Ecological site F134XY021AL
Northern Backswamp

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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-NRCS, 2006). This site is of large extent in MLRA 134 with a maximum distribution and occurrence in the Loess Plains (EPA Level IV Ecoregion: 74b) from western Kentucky to the Southern Rolling Plains (EPA Level IV Ecoregion: 74c) in southwestern Mississippi. The site extends into the adjoining Southern Coastal Plain, MLRA 133A to the east. Although broadly mapped, the actual distribution and number of occurrences likely exceeds what is illustrated on the accompanying map.

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: 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 4514730 Gulf and Atlantic Coastal Plain Floodplain Systems (LANDFIRE, 2008) - East Gulf Coastal Plain Small Stream and River Floodplain Forest CES203.559 (NatureServe, 2012) - East Gulf Coastal Plain Large River Floodplain Forest CES203.489 (NatureServe, 2012) - Southern Coastal Plain Bald-cypress - Tupelo Swamp Forest, CEGL007422 (NatureServe, 2013) -Western Mesophytic Forest Region - Mississippi Embayment Section (Braun, 1950) -Low-gradient Riverine Wetlands (Wilder and Roberts, 2002)

Ecological site concept

The Northern Backswamp belongs to an intricate complex of floodplain ecological sites that developed from the fluvial dynamics of low-gradient, sinuous riverine systems. Soils that define the site formed in silty or loamy alluvium and are very deep, poorly drained, and ponded or flooded for much or all of the year. Soil reactions range from very strongly acid to strongly acid throughout all horizons. Flooding of this site is generally frequent and a critical source of nutrient-rich sediments. These wetlands generally form on floodplain concavities or depressions that are situated between natural levees and upland or terrace scarps. Floodplain features that support this site include abandoned river channels or oxbows, relict stream channels or sloughs, and broad depressions that receive a near constant supply of ground and surface water from springs and runoff from receiving tributaries. Backswamps can also occur on alluvial fans where they sometimes develop as linear features, especially where they have formed on relict stream channels, channel scours, and sloughs. Occasionally, backswamps form on loess-covered terraces (above the 100-yr flood zone). The latter may occur where runoff from adjoining uplands and/or conveyance of local streams collect along concavities or depressions between the terrace proper and upland scarp. Natural vegetation of this site is characteristically typed as a bald cypress - water tupelo swamp. Associates commonly found on drier positions include willow oak, overcup oak, pumpkin ash, green ash, sweetgum, red maple, water locust, and water hickory. Depending on canopy closure and water depth, the shrub-small tree stratum often ranges from dense, impenetrable thickets to sparse, local patches that are frequently composed of black willow, common buttonbush, Virginia sweetspire, hazel alder, eastern swamp privet, and planertree.

Associated sites

F134XY020AL	**Northern Wet Alluvial Flat** This site occurs in close association with backswamps and represents the next "drier" ecological site along the wet - dry gradient and catena of floodplain ecological sites in MLRA 134.

Table 1. Dominant plant species

Tree	(1) *Taxodium distichum* (2) *Nyssa aquatica*
Shrub	(1) *Cephalanthus occidentalis* (2) *Planera aquatica*
Herbaceous	Not specified

Physiographic features

The Northern Backswamp 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 border of the Loess Hills (EPA Level IV Ecoregion: 74a), across the Loess Plains, and into portions of the Southeastern Plains (EPA Level III Ecoregion: 65) where loess continues to cap old fluvial terraces and broad valleys. 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.

Key to the development and occurrence of this ecological site is the presence of standing water for most or all of the year. From a physiographic perspective, this site is found in a variety of geomorphic situations (Conner and Buford, 1998). These wetlands generally form on floodplain concavities or depressions that are situated between natural levees and upland or terrace scarps. Floodplain features that support this site include abandoned river channels or oxbows, relict stream channels or sloughs, and broad depressions that receive a near constant supply of ground and surface water from springs and runoff from receiving tributaries. Backswamps can also occur on alluvial fans where they sometimes develop as linear features, especially where they have formed on relict stream channels, channel scours, and sloughs. Occasionally, backswamps form on loess-covered terraces (above the 100-yr flood zone). The latter may occur where runoff from adjoining uplands and/or conveyance of local streams collect along concavities or depressions between the terrace proper and upland scarp.

The influences of aspect are negligible in this site.

Table 2. Representative physiographic features

Landforms	(1) Backswamp (2) Oxbow (3) Slough
Flooding duration	Very long (more than 30 days)
Flooding frequency	Frequent to very frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	20 – 110 m
Slope	0 %
Ponding depth	0 – 160 cm
Water table depth	0 – 30 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 inches 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 the Northern Loess Interfluve 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) BARDWELL 2 E [USC00150402], Bardwell, KY
- (2) LOVELACEVILLE [USC00154967], Paducah, KY
- (3) CANTON 4N [USC00221389], Canton, MS
- (4) OAKLEY EXP STN [USC00226476], Raymond, MS
- (5) BOLIVAR WTR WKS [USC00400876], Bolivar, TN
- (6) COVINGTON 3 SW [USC00402108], Covington, TN
- (7) DRESDEN [USC00402600], Dresden, TN
- (8) BATESVILLE 2 SW [USC00220488], Batesville, MS
- (9) GRENADA [USC00223645], Grenada, MS
- (10) SENATOBIA [USC00227921], Coldwater, MS
- (11) COLLIERVILLE [USC00401950], Collierville, TN
- (12) NEWBERN [USC00406471], Newbern, TN
- (13) UNION CITY [USC00409219], Union City, TN
- (14) JACKSON INTL AP [USW00003940], Pearl, MS
- (15) BROOKPORT DAM 52 [USC00110993], Paducah, IL
- (16) MURRAY [USC00155694], Murray, KY
- (17) LEXINGTON [USC00225062], Lexington, MS
- (18) GILBERTSVILLE KY DAM [USC00153223], Gilbertsville, KY
- (19) HOLLY SPRINGS 4 N [USC00224173], Holly Springs, MS
- (20) VICKSBURG MILITARY PK [USC00229216], Vicksburg, MS
- (21) YAZOO CITY 5 NNE [USC00229860], Yazoo City, MS
- (22) MILAN EXP STN [USC00406012], Milan, TN
- (23) PADUCAH [USW00003816], West Paducah, KY

Influencing water features

This site remains flooded or ponded for most or all of the year and is directly influenced by a high water table (groundwater) and overland flow from frequent flooding. Dominant vegetation of the site is comprised of wetland obligates. This site is the classic, alluvial deep water swamp of the Southeast. From a wetland classification perspective, the reference state represents “Palustrine – Forested Wetland”. However, following large-scale disturbances, this site is reset to Palustrine – Emergent Wetland followed by Palustrine – Scrub-Shrub. Natural succession transitions the site back to a wetland forest.

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.

This site is characterized by very deep, poorly drained soils that formed in silty or loamy alluvium. These level to nearly level soils are typically on wide floodplains. The site is subject to frequent flooding and ponding for very long durations for much, if not all, of the year. The seasonally high water table is typically above the soil surface and lasts well into the growing season. Soil reactions generally range from strongly acid to very strongly acid.

The soils of this site are very similar to those of the Northern Wet Alluvial Flat ecological site. The primary difference for this site is that the soils are ponded for very long duration. Hence, a “ponded phase” distinguishes the soils and vegetation communities associated with this site. Unfortunately, this may create misleading information when an accurate distribution of this site is desired. Not every soil survey area (e.g., the individual county soil surveys) recognized or described a ponded phase for alluvial soils. Therefore, the actual distribution of backwater swamps is not precisely represented on the accompanying distribution map. It should be noted that this site may occur as inclusions within many of the large, alluvial soil mapping units that are frequently flooded.

The principal soils associated with this site include the Rosebloom (Fine-silty, mixed, active, acid, thermic Fluvaquentic Endoaquepts), and Waverly (Coarse-silty, mixed, active, acid, thermic Fluvaquentic Endoaquepts) series. Rosebloom soils formed in silty alluvium and have a fine-silty particle-size class. Waverly soils also formed in silty alluvium but have a coarse-silty particle-size class (USDA-NRCS, 2016).

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Poorly drained
Permeability class	Moderate
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	17.27 – 21.08 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)	10 – 5.3
Subsurface fragment volume <=3" (Depth not specified)	Not specified

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

Ecological dynamics

This ecological site is representative of the fabled southern deep water swamp. Key to the development and occurrence of this ecological site is the presence of standing water for most or all of the year. These wetlands occur in a variety of geomorphic situations (Conner and Buford, 1998). For MLRA 134, they generally form on floodplain concavities or depressions that are situated between natural levees and upland or terrace scarps. Floodplain features that support this site include abandoned river channels or oxbows, relict stream channels or sloughs, and broad depressions that receive a near constant supply of ground and surface water from springs, runoff from receiving tributaries, and overbank flooding from the river. Backswamps can also occur on alluvial fans where they sometimes develop as linear features, especially where they have formed on relict stream channels, channel scours, and sloughs. Occasionally, backswamps form on loess-covered terraces (above the 100-yr flood zone). The latter may occur where runoff from adjoining uplands and/or the conveyance of local streams collect along concavities or depressions between the terrace proper and upland scarp.

Perhaps no other diagnostic feature depicts this site more than the dominant species that characterizes it: bald cypress and water tupelo. Dominance by one or both species may vary by site. Some locations may be comprised almost entirely by cypress whereas other sites may consist of a preponderance of water tupelo. In general, the two form the dominant plant association of this site. Where backswamps occur on smaller floodplain systems, water tupelo may be replaced or accompanied by the closely related swamp tupelo. Reportedly, swamp tupelo may increase in presence and abundance along the margins of alluvial swamps where maximum water depth is less than 2 feet (Eyre, 1980). Of the three species, bald cypress and water tupelo appear to be most tolerant of inundation and may advance into the deepest portion of a swamp when water levels are at their lowest during droughts.

Summarizing the work of others, Mitsch and Gosselink (1993) emphasized the role of a periodic flooding and inundation on the functionality of backwater swamps. They noted that the productivity of swamps were inextricably linked to the local hydrologic conditions. Sites that exhibited the greatest productivity were associated with a pulsing hydroperiod – one directly associated with seasonal overbank flooding followed by a period of drier conditions. Sites that had the poorest productivity were drained areas and/or swamps that were continuously inundated. This is particularly concerning for alluvial swamps that have become disconnected from the associated stream or river through channelization and levee construction. When periodic flooding of an alluvial river swamp is prevented, nutrient rich sediment that is so important to the system may be reduced or halted altogether. In cases where inundation is retained due to artificial means or through the actions of beaver, these continuously flooded low spots will stagnate, which ultimately decreases productivity.

Succession of the bald cypress – water tupelo association is not known or well documented, and some regard it as “arrested” (Hodges, 1997) or a permanent cover type as long as excessive sedimentation does not alter drainage characteristics (Eyre, 1980). Hodges (1997) emphasized that the cypress – tupelo cover type is the oldest association of the alluvial floodplain and stands may survive for 200 to 300 years before canopy breakup occurs. If depositional rates are extremely slow, and barring catastrophic disturbances, some stands may last for even longer periods. Mitsch and Gosselink (1993) referred to the documentation of some cypress stands existing for 400 to 600 years. Nonetheless, this site does occur in a highly dynamic, constantly changing environment. Over time, even the old, low-lying floodplain depressions aggrade, leading to higher positions, better soil drainage, and eventual colonization by other hardwood species such as the overcup oak – water hickory association of the adjoining wet alluvial flats.

Even though these sites are sometimes viewed as timeless, mature cypress – tupelo stands can experience catastrophic disturbances. Some potential stand initiating events include particularly destructive wind and ice storms. Fire in this system is considered to be rare, however destructive fires into and through backwater swamps have occurred, especially during extreme droughts or following artificial drainage (Mitsch and Gosselink, 1993). In situations where the overstory has been removed or where a new backswamp system is just developing, a series of successional transitions (i.e., seral stages) will occur, the rates of which ultimately depend on deposition rates and a naturally connected hydroperiod. One of the dominant pioneer tree species on this site is black willow, which may dominate an area for up to 30 years before breakup or transition to the next vegetation type (Hodges, 1997; Conner and Buford, 1998). If sedimentation rates remain low and the site does not aggrade rapidly, the next seral stage may be characterized by an association of swamp privet, water elm, and buttonbush. This association may then be replaced by the cypress – tupelo type, which again, may endure for hundreds of years (Hodges, 1997).

As alluded to above, the largest and most significant alteration to this site has been channelization and levee (or spoil bank) construction. Such hydrologic alterations have become the norm for floodplains in this MLRA. 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. Shankman (1993) emphasized that the development of cypress – tupelo swamps were the collective effects of channel migration across the floodplain environment over long periods of time. The disconnection of this natural process via channelization effectively reduces the formation of this natural community (Pierce, 2005). Additionally, many local backswamps have been drained and converted to other uses. For this very reason, reference conditions of this site are modeled after and representative of mature stands occurring in unmodified, low-gradient riverine floodplains.

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 - Northern Backswamp

Figure 6. Legend - Northern Backswamp

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	08/22/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**
