Ecological site F134XY204AL
Western Alluvial Flat

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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. 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 occurs on floodplains of small drainageways to large streams that mainly drain upland areas of Crowley’s Ridge from about Forrest City, Arkansas northward through Stoddard County, Missouri.

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 (USDA-NRCS, 2006) -Environmental Protection Agency’s Level IV Ecoregion: Bluff Hills, 74a (Chapman et al., 2002; Woods et al., 2004) -231H - Coastal Plains-Loess section of the USDA Forest Service Ecological Subregion (McNab et al., 2005) -LANDFIRE Biophysical Setting 4514730 Gulf and Atlantic Coastal Plain Floodplain Systems (LANDFIRE, 2008) - East Gulf Coastal Plain Small Stream and River Floodplain Forest CES203.559 (NatureServe, 2012) -Mesic Bottomland Forest (Nelson, 2005) -Western Mesophytic Forest Region - Mississippi Embayment Section - Loess Hills (Braun, 1950)

Ecological site concept

The Western Alluvial Flat is characterized by deep, well drained to moderately well drained soils that formed in silty to loamy alluvium. Soil reactions range from very strongly acid to strongly acid in all horizons. This site occurs primarily on better drained portions (higher positions) of narrow to broad floodplains and secondarily on alluvial fans. Within stream and floodplain environments, specific landforms associated with the site include natural levees, rises, and the better drained flats that often border the stream-front or levee position. Flooding ranges from rare to frequent during winter and spring, and duration is brief to very long depending on stream and drainage basin size and flood event. Slopes are variable and dependent on floodplain position; dominant slopes of the flats are 0 to 2 percent but range to 5 percent on natural levees. The native vegetation of this site is the fabled, southern bottomland hardwood forest. The better drainage capabilities of the soil provide an incredible medium for supporting exemplary examples of upland and lowland species co-occurring within single stands. Overstory components often include cherrybark oak, white oak, willow oak, water oak, Shumard’s oak, swamp chestnut oak, tuliptree, American beech, American sycamore, sweetgum, maple, eastern cottonwood, hickories, elm, river birch, and green ash.

Associated sites

F134XY205AL	**Western Moderately Wet Alluvial Flat** This site occurs in close association with the Western Alluvial Flat and is characterized primarily by somewhat poorly drained soils.

Similar sites

F134XY102MS	**Southern Rolling Plains Loess Stream Terrace** This site occurs in the southeastern extent of MLRA 134 and supports similar soils and landform characteristics as the Western Alluvial Flat.
F134XY018AL	**Northern Alluvial Flat** This site is the eastern counterpart to the Western Alluvial Flat and includes similar soils.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The distribution of the Western Alluvial Flat is primarily associated with streams that drain upland areas of a distinct physiographic subsection of the Southern Mississippi Valley Loess (MLRA 134): Crowley's Ridge. However, there are a few instances where the soils of this site have been mapped on the adjoining Western Lowlands (EPA Level IV Ecoregion: 73g; Woods et al., 2004) and/or the Southern Mississippi River Alluvium (MLRA 131A).

Physiographic features of the site include narrow flats along stream drainageways, moderately broad to broad floodplain flats of larger stream systems, and alluvial fans. Of the varying geomorphologic characteristics, the narrow to slightly larger stream systems within the topographically varied landscape of Crowley's Ridge best define the site. Here, the silty to loamy alluvial soils within moist ravines and broader valleys create prime conditions for supporting a varied and productive forest community. Landform position of the most incised ravines is probably best referred to as toe slopes. The soils of this site also extend onto the adjoining Southern Mississippi River Alluvium to the east and west of Crowley's Ridge as streams flow to join the larger receiving systems of the St. Francis and Cache Rivers.

The alluvial fans of this site are fairly broad with gentle to moderate slopes, ranging from approximately 2 to 8 percent. This distinct feature mostly occurs along the west slope of Crowley's Ridge where it transitions to the broad, subtle relief of the Western Lowlands. Formation of this landform is generally the result of "water reworked" loess and/or loamy materials that have been deposited onto the adjoining bottoms and terraces.

Table 2. Representative physiographic features

Landforms	(1) Natural levee (2) Alluvial flat (3) Alluvial fan
Flooding duration	Brief (2 to 7 days)

Flooding frequency	None to frequent
Ponding frequency	None
Elevation	80 – 110 m
Slope	0 – 10 %
Ponding depth	0 cm
Water table depth	60 – 120 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 50 inches with a range from 37 to roughly 65 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, and the average annual snowfall in the northern portions of this site in Stoddard County, Missouri is 11 inches (USDA-NRCS, 2006). The average annual maximum and minimum air temperature is 69 (range 45 to 90) and 49 (range 27 to 70) degrees F, respectively. The average frost free and freeze free periods are 197 and 224 days, respectively.

Table 3 Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	220 days
Precipitation total (average)	1,270 mm

- (1) MADISON 1 NW [USC00034528], Forrest City, AR
- (2) WYNNE [USC00038052], Wynne, AR
- (3) MALDEN MUNI AP [USC00235207], Malden, MO
- (4) PARAGOULD 1S [USC00035563], Paragould, AR
- (5) ADVANCE 1 S [USW00093825], Advance, MO
- (6) JONESBORO 2 NE [USC00033734], Jonesboro, AR

Influencing water features

This site occurs within floodplains of small to large stream systems. Overland flooding occurs over a large percentage of the site's distribution. Flood duration is highly variable and directly dependent upon stream size and watershed position. Narrow floodplains of small streams are typically "flashy" and may flood occasionally to frequently but flood duration is generally brief. Sites associated with larger streams and large drainage basins may flood frequently with much longer flood durations. Regardless of flood frequency and duration, the soils of this site are well drained to moderately well drained and are not hydric. On floodplains of larger stream systems, the water table may fluctuate between 1.5 to 2.5 feet of the surface for much of the time during winter and early in spring in most years. Of note, very few if any plant species occurring on these soils classify as wetland obligates. Although this site receives surface flooding,

most of the vegetation would be categorized as facultative wetland and/or have no wetland status.

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, well drained to moderately well drained that formed in silty and/or loamy alluvium. These level to nearly level soils are on flood plains along streams and on alluvial fans, particularly along the western slope of Crowley's Ridge and its interface with the Pleistocene terraces of the Western Lowlands. They are subject to flooding during winter and spring, have slow runoff, and are moderately permeable. Flood duration ranges from brief to very long depending on stream and drainage basin size and flood event. In floodplain environments, slopes range from 0 to 2 percent but may extend slightly higher on natural levees. On alluvial fans, slopes may range upwards to 8 percent, locally. Soil reactions generally range from strongly acid to very strongly acid.

Principal soils associated with this site include Collins (Coarse-silty, mixed, active, acid, thermic Aquic Udifluvents), Iuka (Coarse-loamy, siliceous, active, acid, thermic Aquic Udifluvents), Oaklimeter (Coarse-silty, mixed, active, thermic Fluvaquentic Dystrudepts), and Ochlockonee (Coarse-loamy, siliceous, active, acid, thermic Typic Udifluvents) series.

Collins soils are moderately well drained and formed in silty alluvium. The 10- to 40-inch control section has from 5 to 18 percent clay. Sand content is as much as 30 percent but less than 15 percent is coarser than very fine sand. The soil is saturated in the layers below 18 to 36 inches deep during the winter months in normal years. It is saturated within a depth of 20 inches for more than 30 days in normal years.

Iuka soils are moderately well drained and formed in stratified loamy and sandy alluvium. Clay content of the 10 to 40-inch control section is 10 to 18 percent. Some pedons have thin gravelly or sandy strata and some pedons have textures of sandy clay loam or clay loam at depths below 40 inches. Thin bedding planes of contrasting textures are common throughout in most pedons.

Oaklimeter soils are moderately well drained and formed in silty alluvium. Clay content in the particle size control section is 7 to 18 percent. The saturated hydraulic conductivity is moderately high. A water table is within 20 to 40 inches of the surface for during seasons of high rainfall.

Ochlockonee series often occur on natural levees, are well drained, and formed in loamy and sandy alluvium. Buried soil horizons are present in most pedons below a depth of 25 inches. Some pedons have gravelly strata below a depth of 40 inches. A seasonally high water table is within a depth of 36 to 60 inches in some season of most years (USDA-NRCS, 2016).

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	200 cm

Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	14.22 – 21.59 cm
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	10 – 6.1
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The core concepts of this ecological site are best expressed and defined by the site's primary location in floodplain environments, although the soils associated with this site have been mapped on alluvial fans. Within floodplains, this site consists of natural levees, the first alluvial flat landward of levees and stream fronts, and the higher mounds or rises within wetter flats. The moderately well to well drain soils of this site create an incredible medium for supporting a rich association of deciduous broad-leaved hardwoods. Where disturbances have been minimal (e.g., gap-scale or single tree senescence), a continuous, overlapping canopy typically develops.

The better drainage capabilities of the soil generally supports exemplary examples of both upland and lowland species that co-occur within single stands. Overstory components often include oaks, hickories, elm, beech, sycamore, cottonwood and a number of additional hardwoods. Canopy height ranges from 80 to 150 feet and basal area is typically within 100 to 210 square feet per acre (LANDFIRE, 2008). Unlike the wetter, lower portions of the floodplain, water moves off this site first, which can contribute to a dense understory layer of shrubs, saplings, midstory components, and vines. Herbaceous cover ranges from sparse to dense depending on canopy cover.

The dominant ecological processes associated with this site include periodic flooding, stand disturbances at varying scales, and natural, stream migration. Given the site's landform position, periodic flooding is a common and important process of the system. Flooding can enhance fertility of the soil environment via deposition of new alluvium but can also impact the site by scouring and/or depositing excessive materials. Flood duration is highly variable and directly dependent upon stream size and magnitude of the flood event. Flood durations of small streams are typically brief and "flashy", while those of larger systems may range from brief to very long depending on drainage basin size and flood event. The collective effects of the hydrodynamics within this system naturally lead to migration or movement of the stream across its connected landscape, the floodplain. Low-gradient streams generally meander and frequently change course leading to the erosion of a portion of the floodplain with the concomitant deposition and creation of new point bars, levees, and alluvial flats.

Forest stand disturbances vary in both size and type. Disturbances range from gap-scale (single tree to small group) to stand-initiating events that are greater than one acre (per Johnson et al., 2009). Smaller gaps or forest openings may result in the release of suppressed understory components, but the greatest response is often ingrowth or expansion of the surrounding canopy (Oliver and Larson, 1990). Understories of long-term, non-disturbed portions of the stand (i.e., complete canopy closure) are typically comprised of shade-tolerant woody and herbaceous species. Larger gaps often consist of heavy, downed woody debris and a dense concentration of shrubs, forbs, vines, and released saplings and young trees. Types of disturbances may include wind, severe ice storms, and beaver. The influence of the latter is perhaps the most dynamic as local hydrologic regimes are dramatically altered leading to wetter soils, different vegetation communities, and a different suite of ecological processes.

An additional disturbance factor that rarely occurs on this site today but is thought to have been an important historical influence is fire. This supposition is drawn from the presence of a single species: cane. Cane grows readily on this site and historically, extended across many floodplains of the Southeast (Gagnon, 2009). The sheer presence of this species in the historic community suggests disturbance beyond flooding alone. Fire may have been an important disturbance factor in the pre-settlement bottomland community (see Gagnon and Platt, 2008; Gagnon, 2009), which suggests that the structure of this site may have been more open where dense canebrakes existed. However, any vestige of that system is long past. Those areas that have been allowed to revert naturally are now best characterized as closed-canopied, bottomland hardwoods.

The principal land use, today, is agriculture production with some areas in pasture and/or forage production. The fertile soils of the broader floodplains and alluvial fans are almost exclusively cropland. Timber production is mostly restricted to the narrower drainageways. Perhaps the largest and most significant alteration to this site has been channelization and levee (or spoil bank) construction. Such hydrologic alterations are probably more commonplace on streams that extend onto the Western Lowlands than those occurring within Crowley’s Ridge physiographic area. Still, this action results in a disconnection between the stream - floodplain environment, which interrupts and alters the ecological processes and functions of the system as a whole.

There are a few areas that have been set aside in the public and/or private interest (e.g., parks, refuges, natural areas, and forest preserves), and those areas are now heavily forested. With no example of the pre-settlement plant community remaining intact, reference conditions of this site have been arbitrarily chosen to reflect the native plant species that most frequently occur and that influence the overall structure and characteristics of maturing stands. Locations that offer an opportunity to examine these “surrogate” reference conditions are relegated to those public and private land holdings.

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 this ecological site. This model is based on limited inventories, 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 Alluvial Flat

Figure 6. Legend - Western Alluvial Flat

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

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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	09/08/2026
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:**

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

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

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

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

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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:**