USDA Natural Resources Conservation Service

Ecological site F133BY017TX
Loamy Bottomland

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Accessed: 05/14/2024

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.

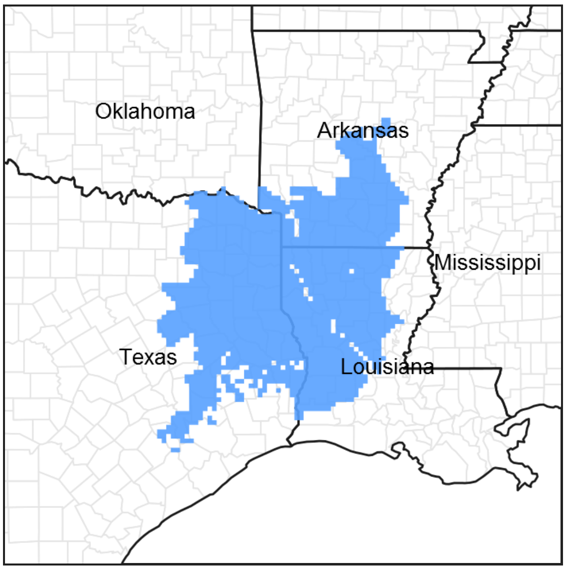


Figure 1. Mapped extent

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

NatureServe, 2002
- CEGL007370 – Temporarily flooded cold-deciduous forest

Soil Survey Staff, 2011
- Woodland Suitability Group – 1w9 Bottomlands

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

Van Kley et. al., 2007

- 23xxx.4.2.20 Overcup Oak/Justicia Clayey/Loamy Seasonally to Nearly Regularly Flooded Low River Floodplains Landtype Phase

Ecological site concept

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

Associated sites

F133BY012TX	**Wet Terrace** Sites are on higher terrace position and do not flood as frequent or for as long.
F133BY013TX	**Terrace** Sites are on higher terrace position and do not flood as frequent or for as long.
F133BY018TX	**Clayey Bottomland** Sites are similar in position, but clayey textured.

Similar sites

F133BY016TX	**Sandy Bottomland** Sites are similar in position, but sandy textured.
F133BY015TX	**Swamp** Sites are semi-permanently ponded.
F133BY018TX	**Clayey Bottomland** Sites are similar in position, but clayey textured.
F133BY001TX	**Depression** Sites are located on depressions of uplands and terraces.
F133BY014TX	**Creek Bottomland** Sites are narrow and do not flood as frequently or for as long of a duration.

Table 1. Dominant plant species

Tree	(1) *Quercus phellos*
Shrub	Not specified
Herbaceous	(1) *Justicia ovata*

Physiographic features

The ecological sites consist of very deep, somewhat poorly drained, moderately permeable soils. These are on nearly level flood plains with slopes ranging from 0 to 1 percent. Flooding can be as short as a few days or long as three months. Flooding generally occurs between November and May.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain
Runoff class	Low to high
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Elevation	15–137 m
Slope	0–1%
Water table depth	0–61 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) GILMER 4 WNW [USC00413546], Gilmer, TX
- (3) CALHOUN RSCH STN [USC00161411], Calhoun, LA
- (4) MINDEN [USC00166244], Minden, LA
- (5) CARTHAGE [USC00411500], Carthage, TX
- (6) RUSK [USC00417841], Rusk, TX
- (7) TOLEDO BEND DAM [USC00419068], Anacoco, TX
- (8) CALION L&D [USC00031140], El Dorado, AR
- (9) MAGNOLIA [USC00034548], Magnolia, AR
- (10) DEKALB [USC00412352], Simms, TX
- (11) JENA 4 WSW [USC00164696], Trout, LA
- (12) HUNTSVILLE [USC00414382], Huntsville, TX

Influencing water features

The site floods regularly and when not flooded typically has a high water table.

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

Mattex and Manco are two of the representative soils of the Loamy Bottomlands. This ecological site formed from loamy alluvium and is associated with very deep, somewhat poorly drained, slowly permeable loamy entisols on bottomlands. The first gleyed-subsurface horizon usually appears within 8 to 11 inches. The gleying and other redoximorphic features continue through the profile usually past 80 inches. Gleying and redoximorphic features are caused by prolonged inundation. Other soils correlated to this site include: Amy, Angelina, Bibb, Bleakwood, Dreka, Groom, Guyton, Kanebreak, Mathiston, Mattex, Nahatche, Pophers, Sardis, Marietta, Mooreville, Ochlockonee, and Socagee.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and siltstone
Surface texture	(1) Loam (2) Clay loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Permeability class	Moderate
Soil depth	203 cm
Surface fragment cover <=3"	0–2%
Available water capacity (0-101.6cm)	7.62–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	4.5–5.5
Subsurface fragment volume <=3" (0-101.6cm)	0–4%

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 Loamy Bottomlands was a Willow Oak/Looseleaf Water-willow (*Quercus phellos*/*Justicia ovata*) Forest. Remnants of this presumed historic plant community still exist where natural 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 – 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.

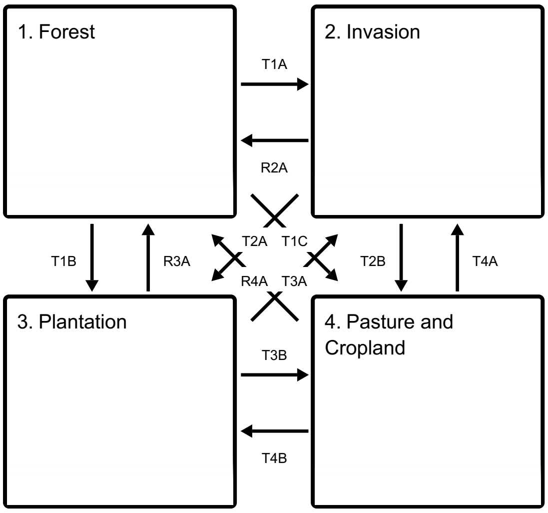
Fire Regimes – Fire was a natural and important disturbance throughout the Western Gulf Plain. Fire occurred naturally and was started by Native Americans for game movement, insect control, travel, and many other reasons. Contrary to most of the region, the bottomland communities developed with a very 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

T1C - Clearcut, grass/crop planting

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

T2A - Clearcut, site preparation, tree planting

T2B - Clearcut, grass/crop planting

R3A - Tree planting, return flooding intervals

T3A - Clearcut, no management, Chinese tallow invasion

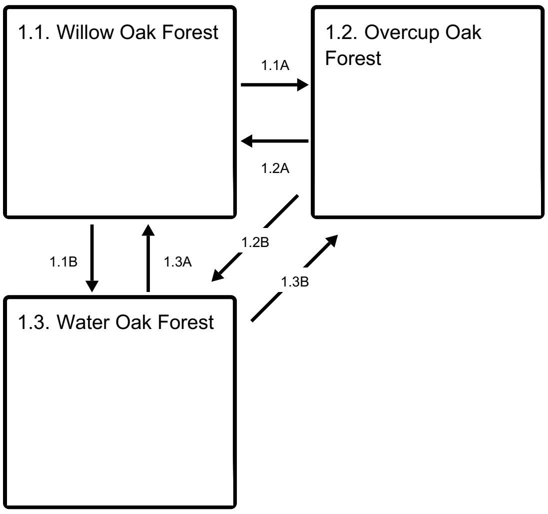
T3B - Clearcut, grass/crop planting

R4A - Tree planting, return of flooding intervals

T4A - Oldfield abondonment, Chinese tallow invasion

T4B - Clearcut, site preparation, tree planting

State 1 submodel, plant communities



1.1A - Longer flood duration

1.1B - Shorter flood duration

1.2A - Shorter flood duration

1.2B - Shorter flood duration

1.3A - Longer flood duration

1.3B - Longer flood duration

State 2 submodel, plant communities

2.1. Invasion

State 3 submodel, plant communities

3.1. Pine/Hardwood Plantation

State 4 submodel, plant communities

4.1. Planted Pasture and Row Crop

State 1 Forest

Three communities exist in the Forest State: the Willow Oak Community (1.1), the Overcup Oak Community (1.2), and the Water Oak Community (1.3). The overall state has a high overstory cover (70 to 95 percent) of bottomland hardwood species. Basal areas range from 70 to 110 square feet per acre. The dominant overstory species are willow oak, overcup oak (*Quercus lyrata*), water oak (*Quercus nigra*), laurel oak (*Quercus laurifolia*), sweetgum (*Liquidambar styraciflua*), and swamp chestnut oak (*Quercus michauxii*). Flooding in the reference state 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. All communities can occur within feet of each other as relief changes ever so slightly. Floodwaters scour and deposit new soil throughout the landscape. The areas with lower relief may have a slightly higher clay content in the surface from settling as flood waters recede. As a general rule, more dense understories are found in the higher-elevation communities and transition to less vegetation as elevation decreases. The reduced-oxygen environment requires all three communities of plants to use adaptations to overcome the inundation by water. Another common feature is a heavy cover of hardwood leaf litter widespread throughout the reference state. Communities within State 1 affected by 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. If the advanced oak regeneration is not present, an ash, sweetgum, or ash/sweetgum dominated stand is possible. 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 in the Loamy Bottomlands are common.

Community 1.1 Willow Oak Forest

The Loamy Bottomland system communities are based highly on micro-relief throughout the landscape. A subtle rise or fall of mere inches can drastically alter the vegetative composition. The willow oak community (1.1) represents the middle-relief elevation in comparison to communities 1.2 and 1.3. Plant species occurring in the willow oak community are usually facultative wet according to the U.S. Army Corps' Wetland Delineation Manual (2010). Understory indicators include blunt broom sedge (*Carex tribuloides*), smallspike false nettle (*Boehmeria cylindrica*l), and American Buckwheat vine (*Brunnichia ovata*).

Table 5. Ground cover

Tree foliar cover	5-15%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	35-85%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0-75%
Bare ground	0-5%

Table 6. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-1%	0-5%	5-10%
>0.15 <= 0.3	5-30%	0-5%	5-10%	10-15%
>0.3 <= 0.6	0-15%	0-15%	5-10%	5-40%
>0.6 <= 1.4	0-5%	0-5%	0-35%	–
>1.4 <= 4	5-10%	0-15%	0-10%	–
>4 <= 12	5-25%	0-15%	–	–
>12 <= 24	50-85%	0-5%	–	–
>24 <= 37	10-35%	0-1%	–	–
>37	–	–	–	–

Community 1.2
Overcup Oak Forest

Community 1.2, the overcup oak community, represents the lowest micro-relief in the reference state. The community commonly has the lowest understory canopy because it stays flooded the longest. The longer flooding duration causes the gives rise to vegetative species obligate to wetlands. The obligate species are able to handle anoxic conditions during prolonged submergence. Looseflower water-willow, cypress swamp sedge (*Carex joorii*), and buttonbush (*Cephalanthus occidentalis*) are common indicators of community 1.2.

Community 1.3
Water Oak Forest

The Water Oak Community (1.3) has the highest relief compared to communities 1.1 and 1.2. Community 1.3 can be found on pseudo-islands positioned amidst the other two communities or on the outskirts of the ecological site transitioning into the surrounding uplands or terraces. The vegetative species occupying Community 1.3 are facultative in nature, equally occurring in wetlands or uplands. Common species include common persimmon (*Diospyros virginiana*), Indian woodoats (*Chasmanthium latifolium*), trumpet creeper (*Campsis radicans*), and peppervine (Ampelopsis arborea).

Pathway 1.1A
Community 1.1 to 1.2

Willow Oak Forest

→

Overcup Oak Forest

The driver for the community shift is longer flood duration. As Communities 1.1 (Willow Oak) and 1.3 (Water Oak) stay flooded longer, their vegetative species are occupied by those in Community 1.2 (Overcup Oak). Species found in the Overcup Oak Community are able to withstand anoxic conditions for longer periods of time.

Pathway 1.1B
Community 1.1 to 1.3


Willow Oak Forest


Water Oak Forest

The driver for the community shift is shorter flood duration. As Communities 1.1 (Willow Oak) and 1.2 (Overcup Oak) stay dry for longer, their vegetative species are occupied by those in Community 1.3 (Water Oak). Species found in the Water Oak Community do not tolerate flooding as well as the other two communities, thus the drier soil conditions assist in the establishment of plants in Community 1.3.

Pathway 1.2A
Community 1.2 to 1.1


Overcup Oak Forest


Willow Oak Forest

The driver for the community shift is shorter flood duration. As Communities 1.1 (Willow Oak) and 1.2 (Overcup Oak) stay dry for longer, their vegetative species are occupied by those in Community 1.3 (Water Oak). Species found in the Water Oak Community do not tolerate flooding as well as the other two communities, thus the drier soil conditions assist in the establishment of plants in Community 1.3.

Pathway 1.2B
Community 1.2 to 1.3


Overcup Oak Forest


Water Oak Forest

The driver for the community shift is shorter flood duration. As Communities 1.1 (Willow Oak) and 1.2 (Overcup Oak) stay dry for longer, their vegetative species are occupied by those in Community 1.3 (Water Oak). Species found in the Water Oak Community do not tolerate flooding as well as the other two communities, thus the drier soil conditions assist in the establishment of plants in Community 1.3.

Pathway 1.3A
Community 1.3 to 1.1


Water Oak Forest


Willow Oak Forest

The driver for the community shift is longer flood duration. As Communities 1.1 (Willow Oak) and 1.3 (Water Oak) stay flooded longer, their vegetative species are occupied by those in Community 1.2 (Overcup Oak). Species found in the Overcup Oak Community are able to withstand anoxic conditions for longer periods of time.

Pathway 1.3B
Community 1.3 to 1.2

Water Oak Forest **Overcup Oak Forest**

The driver for the community shift is longer flood duration. As Communities 1.1 (Willow Oak) and 1.3 (Water Oak) stay flooded longer, their vegetative species are occupied by those in Community 1.2 (Overcup Oak). Species found in the Overcup Oak Community are able to withstand anoxic conditions for longer periods of time.

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
Invasion

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.

Table 7. Ground cover

Tree foliar cover	10-25%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	0-5%
Forb foliar cover	0-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	45-90%
Surface fragments >0.25" and <=3"	0%

Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0-5%

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 the 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 4
Pasture and Cropland

The Pasture and Crop 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 4.1
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 from the 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.

Transition T1C
State 1 to 4

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 a planted grass or row crops.

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.

Transition T2B
State 2 to 4

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 a planted grass or row crops.

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.

Transition T3B
State 3 to 4

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 R4A
State 4 to 1

This restoration pathway may be accomplished by restoring 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 T4A
State 4 to 2

This community transition is caused by neglecting the pasture or not replanting crops. Without control, the understory becomes a dense thicket and can be invaded by Chinese tallow.

Transition T4B
State 4 to 3

The transition is due to the land manager maximizing silviculture potential. The site is prepared and planted to a monoculture of trees.

Additional community tables

Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
willow oak	QUPH	*Quercus phellos*	–	–	20–75	–	–
water oak	QUNI	*Quercus nigra*	–	–	20–60	–	–
overcup oak	QULY	*Quercus lyrata*	–	–	20–50	–	–
laurel oak	QULA3	*Quercus laurifolia*	–	–	10–30	–	–
swamp chestnut oak	QUMI	*Quercus michauxii*	–	–	10–30	–	–
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	10–30	–	–
blackgum	NYSY	*Nyssa sylvatica*	–	–	5–20	–	–
American elm	ULAM	*Ulmus americana*	–	–	5–20	–	–
red maple	ACRU	*Acer rubrum*	–	–	5–20	–	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
giant cane	ARGI	*Arundinaria gigantea*	–	–	5–35
blunt broom sedge	CATR7	*Carex tribuloides*	–	–	5–35
greater bladder sedge	CAIN12	*Carex intumescens*	–	–	0–10
slender woodoats	CHLA6	*Chasmanthium laxum*	–	–	1–5
marsh flatsedge	CYPS	*Cyperus pseudovegetus*	–	–	0–3
Forb/Herb					
smallspike false nettle	BOCY	*Boehmeria cylindrica*	–	–	5–25
camphor pluchea	PLCA7	*Pluchea camphorata*	–	–	5–20
Virginia dayflower	COVI3	*Commelina virginica*	–	–	1–5
Canada germander	TECA3	*Teucrium canadense*	–	–	1–3
smallflower thoroughwort	EUSE	*Eupatorium semiserratum*	–	–	0–3
smooth hedgenettle	STTE	*Stachys tenuifolia*	–	–	0–3
sensitive fern	ONSE	*Onoclea sensibilis*	–	–	0–1
false indigo bush	AMFR	*Amorpha fruticosa*	–	–	0–1
St. Peterswort	HYCR3	*Hypericum crux-andreae*	–	–	0–1
sweetscent	PLOD	*Pluchea odorata*	–	–	0–1
Shrub/Subshrub					
American snowbell	STAM4	*Styrax americanus*	–	–	0–10
possumhaw	ILDE	*Ilex decidua*	–	–	1–10
dwarf palmetto	SAMI8	*Sabal minor*	–	–	1–10
Tree					
willow oak	QUPH	*Quercus phellos*	–	–	5–25
laurel oak	QULA3	*Quercus laurifolia*	–	–	5–25
green ash	FRPE	*Fraxinus pennsylvanica*	–	–	1–5
cherrybark oak	QUPA5	*Quercus pagoda*	–	–	1–5
sugarberry	CELA	*Celtis laevigata*	–	–	0–5
Vine/Liana					
American buckwheat vine	BROV4	*Brunnichia ovata*	–	–	0–15
climbing dogbane	TRDI	*Trachelospermum difforme*	–	–	1–10
climbing hempvine	MISC	*Mikania scandens*	–	–	0–5
catbird grape	VIPA7	*Vitis palmata*	–	–	0–5
American wisteria	WIFR	*Wisteria frutescens*	–	–	1–5

Table 10. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
rice cutgrass	LEOR	*Leersia oryzoides*	–	–	0–10
common rush	JUEF	*Juncus effusus*	–	–	0–10
giant cutgrass	ZIMI	*Zizaniopsis miliacea*	–	–	0–10
shortbristle horned beaksedge	RHCO2	*Rhynchospora corniculata*	–	–	0–10
cypress swamp sedge	CAJO2	*Carex joorii*	–	–	1–5
Louisiana sedge	CALO6	*Carex louisianica*	–	–	0–5
Frank's sedge	CAFR3	*Carex frankii*	–	–	0–3
Forb/Herb					
looseflower water-willow	JUOV	*Justicia ovata*	–	–	5–40
lizard's tail	SACE	*Saururus cernuus*	–	–	1–10
dotted smartweed	POPU5	*Polygonum punctatum*	–	–	0–5
greater marsh St. Johnswort	TRWA	*Triadenum walteri*	–	–	0–5
whorled marshpennywort	HYVE2	*Hydrocotyle verticillata*	–	–	0–5
trailing yellow loosestrife	LYRA3	*Lysimachia radicans*	–	–	0–3
royal fern	OSRE	*Osmunda regalis*	–	–	0–3
taperleaf water horehound	LYRU	*Lycopus rubellus*	–	–	0–3
halberdleaf rosemallow	HILA2	*Hibiscus laevis*	–	–	0–1
ditch stonecrop	PESE6	*Penthorum sedoides*	–	–	0–1
creeping burhead	ECCO3	*Echinodorus cordifolius*	–	–	0–1
Shrub/Subshrub					
common buttonbush	CEOC2	*Cephalanthus occidentalis*	–	–	1–10
eastern swampprivet	FOAC	*Forestiera acuminata*	–	–	0–5
western mayhaw	CROP	*Crataegus opaca*	–	–	0–3
Tree					
overcup oak	QULY	*Quercus lyrata*	–	–	5–25
planertree	PLAQ	*Planera aquatica*	–	–	1–5
swamp tupelo	NYBI	*Nyssa biflora*	–	–	1–5
water locust	GLAQ	*Gleditsia aquatica*	–	–	0–5
Carolina ash	FRCA3	*Fraxinus caroliniana*	–	–	0–3
water hickory	CAAQ2	*Carya aquatica*	–	–	0–3

Table 11. Community 1.3 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Indian woodoats	CHLA5	*Chasmanthium latifolium*	–	–	1–15
needleleaf rosette grass	DIAC	*Dichanthelium aciculare*	–	–	1–10
beaked panicgrass	PAAN	*Panicum anceps*	–	–	1–5
Ravenel's rosette grass	DIRA	*Dichanthelium ravenelii*	–	–	0–3
Forb/Herb					
eastern poison ivy	TORA2	*Toxicodendron radicans*	–	–	1–10
partridgeberry	MIRE	*Mitchella repens*	–	–	0–5
dogfennel	EUCA5	*Eupatorium capillifolium*	–	–	0–5
blue mistflower	COCO13	*Conoclinium coelestinum*	–	–	0–3
St. Andrew's cross	HYHY	*Hypericum hypericoides*	–	–	1–3
slender threeseed mercury	ACGR2	*Acalypha gracilens*	–	–	0–1
Missouri violet	VIMI3	*Viola missouriensis*	–	–	0–1
bursting-heart	EUAM9	*Euonymus americanus*	–	–	0–1
lateflowering thoroughwort	EUSE2	*Eupatorium serotinum*	–	–	0–1
Fern/fern ally					
resurrection fern	PLPO2	*Pleopeltis polypodioides*	–	–	0–3
Shrub/Subshrub					
Gulf Sebastian-bush	DIFR6	*Ditrysinia fruticosa*	–	–	0–3
sawtooth blackberry	RUAR2	*Rubus argutus*	–	–	0–3
Tree					
water oak	QUNI	*Quercus nigra*	–	–	5–25
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	5–25
common persimmon	DIVI5	*Diospyros virginiana*	–	–	5–25
red maple	ACRU	*Acer rubrum*	–	–	5–25
American elm	ULAM	*Ulmus americana*	–	–	1–10
American hornbeam	CACA18	*Carpinus caroliniana*	–	–	1–5
blackgum	NYSY	*Nyssa sylvatica*	–	–	0–3
bitternut hickory	CACO15	*Carya cordiformis*	–	–	0–3
loblolly pine	PITA	*Pinus taeda*	–	–	0–3
Vine/Liana					
roundleaf greenbrier	SMRO	*Smilax rotundifolia*	–	–	1–10
Alabama supplejack	BESC	*Berchemia scandens*	–	–	1–10
muscadine	VIRO3	*Vitis rotundifolia*	–	–	1–10
trumpet creeper	CARA2	*Campsis radicans*	–	–	1–10
crossvine	BICA	*Bignonia capreolata*	–	–	0–5

Table 12. Community 3.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
eastern cottonwood	PODE3	*Populus deltoides*	–	–	–	–	–
green ash	FRPE	*Fraxinus pennsylvanica*	–	–	–	–	–
loblolly pine	PITA	*Pinus taeda*	–	–	–	–	–
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	–	–	–

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 Loamy Bottomlands would have provided the bears with nutrition/food in the form of hard mast (acorns). Other apex predators like the mountain lion and wolf have disappeared in a similar manner.

Recreational uses

The most popular recreational use is hunting for white-tail deer, waterfowl and other game animals. Bird watching is also becoming increasingly popular.

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. The wide range of wood products is attributed to the diverse tree species growing on this ecosite.

Other information

The Loamy Bottomlands contain a high diversity of animal species. Mature oaks drop acorns in the fall that are eaten by a myriad of species from bird to mammal. Woodpeckers are especially common throughout, as well as songbirds and wading birds (when flooded).

White-tailed deer are highly adaptable herbivores and use the bottomlands in combinations with other nearby ecological sites. They consume browse from shrubs and small trees, soft mast, hard mast, including the occasional forb. The hardwood ecosystem is typically denser than the surrounding uplands so deer, and other secretive species, use the bottomlands as a travel corridor.

Healthy bottomlands provide wild turkeys with almost all habitat needs from nesting to foraging. Adult and juvenile turkeys are opportunistic omnivores and use a variety of food items including animal matter, hard and soft mast, green forage, tubers, seeds, and grains, while poults require high protein foods such as insects and young vegetation.

Waterfowl use of the Loamy Bottomlands varies by year depending on flood conditions. When the system is flooded waterfowl take advantage of acorns as a high energy food source. Waterfowl can also be seen feeding on the numerous aquatic invertebrates found in flooded areas. Contrary to migrating waterfowl, wood ducks and hooded mergansers are present year round, so large-natural cavities, and those created by pileated woodpeckers, in dead trees are important.

Other common species that utilize the ecosystem include squirrels and woodcock. Squirrels utilize the hard mast species present, while woodcock probe the moist soil for invertebrates.

Table 13. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
eastern cottonwood	*PODE3*	85	95	143	143	50	–	–	
loblolly pine	*PITA*	95	103	143	143	50	–	–	
sweetgum	*LIST2*	90	100	114	114	50	–	–	
green ash	*FRPE*	75	85	57	57	50	–	–	

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

Tyson Hart

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):**

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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:**
