Ecological site F134XY010AL
Northern Wet Loess Terrace

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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 (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. 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 are predominantly silty where loess thickness of the uplands are deepest but grade to loamy textures in watersheds covered by thin loess. Underlying the loess mantle are Tertiary deposits of unconsolidated sand, silt, clay, gravel, and lignite. 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, 2006a). This site occurs throughout the Loess Plains (EPA Level IV Ecoregion: 74b) from western Kentucky south to the Southern Rolling Plains (EPA Level IV Ecoregion: 74c) in southwestern Mississippi.

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 -Environmental Protection Agency's Level IV Ecoregion: Loess Plains, 74b (Griffith et al., 1998; Woods et al., 2002; Chapman et al., 2004) -231H - Coastal Plains-Loess section of the USDA Forest Service Ecological Subregion (McNab et al., 2005) -LANDFIRE Biophysical Setting 4713260 and NatureServe Ecological System CES203.479 South – Central Interior / Upper Coastal Plain Flatwoods (LANDFIRE, 2009; NatureServe, 2009) -LANDFIRE Biophysical Setting 4713270 and NatureServe Ecological System CES203.479 South – Central Interior / Upper Coastal Plain Wet Flatwoods (LANDFIRE, 2009; NatureServe, 2009) -Xerohydric Flatwoods – Kentucky State Nature Preserves Commission (Evans et al., 2009) -Western Mesophytic Forest Region - Mississippi Embayment Section (Braun, 1950)

Ecological site concept

The Northern Wet Loess Terrace is characterized by deep, poorly drained soils that primarily formed in loess or silty materials. Locations within the Ohio River drainage, the extreme northern extent of the site, were likely formed in clayey lacustrine sediments. This site occurs on broad, nearly level terraces with slopes typically ranging from 0 to 2 percent. Soils have a seasonal high water table from winter to mid-spring, but by late summer, they often become very droughty. This extreme alternation between saturated and droughty conditions is attributed to an impermeable or slowly permeable subsoil layer that is either a fragipan or a dense accumulation of clay. Natural vegetation of these broad flats often resemble or possess characteristics that are suggestive of "hydroxeric" flatwoods; that is, they have a relatively open understory and support droughty woodland species such as post, southern red, and black oaks in a lowland environment. However, considerable variation in the plant community may occur among and between occurrences. Where some local flats are dominated by post oak, others may be dominated by willow oak, and still others may consist of a strange combination of species found in wetlands (e.g., overcup and pin oak) growing beside drought-tolerant trees (e.g., post oak). Shortleaf pine may become an additional community component farther south.

Associated sites

F134XY011AL	**Northern Ponded Loess Terrace** This site occurs in very close association with the Northern Wet Loess Terrace. In fact, the soils are the same; only a ponded phase distinguishes the two sites.
F134XY008AL	**Northern Moderately Wet Loess Terrace** This site often occurs in complex or close association with the Northern Wet Loess Terrace. This site may also represent a "drier phase" of the hydroxeric flatwoods community. More work is needed on both systems.

Similar sites

F134XY103MS	**Southern Rolling Plains Loess Wet Terrace** This site is the southern counterpart to the Northern Wet Loess Terrace.
F134XY202AL	**Western Wet Loess Terrace** This site is the western counterpart to the Northern Wet Loess Terrace, which occurs on the broad, Valley Train Terraces of the Western Lowlands.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Northern Wet Loess Terrace is broadly distributed across the largest physiographic subsection or ecoregion of the MLRA, the Loess Plains. West to east, this ecological site extends from the heart of the plains into portions of the Southeastern Plains (EPA Level III Ecoregion: 65). North to south, the site extends from the plains in western Kentucky to the border of the Southern Rolling Plains in southwestern Mississippi. The latter forms the southern-most boundary of the site due to warmer average annual air temperatures, greater annual rainfall, and a transition to slightly warmer soils (Chapman et al., 2004).

Characteristics of this region generally include undulating uplands, gently rolling hills, and irregular plains. Topographic relief of the Loess Plains is generally low, averaging about 30 to 70 feet. Upland slopes typically range from 0 to 20 percent with 1 to 8 percent being dominant. Elevations in the range of 300 to 400 feet are commonplace to the south but increase to nearly 600 feet in the north. In portions of western Kentucky and Tennessee, the undulating pattern of the plains is interrupted by dissected landscapes. Such areas tend to be hillier with steeper slopes and greater relief and appear to be concentrated along the borders of broader valleys and floodplains. As the plains continue eastward, starkness of the terrain becomes even more pronounced, which signals the transition of the Loess Plains to the thin loess-capped ridges, hills, and plateaus along the western edge of the Southeastern Plains. To the south, through much of Mississippi, the Loess Plains consists of a very thin east – west belt, compressed between the dissected Loess Hills and Mississippi Alluvial Plain to the west and the Coastal Plain to the east. The convergence of such contrasting ecoregions contribute to a very complex pattern of soils, landforms, and vegetation communities.

This ecological site primarily occurs on broad, level to nearly level pre-Holocene age terraces that border the active floodplains of meandering rivers and large streams. 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). It’s important to note that this site occurs to the west of the EPA Level IV Ecoregion, Flatwoods / Black Land Prairie Margins (65b) and should not be construed as part of that ecoregion. There is at least one overlap of a soil series among these ecoregions, and there are many similarities concerning vegetation.

All aspects are well represented and included in this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Flat
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	30 – 140 m
Slope	0 %
Ponding depth	0 – 80 cm
Water table depth	0 – 50 cm
Aspect	Aspect is not a significant factor

Climatic features

This site falls under the Humid Subtropical Climate Classification (Koppen System). The average annual precipitation for this site from 1980 through 2010 is 56 and ranges from 53 in the north to 58 inches in the south. Maximum precipitation occurs in winter and spring and precipitation decreases gradually throughout the summer, except for a moderate increase in midsummer. Rainfall often occurs as high-intensity, convective thunderstorms during warmer periods but moderate-intensity frontal systems can produce large amounts of rainfall during winter, especially in the southern part of the area. Snowfall generally occurs in the north during most years. However, accumulations are generally less than 12 inches and typically melt within 3 to 5 days. South of Memphis, winter precipitation sometimes occurs as freezing rain and sleet. The average annual temperature is 60 degrees F and ranges from 58 in the north to 64 degrees F in the south. The freeze-free period averages 222 days and ranges from 206 days in the north to 252 days in the south. The frost free period averages 197 days and ranges from 191 in the north to 224 days in the south.

The broad geographic distribution of this site north to south naturally includes much climatic variability with areas farther south having a longer growing season and increased precipitation. These climatic factors likely lead to important differences in overall plant productivity and key vegetation components between the southern and northern portions of this site. As future work proceeds, the current distribution of this site will likely be revised with a “central” site interjected between the northern and southern extremes of this MLRA.

Table 3 Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	220 days

Precipitation total (average)	1,420 mm

- (1) GRENADA [USC00223645], Grenada, MS
- (2) COLLIERVILLE [USC00401950], Collierville, TN
- (3) COVINGTON 3 SW [USC00402108], Covington, TN
- (4) LOVELACEVILLE [USC00154967], Paducah, KY
- (5) MURRAY [USC00155694], Murray, KY
- (6) HOLLY SPRINGS 4 N [USC00224173], Holly Springs, MS
- (7) LEXINGTON [USC00225062], Lexington, MS
- (8) DRESDEN [USC00402600], Dresden, TN
- (9) MILAN EXP STN [USC00406012], Milan, TN
- (10) BARDWELL 2 E [USC00150402], Bardwell, KY
- (11) GILBERTSVILLE KY DAM [USC00153223], Gilbertsville, KY
- (12) BATESVILLE 2 SW [USC00220488], Batesville, MS
- (13) CANTON 4N [USC00221389], Canton, MS
- (14) OAKLEY EXP STN [USC00226476], Raymond, MS
- (15) VICKSBURG MILITARY PK [USC00229216], Vicksburg, MS
- (16) YAZOO CITY 5 NNE [USC00229860], Yazoo City, MS
- (17) BOLIVAR WTR WKS [USC00400876], Bolivar, TN
- (18) PADUCAH [USW00003816], West Paducah, KY
- (19) JACKSON INTL AP [USW00003940], Pearl, MS
- (20) BROOKPORT DAM 52 [USC00110993], Paducah, IL
- (21) SENATOBIA [USC00227921], Coldwater, MS
- (22) NEWBERN [USC00406471], Newbern, TN
- (23) UNION CITY [USC00409219], Union City, TN

Influencing water features

The 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. With the exception of some headslopes and streams traversing across terrace landscapes, wetness of this site is primarily influenced by precipitation. Highly localized surfacing of groundwater may influence the site along a very narrow corridor of some drainheads and streams, but such occurrences generally do not have a demonstrable influence on the overall vegetation of this site. Instances where water has the greatest influence are within closed and open (or flow-through) depressions that seasonally pond and in areas where the site is positioned adjacent to small drainageways. Wetland or hydrophytic vegetation occurs mainly within depressions. Vegetation of the drier areas 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.

The soils of this site are very deep, poorly drained, and have a perched water table at or near the surface during wet periods of the year, generally winter into spring. They formed in a mantle of loess, or "water reworked" loess, on broad, level to nearly level terraces where they occur on extensive flats and interspersed, shallow depressions. Dominant slope gradient is between 0 and 1 percent but may range to a high of 2 percent. Permeability is slow and runoff is slow to very slow with some areas receiving overland flow from adjacent sites.

Principal soils of this site include Routon (Fine-silty, mixed, active, thermic Typic Epiaqualfs), Adaton (Fine-silty, mixed, active, thermic Typic Endoaqualfs), Henry (Coarse-silty, mixed, active, thermic Typic Fragiaqualfs), and Calhoun (Fine-silty, mixed, active, thermic Typic Glossaqualfs) soil series. Routon soils are characteristically episaturated; saturation occurs in the layers above 54 inches. Adaton soils are recognized as being endosaturated, but a seasonally high water table may be influenced by an argillic horizon consisting of 20 to 35 percent clay in the upper 20 inches. Henry soils have a slowly permeable fragipan in the subsoil. Depth to the fragipan ranges from 20 to

36 inches (USDA, 2016). Calhoun soils have very slow internal drainage. Clay content of the Btg horizon ranges from 22 to 35 percent. The glossic horizon extends deeply into the B horizon. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 70 percent of the effective cation-exchange capacity.

In northern-most extent of this site near Paducah, Kentucky, a local group of soils have been mapped that support similar perching properties and vegetation communities as the aforementioned loessal soils. That suite of soils apparently was formed from a lacustrine environment during the Late Pleistocene (Olive, 1966). Those soils have a relatively higher clay content in subsoil horizons and have been mapped as the Natalbany (Fine, smectitic, thermic Vertic Epiaqualfs), Ginat (Fine-silty, mixed, active, mesic Typic Endoaqualfs), and Okaw (Fine, smectitic, mesic Chromic Vertic Albaqualfs) series. These soils have not been technically or officially correlated with this site given their regionally-assigned affiliation, but their presence and close association with loessal soils of this site (particularly Routon) warrant recognition. Of note, these soils support exemplary examples of the hydroxeric flatwood communities associated with this site.

Table 4. Representative soil features

Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained
Permeability class	Slow to moderate
Soil depth	20 – 70 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	17.78 – 21.84 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)	4.6 – 5.7

Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The concepts of the Northern Wet Loess Terrace were developed from flatwoods communities within the Loess Plains of MLRA 134. The distribution of this site occurs to the west of the EPA Level IV Ecoregion, Flatwoods / Black Land Prairie Margins (65b) and should not be construed as representative of that ecoregion. Although, there is at least one overlap of a soil series, Adaton that occurs in both the Loess Plains and the Flatwoods ecoregions.

This ecological site is distributed across broad, level to nearly level flats on old fluvial terraces. A key characteristic of this site is the propensity of these poorly drained soils to perch water during wetter times of the year. Poor surface runoff and slow permeability contributes 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, which 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" (or xero-hydric, depending on preference). It's important to note that this site is generally above the modern floodplains of larger streams and rivers and receives very little overland flow. Exceptions occur where this site borders small streams and/or rivers and backflow moves over land.

Interspersed across the broad flats of this site are surface irregularities that include occasional, subtle mounds or micro-highs and distinct, shallow depressions. These microreliefs contribute to species and site diversity, overall. Depressional areas are designated as a separate ecological site, the Northern Ponded Loess Terrace, and is closely associated with the overall complexity of these poorly drained, terrace systems.

Because of the moisture regime and surface complexities, plant communities of this site are highly variable with some areas consisting predominantly of willow oak and others post oak. Species characteristic of both uplands and lowlands often co-occur within a small area (e.g., post oak, an upland species beside overcup oak, typically a wetland species). Areas that remain wetter for longer periods, such as shallow depressions, may support a greater abundance of pin oak, willow oak, and overcup oak. Conversely, areas that tend to dry more quickly may support a preponderance of post oak, hickory, and other upland species.

Some ecologists have typed or classified flatwoods based on the dominant and co-dominant plant species observed. Systems supporting a greater number of species having wet affinities (e.g., willow oak) have been classified as "wet flatwoods", and those dominated by post oak and other drought-tolerant species are typed as "dry flatwoods" (NatureServe, 2009; M. Hines, personal communication). This provisional site represents both wet and dry versions because it is not clear which soils contribute to the observed "wet – dry vegetation gradient." Very little work has been conducted in these dynamic and odd systems. As new information becomes available, one or more soil series provisionally associated with this site may warrant removal or new ones added.

Historically, fire may have been an important influence on this site. Low-intensity fires would have occurred when adjacent systems burned. Additional disturbance factors include severe ice-storm damage and windthrow from tornados and strong, straight-line winds (LANDFIRE, 2009).

The predominant land use activity on this site today is agriculture production with principal crops being soybean, corn, and cotton (USDA-NRCS, 2016). Some areas are in pasture or hayland with principal forage of bermudagrass, bahiagrass, and tall fescue. An additional use of this site is forest production. Overall, all uses on this site likely experience some limitations due to seasonal wetness, however forest production may have additional limitations due to seasonal dryness, particularly with respect to planted seedlings.

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 Northern Wet Loess 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. Some of the presented alternate states may warrant removal as additional information is learned and/or becomes available. 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 - Northern Wet Loess Terrace

Figure 6. Legend - Northern Wet Loess 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 2.1 plant community composition

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

Table 7. Community 3.1 plant community composition

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

Table 8. Community 4.1 plant community composition

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

Table 9. Community 5.1 plant community composition

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

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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	08/30/2026
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):**

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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:**
