Ecological site F133BY018TX
Clayey Bottomland

Last updated: 9/21/2023
Accessed: 04/29/2024

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.

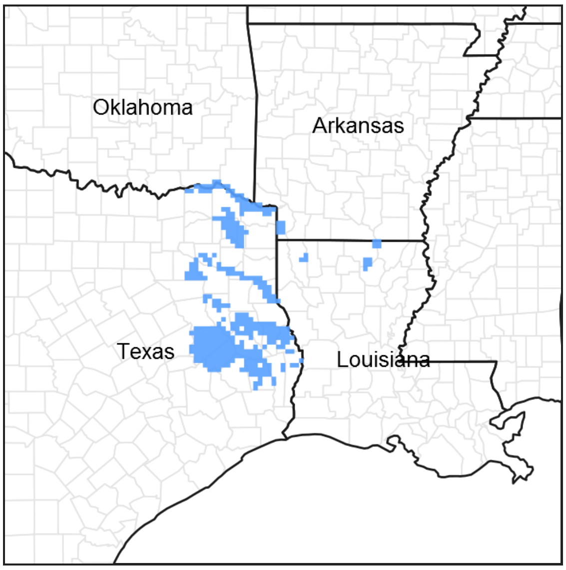


Figure 1. Mapped extent

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

The Clayey Bottomland ecological site has very deep, somewhat poorly drained soils that are flooded occasionally to frequently. The site is typically flooded for long periods during normal rainfall years. They will stay flooded starting in November and ending in May. The clay-textured soils combined with the flooding frequency form the plant community.

Associated sites

F133BY017TX	**Loamy Bottomland** Sites are in a similar position, but loamy textured.
F133BY012TX	**Wet Terrace** Sites are on a higher terrace position and do not flood as frequent or for as long.
F133BY013TX	**Terrace** Sites are on a higher terrace position and do not flood as frequent or for as long.

Similar sites

F133BY014TX	**Creek Bottomland** Sites are narrow and do not flood as frequently or for as long of a duration.
F133BY001TX	**Depression** Sites are located on depressions of uplands and terraces.
F133BY015TX	**Swamp** Sites are semi-permanently ponded.
F133BY017TX	**Loamy Bottomland** Sites are in a similar position, but loamy textured.
F133BY016TX	**Sandy Bottomland** Sites are in a similar position, but sandy textured.

Table 1. Dominant plant species

Tree	(1) *Quercus lyrata* (2) *Carya aquatica*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The ecological site are on nearly level flood plains adjacent to rivers, channels, and streams. Flooding ranges from occasionally to frequently during the months of November through May. The flooding can saturate the soils enough to become ponded up to 36 inches. When not flooded or ponded, a water table can be present with a top depth of 0 to 36 inches. The depth will deepen during the warmer months of the year. Slope is 0 to 1 percent. Elevation ranges from 100 to 1,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain
Runoff class	Negligible to high
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to occasional
Elevation	30–305 m
Slope	0–1%
Ponding depth	0–91 cm
Water table depth	0–91 cm
Aspect	Aspect is not a significant factor

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 3. Representative climatic features

Frost-free period (average)	219 days
Freeze-free period (average)	252 days
Precipitation total (average)	1,397 mm

Climate stations used

- (1) SHERIDAN [USC00036562], Sheridan, AR
- (2) MINDEN [USC00166244], Minden, LA
- (3) GILMER 4 WNW [USC00413546], Gilmer, TX
- (4) CALHOUN RSCH STN [USC00161411], Calhoun, LA
- (5) CARTHAGE [USC00411500], Carthage, TX
- (6) HUNTSVILLE [USC00414382], Huntsville, TX
- (7) RUSK [USC00417841], Rusk, TX
- (8) TOLEDO BEND DAM [USC00419068], Anacoco, TX
- (9) CALION L&D [USC00031140], El Dorado, AR
- (10) MAGNOLIA [USC00034548], Magnolia, AR
- (11) DEKALB [USC00412352], Simms, TX
- (12) JENA 4 WSW [USC00164696], Trout, LA

Influencing water features

The site floods regularly and typically has a high water table during drier times of the year.

Wetland description

The site supports hydrophytic vegetation and the soils are hydric as long as natural flooding has not been manipulated. Onsite delineations are required as some mapped areas and locations on the peripheries may not fall within the United States Army Corps of Engineers (USACOE) definition of a wetland.

Soil features

The soils of this site are deep and characterized by clay horizons throughout the entire soil profile, measured to 80 inches. The clay has properties causing movement and cracking when dried, indicative of shrink-swell clays. All of the horizons are black to dark gray with the lower subsoil horizons exhibiting the gray as a result of anaerobic conditions while being saturated with water. The surface layer is darkest and the underlying subsoil layers are distinguished by color, amount of iron manganese nodules, and redoximorphic concentrations. Estes is a representative soil consists of very deep, somewhat poorly drained soils that formed in clayey alluvial deposits. The series is classified as a fine, smectitic, thermic Aeric Dystraqert. Other soils correlated to this ecological site include: Gladewater, Kaufman, Litro, Ozias, Tuscosso, Una, Urbo, and Urbo.

Table 4. Representative soil features

Parent material	(1) Alluvium–mudstone
Surface texture	(1) Clay
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Very slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–17.78 cm
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–5
Soil reaction (1:1 water) (0-101.6cm)	3.5–7.5
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

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 Clayey Bottomland ecological site was a Overcup Oak/Water Hickory (*Quercus lyrata*/*Carya aquatica*) 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. Oftentimes, an early settler would make camp by logging pines in the area for lodging. The accompanying livestock would graze the upland woodlands filled with warm-season forage during the summer. As the summer grazing season would end, the livestock would naturally begin grazing in the bottoms to forage on large cane breaks and other cool-season plants found in the area. The bottomlands also provided plentiful hunting opportunities for deer, turkey, and squirrel that utilize the acorn crop.

Eventually, 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. The loblolly pines were commonly grown plantation style (site preparation, planting, long-term weed control, etc). This, coupled with the advent of heavy site preparation machinery made the conversion from low-grade hardwood possible.

Current Management and State – Today much of the remnant forest is gone, replaced by tree plantations, crops, and pastures. The largest bottomlands of disappearance are areas converted to reservoirs, including Sam Rayburn and Toledo Bend. The areas that have not been converted retain resemblance to pre-settlement conditions. Fire is not a large driver in the bottomlands, hence fire suppression does not play a large role in shaping the forested communities.

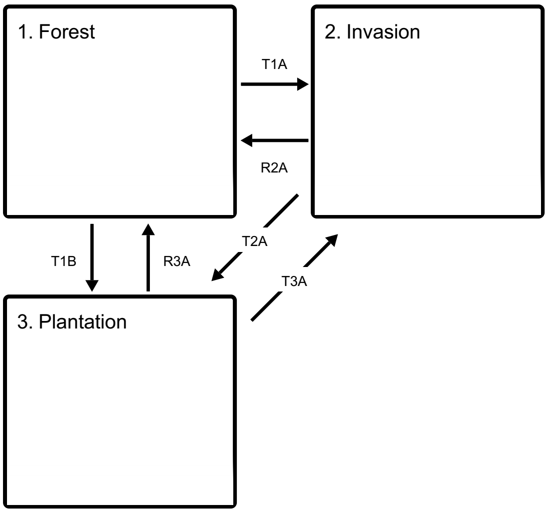
Fire Regimes – Fire was a natural and important disturbance throughout the Western Gulf Plain. Fire occurred naturally and was started by Native Americans for game movement, insect control, travel, and many other reasons. Contrary to most of the region, the bottomland communities developed with a very infrequent fire regime. The bottomlands are estimated to have burned one in every 50 years. Bottomlands naturally retard fire in a number of ways. Frequent flooding inundates the sites for sometimes months, and fire cannot travel. Another reason for reduced fire intervals is the understory vegetation is somewhat sparse of fine-fuel materials compared to those in the uplands. Coupled with the thicker, fire-resistant leaves adorning much of the vegetation, the bottomlands do not burn very often.

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. Flooding events occur most years in which rainfall is normal or higher. Prolonged flooding due to excessive precipitation can cause mortality in vegetative species that are unable to handle the continuous water, especially during the growing season (March through September). Reservoirs affect the natural flooding regimes. Upstream areas remain flooded longer and the frequency and duration of flooding on downstream areas are also impacted.

Plant Community Interactions – The dominant force in shaping the bottomlands is the close-proximity to a water source that floods the site throughout the year. Flooding for one to three months during the dormant season gives rise to plants that tolerate a wetter environment. Micro-relief within the broadly delineated bottomlands also affects the plant dispersion. Plants more adapted to water grow in the lower micro-elevations, and those that are more facultative (less water tolerant) occupy the higher micro-elevations. The difference between the upper and lower elevations could be as little as inches. The loamy surface of the ecological site has gleyed subsoils resulting from lack of oxygen during flooding. The communities are dominated by hardwood trees and an understory that can tolerate the varying conditions accompanying the floods.

State and transition model

Ecosystem states



T1A - Invasion by Chinese tallow

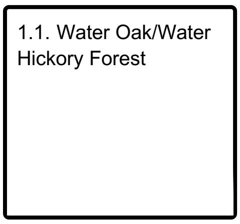
T1B - Clearcut, site preparation, tree planting

R2A - Removal of Chinese tallow, return over/understory to natives

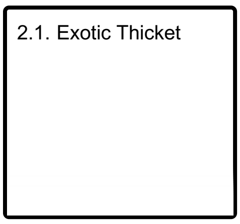
T2A - Clearcut, site preparation, tree planting

R3A - Tree planting, return of natural flooding intervals

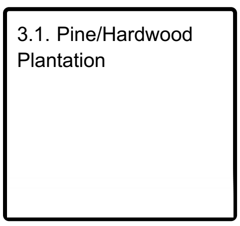
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Forest

The overall state has a high overstory cover of bottomland hardwood species. The dominant overstory species are overcup oak, water hickory (Carya aquatic), and water locust (Gleditsia aquatic). Willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), and bald cypress (*Taxodium distichum*) may be present, but are not as abundant. Flooding in is common, varying from brief durations to long durations depending on micro-relief, size of precipitation events, and current saturation of the soil. Flooding typically occurs during the dormant season, November to May. Growing season flooding for prolonged periods will cause mortality to overstory trees. A canopy-clearing disturbance can be inhabited by light-seeded species. If advanced oak reproduction is present at time of disturbance the stand will retain its oak dominance. Oaks will sprout, grow, die-back, and regrow for many years. Otherwise, ash (Fraxinus sp.) and sweetgum will colonize the canopy due to their rapid growth and ability to grow into the crown early. Fire plays a small role in the overall ecosystem. Prolonged drought and severe dry conditions could allow a fire to burn through the bottoms, but it was only estimated to occur once in every 50 years. More common is treefall due to windthrow. The rooting systems in the bottoms are oftentimes shallow. In combination with some mortality due to prolonged flooding, downed trees and upright snags are common.

Community 1.1
Water Oak/Water Hickory Forest

Shrub and herbaceous understory species will be tolerant of flooding. Common shrub species will include: possumhaw (*Ilex decidua*), eastern swampprivit (*Forestiera acuminata*), and common persimmon (*Diospyros virginiana*). Common understory species include: looseleaf waterwillow (*Justicia ovata*), lizard's tail (*Saururus cernuus*), and various sedges (Carex sp.).

State 2
Invasion

Chinese tallow (*Triadica sebifera*) is an undesired, invasive species brought to the United States in 1776 (Randall & Marinelli, 1996). Rapid expansion along the gulf coastal states has allowed the species to invade many ecosystems and consequently reduce diversity. Tallow trees are known to cause gastrointestinal upset, contact dermatitis, and toxicity in livestock and humans. Mechanical and chemicals options exist as a means to control the trees.

Community 2.1
Exotic Thicket

Chinese tallow invade the ecological site via flooding events as nearby waterways transport seeds. Once settled, the seeds produce saplings viable to reproduce seeds in as little as three years. The rapid establishment immediately blocks sunlight to understory species and reduces diversity. Unabated growth quickly allows the saplings to grow into the overstory, thus changing the ecological state entirely. Reductions in size and number of all vegetative species are seen in all canopy tiers.

State 3
Plantation

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

Community 3.1
Pine/Hardwood 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 trees. As the overstory canopy closes, less understory management is required due to sunlight restrictions to the ground layer.

Transition T1A
State 1 to 2

The transition from State 1 to State 2 is a result of occupancy by Chinese tallow. Chinese tallow invades oftentimes from upstream as their seeds are carried by floodwaters. Tallow trees grow and spread quickly throughout infected sites.

Transition T1B
State 1 to 3

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.

Restoration pathway R2A
State 2 to 1

The driver for restoration is control of Chinese tallow. Although an option, mechanical removal of the trees is difficult because they readily regrow from roots and seeds. Several chemicals methods are available including glyphosate for cut-stump treatments, triclopyr for cut-stump and foliar treatments, imazamox for broad spectrum application, and imazapyr as a foliar spray. Many aquatic herbicides have water use restrictions and can potentially kill hardwoods, so labels and restrictions should be read carefully prior to application.

Transition T2A
State 2 to 3

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.

Restoration pathway R3A
State 3 to 1

This restoration pathway may be accomplished by removing planted trees (pine or other hardwood) and replanting bottomland hardwoods. Restoration efforts for bottomland hardwood forests have proven difficult and much research has been done on these ecosystems. Many times restoring the function of the ecosystem is the most difficult obstacle. Evapotranspiration and hyrdoperiod are closely linked and may never fully be restored until a forested condition exists again (Stanturf et al., 2001). Local tree availability may limit the possibilities of species composition. Careful planning of available species, site design, and further management actions should be conversed with a knowledgeable restoration source. With this in mind, oftentimes late summer and early fall are the best times to begin due to possibly wet conditions during the late fall to early spring. Many detailed guides have been written to assist with restoration, and suggested readings include, “A Guide to Bottomland Hardwood Restoration” (Allen et al., 2001).

Transition T3A
State 3 to 2

This community transition is caused by neglecting the plantation understory. Without control, the understory becomes a dense thicket and can be invaded by Chinese tallow.

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	09/03/2021
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:**