Ecological site F134XY202AL
Western Wet Loess Terrace - PROVISIONAL

Accessed: 12/08/2023

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 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 locally on low-lying areas within Crowley's Ridge and to the east on the Northern Holocene Meander Belts (EPA Ecoregion: 73c; Woods et al., 2004). The distribution of this site spans the boundaries of MLRA 134 and MLRA 131A (Southern Mississippi River Alluvium).

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 (wet phase) (Klimas et al., 2012)
-Bottomland Flatwoods (Nelson, 2005)

Ecological site concept

The Western Wet Loess Terrace is characterized by deep, poorly drained soils that primarily formed in loess or loess-like materials with low sand content. This site occurs primarily on broad, level to nearly level Pleistocene-age terraces with slopes ranging from 0 to 2 percent but dominantly less than 1 percent. Soils have a seasonally high water table from winter to mid-spring that often become quite dry by late summer. This extreme alteration 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. Locally, loblolly pine may become an additional community component farther south. 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). 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).

Associated sites

F134XY201AL	**Western Loess Terrace - PROVISIONAL**
F134XY206AL	**Western Fragipan Terrace - PROVISIONAL**
F134XY209AL	**Western Moderately Wet Terrace - PROVISIONAL**

Similar sites

F134XY010AL	**Northern Wet Loess Terrace - PROVISIONAL** Eastern counterpart to the Western Wet Loess Terrace.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Western Wet Loess 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 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. However, some of the soils associated with this site appear to be mapped on lower or Late Wisconsin Terraces. 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) Terrace (2) Flat (3) Valley train
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Elevation	140–340 ft
Slope	0–3%
Ponding depth	0 in
Water table depth	6–12 in
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 35 to roughly 70 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 71 (range 47 to 91) and 50 (range 29 to 71) degrees F, respectively. The average frost free and freeze free periods are 203 and 231 days, respectively.

Table 3. Representative climatic features

Frost-free period (average)	203 days
Freeze-free period (average)	231 days
Precipitation total (average)	50 in

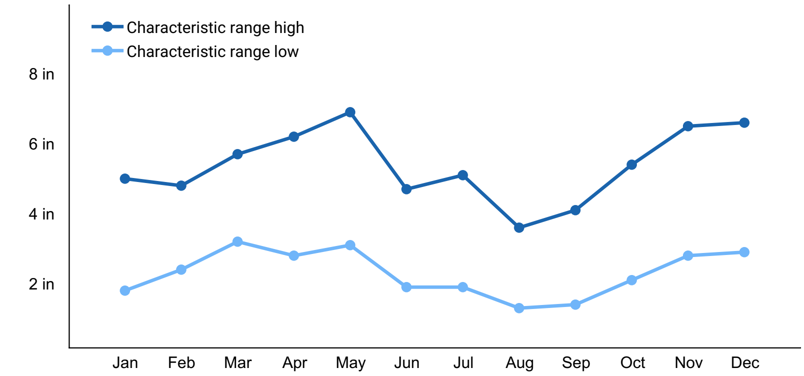

Figure 1. Monthly precipitation range

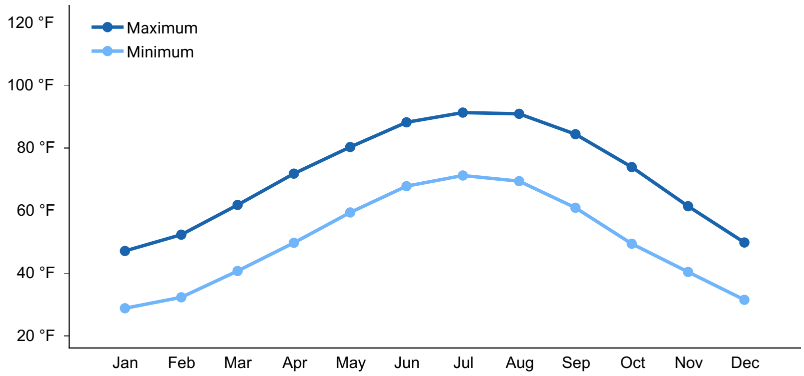

Figure 2. Monthly average minimum and maximum temperature

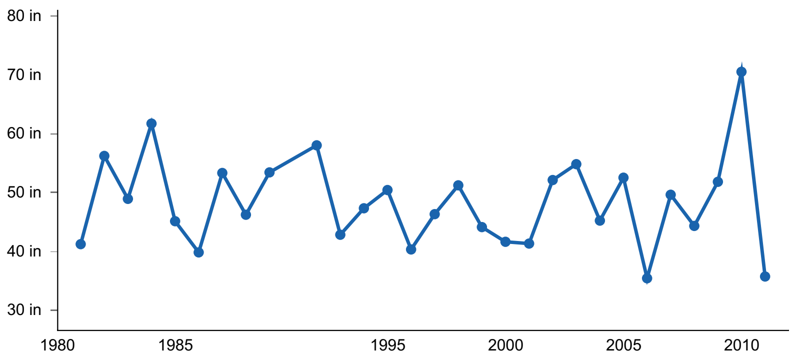

Figure 3. Annual precipitation pattern

Climate stations used

- (1) CLARENDON [USC00031442], Clarendon, AR
- (2) NEWPORT [USC00035186], Newport, AR
- (3) SAINT CHARLES [USC00036376], Clarendon, AR
- (4) ADVANCE 1 S [USW00093825], Advance, MO
- (5) STUTTGART 9 ESE [USC00036920], Stuttgart, AR
- (6) ALICIA 2NNE [USC00030064], Alicia, AR
- (7) HELENA [USC00033242], Helena, AR
- (8) BRINKLEY [USC00030936], Brinkley, AR
- (9) CORNING [USC00031632], Corning, AR
- (10) DES ARC [USC00031968], Des Arc, AR
- (11) MADISON 1 NW [USC00034528], Forrest City, AR
- (12) MALDEN MUNI AP [USC00235207], Malden, MO

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. 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 overbank flows. Wetland or hydrophytic vegetation occurs mainly in closed and some flow-through depressions. Vegetation of these terrace 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.

The soils of this site are 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 Pleistocene-age 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 the Calhoun (Fine-silty, mixed, active, thermic Typic Glossaqualfs) and Henry (Coarse-silty, mixed, active, thermic Typic Fragiaqualfs) soil series. 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.

Henry soils have a slowly permeable fragipan in the subsoil. Depth to the fragipan ranges from 20 to 36 inches (USDA, 2016). Clay content between 10 inches and the top of the fragipan ranges from 10 to 18 percent. Much of the illuvial clay is in vertical streaks and pockets rather than being uniformly distributed throughout the B horizon.

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 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6.7–8.6 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0

Soil reaction (1:1 water) (0-40in)	4.7–6.2
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

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 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. Ironically, 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 is either a true fragipan or what some refer to as a claypan. 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's important to note that this site is generally above the modern floodplains of larger streams and rivers of the Western Lowlands and receives very little overland flow (NatureServe, 2009). Exceptions occur where this site borders small tributaries or drains and especially when beaver activity plugs such watercourses (T. Foti, personal communication). 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 with some areas consisting predominantly of willow oak flats and others post oak flats. Species characteristic of uplands and lowlands are often seen co-occurring 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 and overcup oak; Klimas et al. (2012) lists Nuttall oak as an additional species occurring in vernal pools. Conversely, areas that tend to dry more quickly may support a preponderance of post oak and other upland species. One postulate concerning the co-occurrence of species with dramatically different moisture tolerances hinges on cyclical weather patterns of dry and wet years (LANDFIRE, 2008).

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 a range of habitat or community types. Where trees occurred, conditions probably ranged from savanna to open flatwoods. Locally, meadows or prairies existed in a patchwork pattern among the woodlands and/or savannas. This mosaic likely persisted as a "physiognomic gradient" with meadows grading to savannas and savannas grading to woodland – and vice versa (T. Foti, personal communication).

The predominant land use activity on this site today is agriculture production with principal crops being soybean, rice, cotton, and grain sorghum (USDA-NRCS, 2006b). Depending on crop type, manipulation and management of surface water and drainage capabilities of a given site is generally implemented. A minor use on this site is reportedly pastureland or hayland with principal forage of bermudagrass, bahiagrass, and tall fescue. This site has some limitations for forest production, mainly due to seasonal wetness but also dryness during summer and fall. (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 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. 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

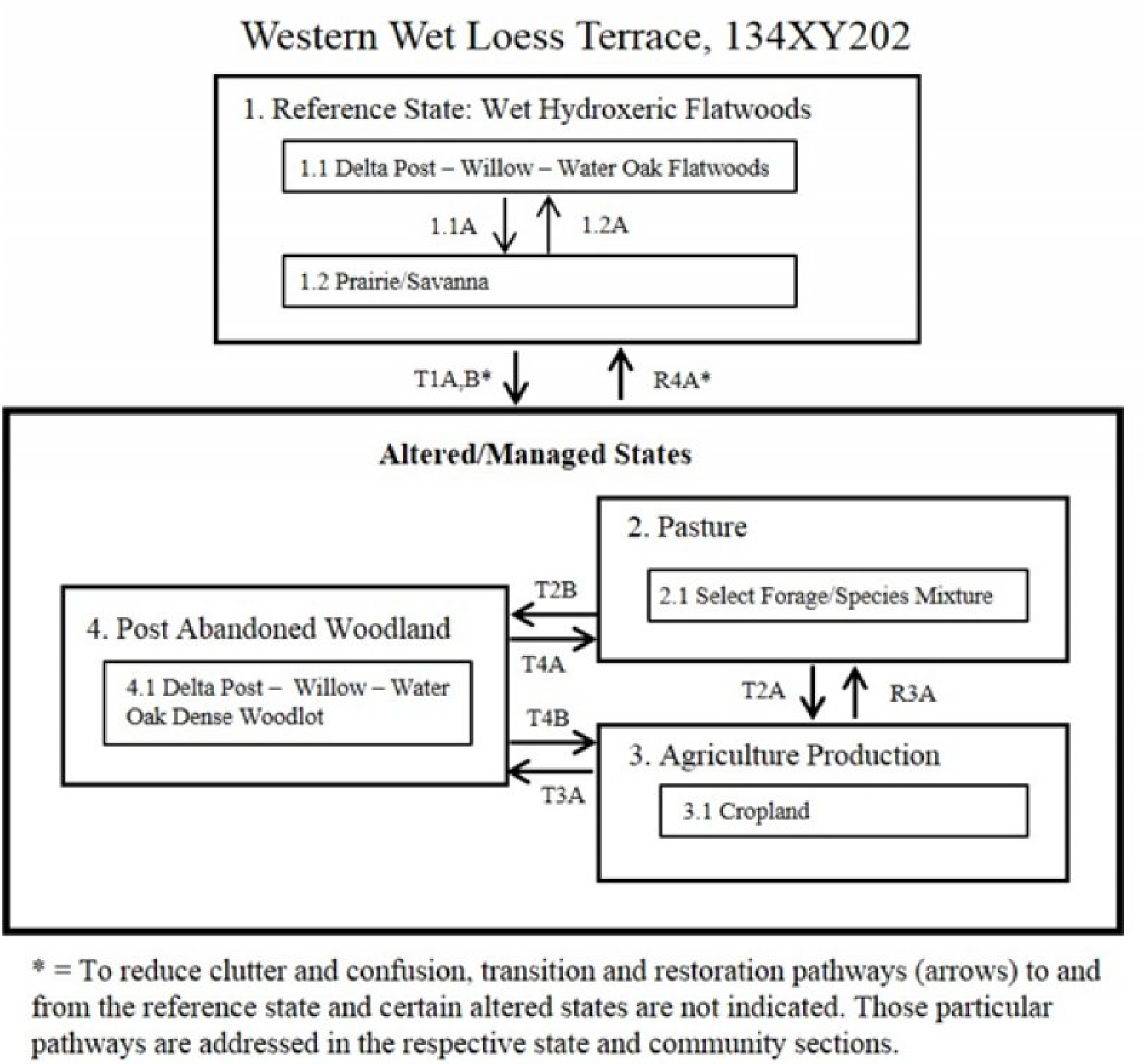

Figure 5. STM - Western Wet Loess Terrace

Pathway	Practice
1.1A	major stand-scale disturbance (extensive, prolonged drought, wind, catastrophic ice, replacement fire) followed by periodic surface fire on a frequent return interval
1.2A	natural succession; infrequent fire (long return interval); small, gap-scale disturbance (wind, ice, mixed-severity fire)
T1A, R3A, T4A	mechanical removal of vegetation; herbicide application; seedbed preparation; planting desired species at appropriate rate (State 2)
T1B, T2A, T4B	mechanical removal of vegetation; potential construction of artificial drainage system, preparation for cultivation (State 3)
T2B, T3A	natural succession (State 4)
R4A	natural succession; return of maintenance or disturbance (e.g., fire); any former alteration to soil drainage MUST be restored before returning to true reference conditions (State 1)

Figure 6. Legend - Western Wet Loess Terrace

State 1
Wet Hydroxeric Flatwoods

Exemplary examples of the full range of plant communities and ecological processes that were once commonplace on this ecological site no longer exist. Vestiges of this once vast system are primarily relegated to abandoned woodlots and narrow, roadway corridors that now hold the only remaining example of native prairie vegetation that was once part of the greater ecological system. However, there is one example where the soils of this site occur in complex with other ecological sites forming a mosaic of wet hardwood flats (this ecological site), loblolly pine flats, and alkali flatwoods within a relatively confined area. It is from this example and remaining remnants, mostly abandoned woodlots, that we draw a greater understanding of the “perceived” reference conditions for this ecological site. Klimas et al. (2012) identified this site as “hardwood flats (wet phase).” The saturated, poorly drained soils during winter and spring supports conditions suitable for more lowland species such as willow oak, overcup, and pin oak – the latter two more typical of vernal pools. The drying of the soils by summer create conditions suitable for more upland species, the principal species of which is delta post oak and/or post oak. To the south, loblolly pine is locally a dominant species. However, loblolly pine has a fairly restricted range in the Western Lowlands and is not a characteristic species through the northern portions of this ecological site (T. Foti, personal communication). Embedded among the woodlands of this site were prairies and savannas, some of which were likely extensive. Vegetation of the open areas would have been quite similar to that of the Grand Prairie to the south. It is generally held that areas of prairie extended or “fingered” northward from the Grand Prairie province well into the Western Lowlands (T. Foti, personal communication). Two community phases are recognized for representing the reference state of this ecological site: 1) the open structure of the flatwoods and 2) prairie and savanna. Of the utmost concern, this site has incurred tremendous alteration to drainage. Any attempt to reestablish perceived reference conditions of a stand or a local site must first restore the natural hydrology of that site, which may entail removing drainage structures. If not, management may improve stand structure and even composition to a degree, but the site, overall, will remain in an altered state relative to the reference state. Retaining drainage structures (either pulling excessive water off or retaining water for rice) will directly influence the types of vegetation that colonize the site, which may be entirely different than reference conditions.

Community 1.1
Delta Post – Willow – Water Oak Flatwoods

This community phase represents the successional stage, compositional, and structural complexity of stands supporting perceived reference conditions. For the wet flatwoods community, this phase represents late development with and without frequent, low-intensity fire. Where the recurrence of fire is more frequent, the canopy is more open, taking on an open woodland structural characteristic. Under this fire regime, herbaceous cover is anticipated to be quite dense with the possible exception of depressions that remain wet for longer periods. Where fire is very infrequent, canopy cover may approach closure but the overall structure of the understory generally remains somewhat open. This is generally a common structural feature of flatwoods systems in other areas of the U.S. (Taft et al., 1995; Fralish et al., 1999). Composition of this community is quite variable ranging from delta post oak (or post oak) flatwoods to willow oak flatwoods (Klimas et al., 2012). Associates of these stands may include water oak, swamp chestnut oak, sweetgum, hickory, black gum, elm, red maple, green ash, sassafras, and persimmon. Wetter locations such as depressions may support higher abundances of overcup oak, pin oak, Nuttall oak, buttonbush, and water elm. The understory is generally open and is often occupied by smaller, canopy species and possumhaw. Vines and lianas are represented by roundleaf greenbrier, climbing dogbane, and muscadine.

Ground cover may be sparse where canopies are more closed. Herbaceous species associated with this site includes several sedges, sweet wood reed, redtop panic grass, St. Andrews cross, Virginia dayflower, thoroughwort, flattop goldentop, ironweed, large areas of Sphagnum moss (Heineke, 1987).

Community 1.2
Prairie/Savanna

This community phase represents another aspect of the historic community on this site, prairie and savanna. Prairies of the Grand Prairie province extended into and through portions of the Western Lowlands (T. Foti, personal communication). Periodic fires on a 1 to 3 year return interval would have maintained their presence and persistence (LANDFIRE, 2008). This community type within the Western Lowlands was reported and somewhat described by early naturalists traveling through the region (see Heineke, 1987) and from naturalists as late as one century ago (e.g., Harper, 1914 and 1917). Vegetation of the prairies and savannas are thought to have been similar to that of the Grand Prairie (T. Foti, personal communication). Harper (1917) mentioned this similarity while examining a small prairie in Craighead County, Arkansas. He mentioned the site being bordered by a scattering of pin oak. Species anticipated to occur across the prairies of this site include switchgrass, big bluestem, Indian grass, little bluestem, prairie blazing star, pinkscale blazing star, wild indigo, compass plant, meadow evening primrose, wild quinine, wooly ragwort, hoarypea, and Baldwin's ironweed (Heineke, 1987; NatureServe, 2015) among many additional taxa.

Pathway 1.1A
Community 1.1 to 1.2

This pathway represents a major stand-scale disturbance such as extensive, prolonged drought, wind, catastrophic ice, and/or stand replacement fire. Such catastrophic events would then be followed by low-intensity surface fires on a frequent return interval, which would support transition to prairie and/or savanna conditions.

Pathway 1.2A
Community 1.2 to 1.1

This pathway represents a return to an open woodland or flatwoods structural characteristic. Processes leading to woodland conditions is a relaxation of fire or fire occurring on a much longer return interval. Disturbance occurs at the gap-scale (i.e., less than 1 acre).

State 2
Pasture

This state is representative of sites that have been converted to and maintained in pasture and forage cropland, typically a grass – legume mixture. For pastureland, planning or prescribing the intensity, frequency, timing, and duration of grazing can help maintain desirable forage mixtures at sufficient density and vigor (USDA-NRCS, 2010; Green et al., 2006). Overgrazed pastures can lead to soil compaction and numerous bare spots, which may then become focal points of colonization by undesirable plants or weeds. Soils exhibiting the core concepts of this site have a pronounced period of wetness followed by droughty conditions. Limitations may pertain mainly to periods of extreme wetness. Planning or prescribing the intensity, frequency, timing, and duration of grazing can help maintain desirable forage mixtures at sufficient density and vigor (USDA-NRCS, 2010; Green et al., 2006). Because of the limitations of this site, grazing may be limited to small intervals within the appropriate season(s). It is strongly advised that consultation with State Grazing Land Specialists and District Conservationists at local NRCS Service Centers be sought when assistance is needed in developing management recommendations or prescribed grazing practices on this site.

Community 2.1
Select Forage/Species Mixture

This community phase represents commonly planted forage species on pasturelands and haylands. The suite of plants established on any given site may vary considerably depending upon purpose, management goals, usage, and soils. The limitations of this site may preclude some of the commonly planted mixtures. However, there is some indication that tall fescue, common bermudagrass, bahiagrass, and annual lespedeza are adapted to this site

(USDA-NRCS, 2006b). Should active management (and grazing) of the pastureland be halted, this phase will transition to “old field” conditions, which is the transitional period between a predominantly open, herbaceous field and the brushy stage of a newly initiated stand of trees.

State 3
Agriculture Production

Agriculture production on this site is somewhat limited due to seasonal wetness. However, the vast majority of the acreage in this ecological site is in agriculture production. Where idle woodlots occur today, those sites were very likely cropped at some point in the past.

Community 3.1
Cropland

Soybean, rice, cotton, and grain sorghum (USDA-NRCS, 2006b).

State 4
Post Abandoned Woodland

Most, if not all, of the woodlots and local patches of woodlands occurring on this site represent this state. These stands still support some of the components that characterizes the community. The structure of these stands are typically denser than a late development, fire-influenced stand. However, the co-occurrence of upland and lowland taxa and a moderately open understory provide indications of hydroxeric influences. Restoration potential of these sites back to reference conditions is possible, provided that the appropriate management regime is initiated and maintained. Before this can happen, the natural hydrology of the area of interest must first be restored, which may entail removing drainage structures. If not, management may improve stand structure and even composition to a degree, but the site, overall, will remain in an altered state relative to the reference state.

Community 4.1
Delta Post – Willow – Water Oak Dense Woodlot

This community phase represents the species characteristic of the regenerating woodlots. Delta post oak is often the dominant species with associates consisting of willow oak, water oak, southern red oak, hickory, winged elm, green ash, and an occasional cherrybark oak.

Transition T1A
State 1 to 2

This pathway represents an attempt to convert the woodland community to pasture or forage production. Actions include clearing, stump removal, herbicide application, seedbed preparation, and the establishment of desired plants (State 2).

Transition T1B
State 1 to 3

Actions include mechanical removal of vegetation and stumps; herbicide treatment of residual plants; and preparation for planting. May include the installation of drainage control structures (State 3).

Transition T2A
State 2 to 3

Actions include removal of vegetation or pasturage; herbicide treatment of residual plants; and preparation for planting.

Transition T2B
State 2 to 4

Abandonment of grassland/pastureland management and allowing natural succession to proceed beyond the old field stage to canopy development of the young woodland.

Restoration pathway R3A
State 3 to 2

Seedbed preparation and establishment of desired forage/grassland mixture.

Transition T3A
State 3 to 4

Abandonment of cropland management and allowing natural succession to proceed to canopy development of the young woodland.

Restoration pathway R4A
State 4 to 1

This pathway represents restoration back to perceived reference conditions. The period required for this transition to take place likely varies by location and is dependent upon local site conditions. In some cases, a return to the reference state may not be possible without considerable management effort. That effort may involve exotic species control, restoration of the natural hydrologic regime of a given locality, and the reestablishment of components considered characteristic of the reference state.

Transition T4A
State 4 to 2

This pathway represents an attempt to convert the woodland community to pasture or forage production. Actions include clearing, stump removal, herbicide application, seedbed preparation, and the establishment of desired plants (State 2).

Transition T4B
State 4 to 3

Actions include mechanical removal of vegetation and stumps; herbicide treatment of residual plants; and preparation for planting (State 3).

Additional community tables

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).

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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	
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):**

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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):**

---

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):**

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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:**