, and J.R. Martin. 2006. Weed management in grass pastures, hayfields, and other farmstead sites. University of Kentucky Cooperative Extension Service, Publication AGR-172.

Harper, R.M. 1914. Phytogeographical notes on the Coastal Plain of Arkansas. The Plant World 17(2):36-48.

Harper, R.M. 1917. Some undescribed prairies in northeastern Arkansas. The Plant World 20(2):58-61.

Heineke, T.E. 1987. The Flora and Plant Communities of the Middle Mississippi River Valley. Doctoral Dissertation, Southern Illinois University, Carbondale, IL. 669 p.

Klimas, C., E. Murray, T. Foti, J. Pagan, M. Williamson, and H. Langston. 2009. An ecosystem restoration model for the Mississippi Alluvial Valley based on
geomorphology, soils, and hydrology. Wetlands 29(2):430-450.

Klimas, C., T. Foti, J. Pagan, E. Murray, and M. Williamson. 2012. Potential Natural Vegetation of the Mississippi Alluvial Valley: Western Lowlands, Arkansas, Field Atlas. Ecosystem Management and Restoration Research Program ERDC/EL TR-12-27, U.S. Army Corps of Engineers. Environmental Laboratory. 318 p.

LANDFIRE. 2008. LANDFIRE Biophysical Setting Models. Biophysical Setting 45. (2008, February - last update). Homepage of the LANDFIRE Project, U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, [Online]. Available: http://www.landfire.gov/index.php (Accessed: 1 July 2014).

McNab, W.H.; Cleland, D.T.; Freeouf, J.A.; Keys, Jr., J.E.; Nowacki, G.J.; Carpenter, C.A., comps. 2005. Description of ecological subregions: sections of the conterminous United States [CD-ROM]. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.

NatureServe. 2015. Arkansas Grand Prairie Switchgrass - Big Bluestem Grassland. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: 25 August 2016).

Nelson, P. 2005. The Terrestrial Natural Communities of Missouri. Third edition. Missouri Natural Areas Committee, Department of Natural Resources and the Department of Conservation, Jefferson City, MO. 550 p.

Rhodes, G.N., Jr., G.K. Breeden, G. Bates, and S. McElroy. 2005. Hay crop and pasture weed management. University of Tennessee, UT Extension, Publication PB 1521-10M-6/05 (Rev). Available: https://extension.tennessee.edu/washington/Documents/hay_crop.pdf.

Saucier, R.L. 1994. Geomorphology and Quaternary geologic history of the Lower Mississippi Valley. Volumes 1 (report) and 2 (map folio). U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, USA.

Taft, J.B., M.W. Schwartz, and L.R. Philippe. 1995. Vegetation ecology of flatwoods on the Illinoian till plain. Journal of Vegetation Science 6:647-666.

[USDA-NRCS] United States Department of Agriculture, Natural Resources Conservation Service. 2006a. 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.

[USDA-NRCS] United States Department of Agriculture, Natural Resources Conservation Service. 2006b. Soil Survey of Greene County, Arkansas. 231 p. Available online: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/arkansas/AR055/0/Greene%20County_Arkansas.pdf. (Accessed: 30 November 2015).

[USDA-NRCS] United States Department of Agriculture, Natural Resources Conservation Service. 2010. Conservation Practice Standard: Prescribed Grazing. Practice Code 528. Updated: September 2010. Field Office Technical Guide, Notice 619, Section IV. [Online] Available: efotg.sc.egov.usda.gov/references/public/ne/ne528.pdf.

[USDA-NRCS] United States Department of Agriculture, Natural Resources Conservation Service. 2016. Official Soil Series Descriptions. Available online: https://soilseries.sc.egov.usda.gov/osdname.asp. (Accessed: 17 May 2016).

Woods, A.J., T.L. Foti, S.S. Chapman, J.M. Omernik, J.A. Wise, E.O. Murray, W.L. Prior, J.B. Pagan, Jr., J.A. Comstock, and M. Radford. 2004. Ecoregions of Arkansas (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,000,000).

Contributors

Barry Hart

Approval

Matthew Duvall, 3/24/2025

Acknowledgments

Tom Foti (Ecologist, Arkansas Natural Heritage Commission) and Henry Langston (Arkansas Highway Department) provided invaluable discussion, knowledge, and experience with regards to the soils and vegetation associated with this site.

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	08/31/2026
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:

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:**