Ecological site F133BY015TX
Swamp

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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): 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

NatureServe, 2002 - I.B.2.N.e.22 – Bald Cypress – (Water Tupelo, Swamp Blackgum, Ogeechee Tupelo) Seasonally Flooded Forest Alliance (A.337) Soil Survey Staff, 2011 - Woodland Suitability Group – 4w6 Bottomlands USDA-Natural Resources Conservation Service, 2006. -Major Land Resource Area (MLRA) 133B Van Kley et. al., 2007 - 23xxx.4.3.20 – Baldcypress/Ceratophyllum Clayey Semi-Permanently Flooded Swamps Landtype Phase

Ecological site concept

The Swamp ecological site has very deep, very poorly drained soils that are ponded throughout a portion of the year. A wetland plant community exists because it is the lowest position on the landscape, along with the flooding and ponding regimes.

Associated sites

F133BY012TX	**Wet Terrace** Sites are on a higher terrace landscape and are not as wet.
F133BY013TX	**Terrace** Sites are on a higher terrace landscape and are not as wet.

Similar sites

F133BY018TX	**Clayey Bottomland** Sites are located in bottomlands and do not stay flooded or ponded as long.
F133BY017TX	**Loamy Bottomland** Sites are located in bottomlands and do not stay flooded or ponded as long.

Table 1. Dominant plant species

Tree	(1) *Taxodium distichum*
Shrub	(1) *Cephalanthus occidentalis*
Herbaceous	(1) *Ceratophyllum demersum*

Physiographic features

The ecological site includes areas in low flood plains. They are almost permanently saturated with water and slopes are generally less than 1 percent.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain (2) Coastal plain > Swamp
Runoff class	Negligible
Flooding duration	Long (7 to 30 days) to 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	30 – 80 m
Slope	0 %
Ponding depth	0 – 120 cm
Water table depth	0 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)	220 days
Freeze-free period (average)	250 days
Precipitation total (average)	1,270 mm

- (1) MOORINGSPORT 1 N [USC00166364], Mooringsport, LA
- (2) JEFFERSON [USC00414577], Jefferson, TX
- (3) ATLANTA [USC00410408], Atlanta, TX
- (4) DAINGERFIELD 9 S [USC00412225], Daingerfield, TX

Influencing water features

The Swamp is a semi-permanently flooded and may only be exposed to dryer conditions during short periods of the year. These conditions are necessary for recruitment of new bald cypress.

Wetland description

The Swamp is a semi-permanently flooded wetland. The ecological site supports hydrophytic vegetation and the soils are hydric.

Soil features

These soils are very deep, very poorly drained, and very slowly permeable on submerged areas. These soils formed in acidic, clayey alluvial sediments in lake beds, oxbows, and stream channels. Cypress is a representative soil of the Swamps. This ecological site formed from clayey alluvium of Holocene age. The surface horizon is generally a gray clay loam from 0 to 6 inches. he subsurface horizons are typically gray clays from 6 to 20 inches and a secondary subsurface of gray clay 20 to 60 inches. Horizons are gray because of prolonged anoxic conditions and all horizons are sticky and plastic.

Table 4. Representative soil features

Parent material	(1) Alluvium – mudstone
Surface texture	(1) Clay (2) Clay loam
Family particle size	(1) Clayey

Drainage class	Very poorly drained
Permeability class	Very slow
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	15.75 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)	0 – 10
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

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 historic plant community for the Clayey Swamp was a bald cypress/buttonbush/coon's tail (Taxodium distichum/Cephalanthus occidentalis/Ceratophyllum demersum) forest. Remnants of this presumed historic plant community still exist where the historic conditions are still in place. 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.

Settlement Management – Unlike much of the Pineywoods region, the Caddo Lake area was not utilized as much for timber and grazing. Instead, the invention of the steamboat in the 19th century provided reason for development. The cities of Port Caddo, Swanson's Landing, Jefferson, and Mooringsport became thriving riverboat ports. But, as log jams were cleared, the lake level dropped ten feet. This caused the riverboat industry to fail. However, shortly thereafter, oil was discovered in the area and the first oil platform built in 1911. Later the Longhorn Army Ammunition Plant was built in 1942 near the shores of the lake, further adding to change in the area.

Current Management and State – Lake Caddo and its surrounding ecosystems have undergone much change. Today, ecological tourism is the most common land use. Much of the ecological site is within the boundaries of Caddo Lake State Park and Caddo Lake National Wildlife Refuge operated by Texas Parks and Wildlife (TPWD) and the United States Fish and Wildlife Service (USFWS), respectively. Large conservation efforts have taken place in the last 20 years to try and reverse any damage caused by previous human destruction. Currently, the greatest threat to the ecosystem is the invasion of noxious aquatic weeds. The main plant of concern is Giant Salvinia (Salvinia molesta), which spreads by doubling in size every four to ten days under optimal conditions. Efforts to remove the weed include biological control by beetles and the use of herbicides.

Disturbance Regimes – the Clayey Swamp site has adapted to a semi-permanent flooding regime. The site stays inundated with up to four feet of water 75 to 100 percent of the time. At times during the late summer (July to September) some sites may become dry. Otherwise emergent, submergent, and floating aquatic vegetation dominate the site. The effects of fire on the sites are rare because of the wet nature but may have occurred during droughts. 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.

Plant Community Interactions – The dominant force in shaping the swamp is the semi-permanent inundation of water. The hydrology does not allow oxygen to flow through the soil, causing anoxic conditions. Some indicators include: gleyed (grey) soil color with redoximorphic features (reds and yellow intermixed) and the smell of rotten eggs when disturbed (release of hydrogen-sulfide gases). The vegetation has adapted to the anaerobic conditions and these plants are dominant. The United State Army Corps of Engineers (USACOE) classifies plants that occur in wetlands with an estimated probability greater than 99 percent obligate (OBL), and those 67 to 99 percent facultative wetland (FACW) plants. Obligate and facultative wetland plants are the most common encountered throughout the Clayey Swamps. Indicator species are Bald Cypress, buttonbush, coon's tail, duckweeds (Azolla sp., Lemna sp., and Wolffia sp.), fiddleleaf (Hydrolea uniflora), water lilies (Nupha sp. and Nelumbo sp.), and various sedges (Carex sp.).

State and Transition Diagram -
The following diagram suggests some pathways the vegetative communities may take. Other states may exist that are not shown on the diagram. The information is intended to show what might happen through different circumstances; it does not mean that this would happen the same way in every instance. Changes to the community within a state move back-and-forth easily, but as thresholds are crossed the site changes from state to state. Meaning, changes have progressed to the point where some form of energy is necessary to return the site to the previous state.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
bald cypress	TADI2	*Taxodium distichum*	–	–	90-100	–	–
planertree	PLAQ	*Planera aquatica*	–	–	0-10	–	–
water tupelo	NYAQ2	*Nyssa aquatica*	–	–	0-10	–	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
giant cutgrass	ZIMI	*Zizaniopsis miliacea*	–	–	0-35
rice cutgrass	LEOR	*Leersia oryzoides*	–	–	0-20
redroot flatsedge	CYER2	*Cyperus erythrorhizos*	–	–	5-15
cypress swamp sedge	CAJO2	*Carex joorii*	–	–	5-15
coast cockspur grass	ECWA	*Echinochloa walteri*	–	–	0-10
Forb/Herb					
coon's tail	CEDE4	*Ceratophyllum demersum*	–	–	5-85
dotted duckmeat	LAPU12	*Landoltia punctata*	–	–	5-75
yellow pond-lily	NULU	*Nuphar lutea*	–	–	5-75
American lotus	NELU	*Nelumbo lutea*	–	–	5-75
longleaf pondweed	PONO2	*Potamogeton nodosus*	–	–	5-35
Columbian watermeal	WOCO	*Wolffia columbiana*	–	–	5-35
marsh seedbox	LUPA	*Ludwigia palustris*	–	–	3-35
oneflower false fiddleleaf	HYUN	*Hydrolea uniflora*	–	–	3-20
Shrub/Subshrub					
common buttonbush	CEOC2	*Cephalanthus occidentalis*	–	–	3-10
Tree					
bald cypress	TADI2	*Taxodium distichum*	–	–	0-5
planertree	PLAQ	*Planera aquatica*	–	–	0-5
water tupelo	NYAQ2	*Nyssa aquatica*	–	–	0-5
Vine/Liana					
Spanish moss	TIUS	*Tillandsia usneoides*	–	–	5-35

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Florida paspalum	PAFL4	*Paspalum floridanum*	–	–	5-35
whitegrass	LEVI2	*Leersia virginica*	–	–	5-25
blunt broom sedge	CATR7	*Carex tribuloides*	–	–	3-10
redroot flatsedge	CYER2	*Cyperus erythrorhizos*	–	–	3-10
Forb/Herb					
smallspike false nettle	BOCY	*Boehmeria cylindrica*	–	–	10-50
lizard's tail	SACE	*Saururus cernuus*	–	–	10-50
swamp smartweed	POHY2	*Polygonum hydropiperoides*	–	–	10-50
whorled marshpennywort	HYVE2	*Hydrocotyle verticillata*	–	–	5-20
oneflower false fiddleleaf	HYUN	*Hydrolea uniflora*	–	–	5-20
marsh seedbox	LUPA	*Ludwigia palustris*	–	–	3-15
delta arrowhead	SAPL	*Sagittaria platyphylla*	–	–	3-10
greater marsh St. Johnswort	TRWA	*Triadenum walteri*	–	–	0-5
Shrub/Subshrub					
common buttonbush	CEOC2	*Cephalanthus occidentalis*	–	–	5-40

water locust	GLAQ	*Gleditsia aquatica*	–	–	0-10
eastern swampprivet	FOAC	*Forestiera acuminata*	–	–	0-10
Tree					
bald cypress	TADI2	*Taxodium distichum*	–	–	5-15
planertree	PLAQ	*Planera aquatica*	–	–	0-15
water tupelo	NYAQ2	*Nyssa aquatica*	–	–	0-15
black willow	SANI	*Salix nigra*	–	–	0-10
common persimmon	DIVI5	*Diospyros virginiana*	–	–	0-5
overcup oak	QULY	*Quercus lyrata*	–	–	0-5
Vine/Liana					
Spanish moss	TIUS	*Tillandsia usneoides*	–	–	5-25
American buckwheat vine	BROV4	*Brunnichia ovata*	–	–	0-15
lanceleaf greenbrier	SMSM	*Smilax smallii*	–	–	0-15

Table 10. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

The historic animal community is relatively similar to the current community in the reference state. One major missing component is the black bear. Black bears were highly prevalent across the Western Coastal Plain. Their reduced numbers are directly correlated with the westward expansion of the European settlers. Like other mobile animals in the area, bears would have used multiple ecological sites. The Clayey Swamp would have provided the bears with nutrition/food in the form of hunting opportunities from the bountiful wildlife species that use the sites. Other apex predators like the mountain lion and wolf have disappeared in a similar manner. The Clayey Swamps contain a high diversity of animal species. Mature bald cypress produce seeds and are often consumed by squirrels. Other mammals frequenting the area include raccoons, beavers, and the occasional white-tailed deer (more often when dry). The swamps provide great habitat for reptiles and amphibians, none greater than the alligator. They can be seen floating in the deeper water areas adjacent to shallows. The alligators nest from mid-June to September on dense mats of vegetation in the Clayey Swamps, correlating with seasonal water lows. Wide arrays of avian species use the ecosystem. Egrets, herons, hawks, and woodpeckers are all common. During the spring migration, warblers collect insects from the trees. Prothonotary warblers, northern parula, and common yellowthroat stay through the summer and breed, while migrating shorebirds use the areas to refuel en route to their artic breeding grounds. During the fall and winter, the Clayey Swamps are important to waterfowl as they provide high quality habitat. Waterfowl feed on invertebrates and seeds (annuals providing more energy) located in the shallow-water habitats. In 1993, Caddo Lake and its surrounding ecosystem was designated a “wetland of international importance, especially as waterfowl habitat,” under the Ramsar Preservation Convention.

Recreational uses

The ecological site attracts people and wildlife alike. Bird watching, fishing, hiking, canoeing, kayaking, photography, and hunting are all popular activities in the Clayey Swamp.

Wood products

Pines are used for all types of wood products. Hardwoods are suitable for use as pulpwood, firewood, charcoal, lumber, furniture, railroad ties, and pallet material.

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.

Type locality

Location 1: Harrison County, TX	
Latitude	32° 39′32″
Longitude	94° 7′20″

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Contributors

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Approval

Bryan Christensen, 12/13/2023

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	
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:**

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future**

establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

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17. **Perennial plant reproductive capability:**
