Ecological site F133BY001TX
Depression

Last updated: 9/21/2023
Accessed: 04/19/2024

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.

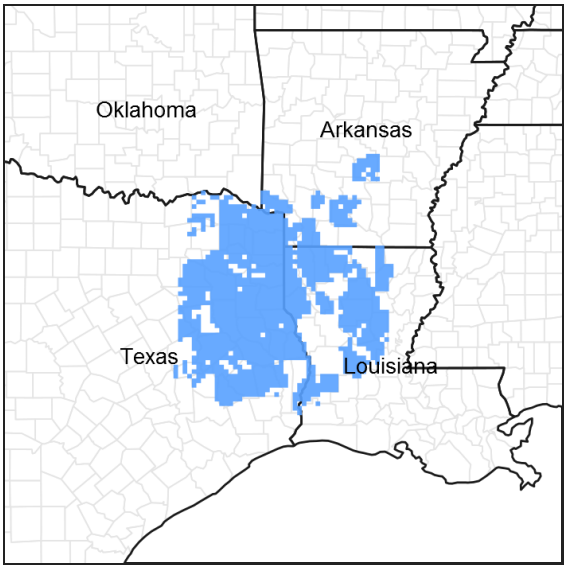


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 133B–Western Coastal Plain

Major Land Resource Area (MLRA) 133B, Western Coastal Plain is in eastern Texas, western Louisiana, and the southwest corner of Arkansas. The area is dominated by coniferous forest covering 45,450 square miles (29,088,000 acres). The region is a hugely diverse transition zone between the eastern deciduous forests and the central grasslands to the west.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 133B

Ecological site concept

Depressions occur on isolated flats of upland and terraces. Their drainage patterns are poor and result in long periods of water retention. Their vegetation more closely resembles bottomlands as opposed to the surrounding uplands.

Associated sites

F133BY012TX	**Wet Terrace** Landform is slightly higher and sites are not as wet.
F133BY013TX	**Terrace** Landform is higher and sites have better drainage patterns.
F133BY003TX	**Loamy Over Clayey Upland** Landform is higher and sites have better drainage patterns.
F133BY004TX	**Loamy Claypan Upland** Landform is higher and soils are not as deep.
F133BY005TX	**Loamy Upland** Landform is higher, soils have loamy texture, and sites have better drainage patterns.
F133BY002TX	**Seasonally Wet Upland** Landform is slightly higher and sites are not as wet.

Similar sites

F133BY012TX	**Wet Terrace** Landform is slightly higher and sites are not as wet.
F133BY018TX	**Clayey Bottomland** Soils are located in bottomlands as opposed to depressions of uplands and terraces.
F133BY017TX	**Loamy Bottomland** Soils are located in bottomlands as opposed to depressions of uplands and terraces.
R087BY001TX	**Depression** Different MLRA.

Table 1. Dominant plant species

Tree	(1) *Quercus phellos* (2) *Fraxinus pennsylvanica*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The ecological site occurs on depressions of both uplands and terraces. Slope ranges from 0 to 5, but is usually flat from 0 to 1 percent. Sites are ponded up to 12 inches, especially from November to May. When not ponded, they may also exhibit a high water table from 0 to 12 inches.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Depression
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Rare to occasional
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	100–1,000 ft
Slope	0–1%
Ponding depth	0–12 in
Water table depth	0–12 in

Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0–5%
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

The climate of the Western Coastal Plain (MLRA 133B) is humid subtropical with hot summers and mild winters. Canadian air masses that move southward across Texas and Louisiana over the Gulf of Mexico in winter produce cool, cloudy, rainy weather with only rare cold waves that moderate in one or two days. Precipitation is distributed fairly even throughout the year and is most often in the form of slow and gentle rains.

Spring weather can be variable. March is relatively dry while thunderstorm activities increase in April and May. Occasional slow-moving thunderstorms or other weather disturbances may dump excessive amounts of precipitation on the area. Fall has moderate temperatures. Fall experiences an increase of precipitation and frequently has periods of mild, dry, sunny weather. Heavy rain may occur early in the fall because of tropical disturbances, which move westward from the gulf. Tropical storms are a threat to the area in the summer and fall but severe storms are rare. Prolonged droughts and snowfall are rare.

The total annual precipitation ranges from 39 inches in the western part of the region to 60 inches in the eastern part of the region. Approximately 50 percent of the rainfall occurs between April and September, which includes the growing season for most crops. Thunderstorms occur on about 50 days each year and most occur during the summer.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night and the average at dawn is about 90 percent. The sun shines 70 percent of the time in summer and 50 percent in winter. The prevailing wind is from the south-southeast. Average wind-speed is highest at 11 miles per hour in spring.

Table 4. Representative climatic features

Frost-free period (average)	219 days
Freeze-free period (average)	252 days
Precipitation total (average)	55 in

Climate stations used

- (1) CARTHAGE [USC00411500], Carthage, TX
- (2) RUSK [USC00417841], Rusk, TX
- (3) TOLEDO BEND DAM [USC00419068], Anacoco, TX
- (4) MAGNOLIA [USC00034548], Magnolia, AR
- (5) CALHOUN RSCH STN [USC00161411], Calhoun, LA
- (6) DEKALB [USC00412352], Simms, TX
- (7) SHERIDAN [USC00036562], Sheridan, AR
- (8) HUNTSVILLE [USC00414382], Huntsville, TX

- (9) JENA 4 WSW [USC00164696], Trout, LA
- (10) MINDEN [USC00166244], Minden, LA
- (11) GILMER 4 WNW [USC00413546], Gilmer, TX
- (12) CALION L&D [USC00031140], El Dorado, AR

Influencing water features

Depression sites have high water tables, influences from flooding, and can be ponded up to 12 inches during parts of the year.

Wetland description

Soils included within the sites are considered hydric.

Soil features

The soils consist of very deep, poorly drained, slowly permeable soils. Most of the soils are classified as typic glossaqualfs, but other classifications exist. Soils correlated to this ecological site include: Adaton, Ashford, Catuna, Derly, Goreen, Guyton, Leagueville, Leggett, Merryville, Mollville, Percilla, and Talco.

Table 5. Representative soil features

Parent material	(1) Alluvium–siltstone
Surface texture	(1) Clay (2) Silt loam
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Moderately slow
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–15 in
Calcium carbonate equivalent (0-40in)	0–1%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	4.5–7.5
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

The information in this ecological site description (ESD), including the state-and-transition model (STM), was developed using archeological and historical data, professional experience, and scientific studies. The information is representative of a complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals, and ecological processes are described to inform land management decisions.

Introduction – Southern Arkansas, western Louisiana, and eastern Texas have been deemed the Pineywoods

because of the vast expanse of pine trees. The region represents the western edge of the southern coniferous belt. Historically, the area was covered by pines with mixed hardwoods, sparse shrubs, and a diverse understory of grasses and forbs. Fire played a significant role in reducing the woody competition that generally out-competes the herbaceous understory layer. Fire suppression and land conversion have reduced the amount of historical communities in existence today.

Background – Prior to settlement by the Europeans, the reference state for the Depression ecological site was a Willow Oak/Green Ash (*Quercus phellos*/*Fraxinus pennsylvanica*) Forest. Remnants of this presumed historic plant community still exist where natural conditions are replicated through conservation management techniques. Evidence of the reference state is found in accounts of early historic explorers to the area, historic forest and biological survey teams, as well as recent ecological studies in the last 30 years. The age of this woodland community varies, and has a diverse understory of grasses and forbs.

Settlement Management – As human settlement increased throughout the area, so did the increase in logging and grazing by domestic livestock. The logging became so extensive that by the 1930's most of the region had been cut-over. Replanting trees to historic communities was not common and early foresters began planting loblolly pine (*Pinus taeda*) for its quick growth. As more people colonized they began suppressing fire, which allowed dense thickets of shrubs to replace the herbaceous understory.

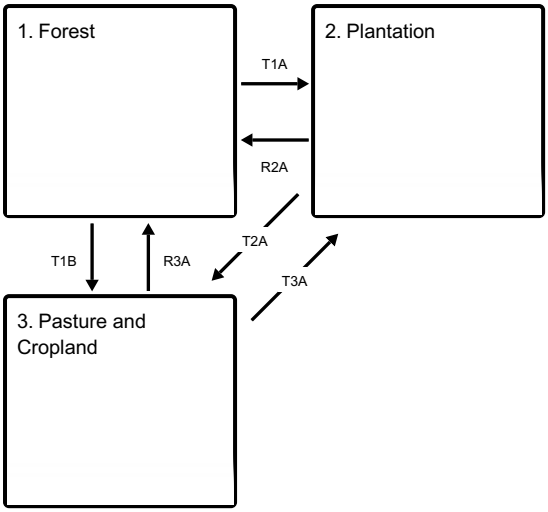
Current Management and State – Today much of the remnant forest is gone, replaced by pine plantations, crops, and pastures. The areas that were not converted have been fire-suppressed so long that loblolly pine and fire intolerant hardwoods populate the overstory structure. Currently, U.S. Forest Service properties are the best place to view the remnant sites. Some private individuals have begun restoring communities through selective tree planting and retention of communities that remain. Other restoration efforts include mimicking natural-disturbance regimes through gap-phase regeneration on plantation sites.

Fire Regimes – Fire was a natural and important disturbance throughout the Western Gulf Plain. Fire occurred naturally from lightning strikes and by Native Americans for game movement. The reference community developed with a frequency of fire every 10 to 20 years. Fires usually occurred in early spring, removing senescent vegetation, recycling nutrients and minerals, and spurring new plant growth. Late summer fires occurred as well, but with a different community effect. Summer fires burned hotter and with more intensity, greatly suppressing the shrub canopy layer. The summer fires also shifted the ecological site transitional state by decreasing grass densities and increasing forb densities. The topography, fuel loads, and other conditions caused patchy burns throughout the region resulting in mosaic patterns of plant communities and a heterogeneous landscape.

Disturbance Regimes – Extreme weather events occur occasionally throughout the region. Tornados uproot trees and open canopies in the spring months. In the late summer and early fall, hurricanes or tropical depressions often make landfall, dumping excessive amounts of rain and toppling trees with high winds. Another cause of large canopy openings is the effects of the southern pine beetle (Dendroctonus frontalis). Starting in the late 1950's, beetle outbreaks have occurred every 6 to 9 years (although a major attack has not occurred in some time), usually when the trees are stressed due to multiple environmental factors.

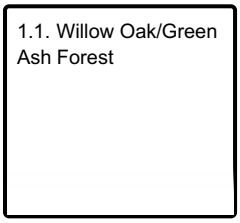
State and transition model

Ecosystem states

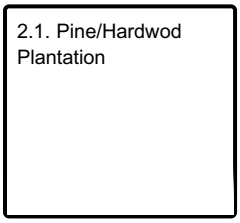


T1A - Clearcut, site preparation, tree planting
T1B - Clearcut, grass/crop planting
R2A - Gap-phase regeneration or clearcut with tree planting
T2A - Clearcut, grass/crop planting
R3A - Tree planting, mature overstory establishment
T3A - Clearcut, site preparation, tree planting

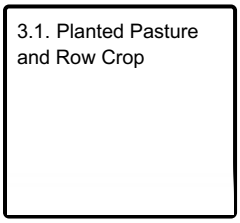
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Forest

State 1 has an overstory of willow oak, green ash, and laurel oak (*Quercus laurifolia*). The fringes around the depressions and mounds in between may have loblolly pine (*Pinus taeda*) and southern red oak (*Quercus falcata*). The shrub layer oftentimes forms dense thickets. Species that grow in these areas have to be able to withstand prolonged soil saturation and erratically-timed ponding up to 12 inches. Natural disturbances of fires, lightning strikes, hurricanes (wind throw), ice events (rare), and beetle infestations aid in maintaining the uneven-age structure. The natural canopy spacing is kept intact by the natural droughtiness and periodic fires ranging from 10 to

20 years. Fire is not an extremely important factor until the sites become really dry and experience burning from the adjacent uplands and terraces. Instead, treefall from soil saturation is the most common disturbance.

Dominant plant species

- laurel oak (*Quercus laurifolia*), tree
- loblolly pine (*Pinus taeda*), tree

Community 1.1
Willow Oak/Green Ash Forest

Species that can stand excess wetness are found on these sites. Thickets of green ash and mayhaw (*Crataegus opaca*) are common, oftentimes limiting the growth of the understory grass and forb layer. Other species in the shrub layer include: carolina ash (Fraxinus carolina), common persimmon (*Diospyros virginiana*), and bottomland post oak (*Quercus similis*). Ground layer species include: inland sea oats (*Chasmanthium latifolium*), switchcane (*Arundinaria gigantea*), sedges (Carex sp.), and rushes (Juncus sp.).

State 2
Plantation

The Plantation State is a result of conversion activities. The landowner has maximized silviculture production by planting a monoculture of tree species.

Community 2.1
Pine/Hardwod Plantation

In the immediate years following the initial plantation tree planting, the understory community will resemble State 1. During this early growth period, the landowner will typically remove unwanted hardwoods and herbaceous plants to reduce competition with the planted pine trees. As the overstory canopy closes, less understory management is required due to sunlight restrictions to the ground layer.

State 3
Pasture and Cropland

The Pasture and Cropland state is a result of conversion activities. The landowner has maximized agriculture production by planting a monoculture of introduced grass species or agricultural row crops.

Community 3.1
Planted Pasture and Row Crop

Typical introduced pasture grass species include bahiagrass (*Paspalum notatum*) and different varieties of bermudagrass (*Cynodon dactylon*). The grasses are grown for livestock production through direct grazing or baling hay for later use. Agricultural row crops are grown for food and fiber production. Many farmers use herbicides to reduce unwanted plant competition which yields a plant community unrepresentative of State 1 or subsequent vegetative states.

Transition T1A
State 1 to 2

The transition is due to the land manager maximizing silviculture potential. Merchantable timber is harvested by clearcut, then the site is prepared and planted to a monoculture of trees.

Transition T1B
State 1 to 3

The transition is due to the land manager maximizing agricultural production. Merchantable timber is harvested by clearcut, then the site is prepared and planted to either an improved grass or row crops.

Restoration pathway R2A
State 2 to 1

When restoring a plantation, the land manager can either clearcut the timber, prepare the site, and plant trees. Otherwise, gap-phase regeneration is possible through selective timber harvests. This involves replanting the desired overstory species in small openings within the current structure of the forest. The benefit is a slow progression of restoration instead of starting from primary succession.

Transition T2A
State 2 to 3

The transition is due to the land manager maximizing agricultural production. Merchantable timber is harvested by clearcut, then the site is prepared and planted to either an improved grass or row crops.

Restoration pathway R3A
State 3 to 1

This restoration path can be accomplished by planting a mix of native species to their natural frequencies while trying to attain a mature overstory canopy. Management will be required to control unwanted species by burning, mowing, and/or herbicides. Controlling introduced pasture grasses is difficult, with complete control likely not attainable. The herbaceous understory will take time to develop, but this process can be expedited if adapted plant material seed is available.

Transition T3A
State 3 to 2

The transition is due to the land manager maximizing silviculture production. The site is prepared and planted to a monoculture of pine or hardwood trees.

Additional community tables

Inventory data references

These site descriptions were developed as part a Provisional Ecological Site project using historic soil survey manuscripts, available site descriptions, and low intensity field traverse sampling. Future work to validate the information is needed. This will include field activities to collect low, medium, and high-intensity sampling, soil correlations, and analysis of that data. A final field review, peer review, quality control, and quality assurance review of the will be needed to produce the final document.

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Contributors

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Approval

Bryan Christensen, 9/21/2023

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	05/06/2020
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

    ___

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

    ___

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

    ___

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

    ___

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

    ___

17. **Perennial plant reproductive capability:**

    ___