Ecological site F133BY014TX
Creek Bottomland

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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.
- CEGL004911 – Hardwood Small Stream Forest

Soil Survey Staff, 2011
- Woodland Suitability Group – 1w8 Bottomlands

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

Van Kley et. al., 2007
- 231eg.12.4 Minor Stream Bottoms Landtype

Ecological site concept

The ecological site has developed along fast moving water bodies that flood occasionally to frequently. The sites do not pond water and are moderately well to well drained. The plant communities are not typically hydrophitic, but are influenced by the flooding regime.

Associated sites

F133BY011TX	**Deep Sandy Terrace** Sites are located in a higher terrace position and do not flood on a regular basis.
F133BY012TX	**Wet Terrace** Sites are located in a higher terrace position.
F133BY013TX	**Terrace** Site are on a higher terrace landscape.

Similar sites

F133BY017TX	**Loamy Bottomland** Sites are located on wider loamy bottoms and flood for longer duration.
F133BY018TX	**Clayey Bottomland** Sites are located on wider clayey bottoms and flood for longer duration.
F133BY016TX	**Sandy Bottomland** Sites are located on wider sandy bottoms and flood for longer duration.

Table 1. Dominant plant species

Tree	(1) *Quercus nigra* (2) *Quercus alba*
Shrub	Not specified
Herbaceous	(1) *Chasmanthium latifolium* (2) *Mitchella repens*

Physiographic features

These soils formed in recent alluvium derived from coastal plain sediments on flood plains. The slope ranges from 0 to 1 percent. These soils are commonly flooded. Typically, they flood 1 to 3 times during most years. Periods of flooding are very brief to brief.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	15–198 m
Slope	0–1%
Water table depth	30–122 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

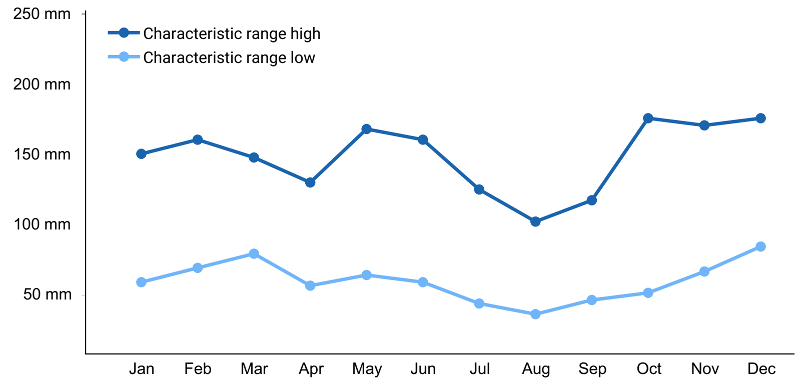


Figure 1. Monthly precipitation range

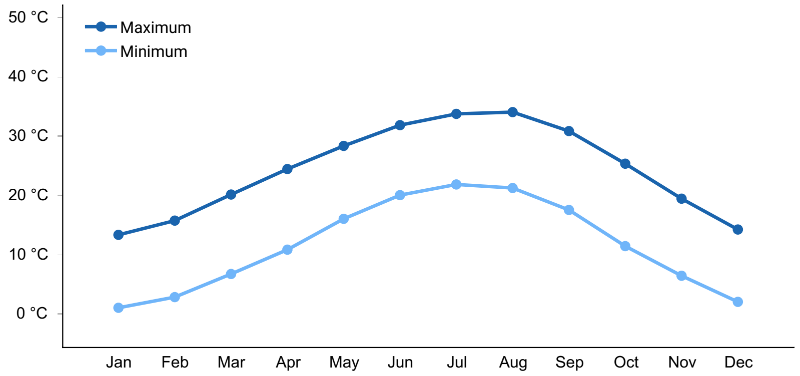


Figure 2. Monthly average minimum and maximum temperature

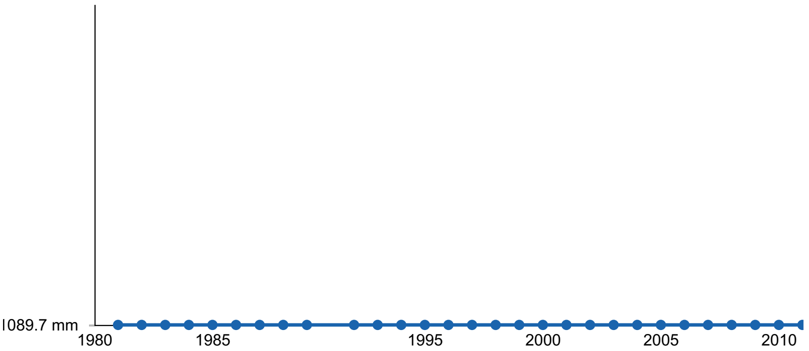


Figure 3. Annual precipitation pattern

Climate stations used

- (1) CALHOUN RSCH STN [USC00161411], Calhoun, LA
- (2) CARTHAGE [USC00411500], Carthage, TX
- (3) HUNTSVILLE [USC00414382], Huntsville, TX
- (4) RUSK [USC00417841], Rusk, TX
- (5) TOLEDO BEND DAM [USC00419068], Anacoco, TX

- (6) CALION L&D [USC00031140], El Dorado, AR
- (7) JENA 4 WSW [USC00164696], Trout, LA
- (8) DEKALB [USC00412352], Simms, TX
- (9) GILMER 4 WNW [USC00413546], Gilmer, TX
- (10) MAGNOLIA [USC00034548], Magnolia, AR
- (11) SHERIDAN [USC00036562], Sheridan, AR
- (12) MINDEN [USC00166244], Minden, LA

Influencing water features

The soils are not classified as hydric, although they do flood frequently to occasionally throughout the year. Plants nearest the water, or areas staying inundated for long periods may have hydrophytic vegetation.

Wetland description

The sites are not generally classified as a wetland but onsite field investigations should occur.

Soil features

Iulus is a representative soil of the Creek Bottomlands. The series consists of very deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in recent alluvium derived from coastal plain sediments. The slope ranges from 0 to 1 percent. Other soils correlated to this ecological site include: Dardanelle, Dela, Ennis, Hannahatchee, Iuka, Iulus, Jena, Kosse, Koury, Laneville, Owentown, and Thenas.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone
Surface texture	(1) Fine sandy loam (2) Silt loam (3) Coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–17.78 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)	4.5–7
Subsurface fragment volume <=3" (Depth not specified)	0%
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 historic plant community for the Creek Bottomlands was a Water Oak/White Oak (*Quercus nigra*/*Quercus alba*) 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 – 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. With early settlement also came the arrival of the railroads, initially causing a mosaic effect (small areas being cut) across the landscape.

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 (e.g., site preparation, planting, long-term weed control). 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 some resemblance to pre-settlement conditions. Fire is not a large driver in the Creek 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 Creek Bottomland reference community developed with a very infrequent fire regime. The bottomlands are estimated to have burned once in every 20 to 50 years. Bottomlands naturally retard fire in a number of ways. Frequent flooding inundates the sites for periods, 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.

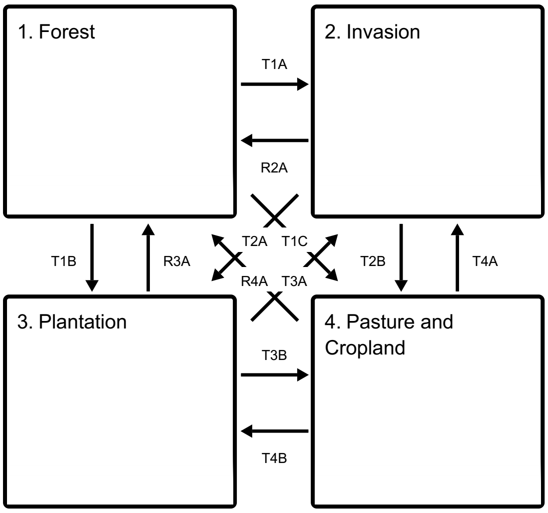
Disturbance Regimes – Extreme weather events occur occasionally throughout the region. Tornados uproot trees and open canopies in the spring months. In the late summer and early fall, hurricanes or tropical depressions often make landfall, dumping excessive amounts of rain and toppling trees with high winds. Another cause of large canopy openings is the effects of the southern pine beetle (Dendroctonus frontalis). Since the Forest Service has been recording 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 because of multiple environmental factors.

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.

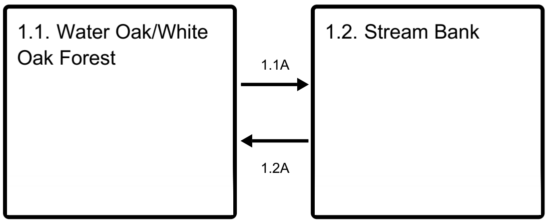
State and transition model

Ecosystem states



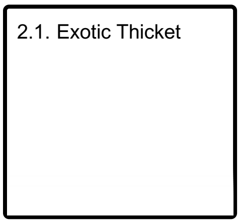
T1A - Invasion by Chinese tallow
T1B - Clearcut, site preparation, tree planting
T1C - Clearcut, grass/crop planting
R2A - Removal of Chinese tallow, return over/understory to natives
T2A - Clearcut, site preparation, tree planting
T2B - Clearcut, grass/crop planting
R3A - Tree planting, return flooding intervals
T3A - Clearcut, abandonment, Chinese tallow invasion
T3B - Clearcut, grass/crop planting
R4A - Tree planting, return flooding intervals
T4A - Oldfield abandonment, Chinese tallow invasion
T4B - Clearcut, site preparation, tree planting

State 1 submodel, plant communities



1.1A - Closer to stream and/or more frequent flooding
1.2A - Further from stream and/or less frequent flooding

State 2 submodel, plant communities



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

Two communities exist in the Forest State: the Water Oak/White Oak Forest Community (1.1) and the Stream Bank Community (1.2). The overall state has a high overstory canopy cover (75 to 95 percent) of hardwood species with some pine mixed in. Basal areas usually range from 80 to 100 square feet per acre, but can be as low as 60 and as high as 140 square feet per acre. The dominant overstory species are water oak, white oak, sweetgum (Liquidambar styracifllua), and loblolly pine. Flooding in State 1 is common varying from brief to very brief durations depending on micro-relief, amount of precipitation, and current saturation of the soil. Flooding can occur anytime, but typically occurs during the dormant-growing season (October to February).

Community 1.1
Water Oak/White Oak Forest

The Creek Bottomland Communities are highly based on proximity to the stream channel and micro-relief throughout the site. A subtle rise or fall of mere inches can drastically alter the vegetative composition. The Water Oak/White Oak community (1.1) represents the higher elevation sites, further away from the stream bank in comparison to community 1.2. Plant species occurring in the Water Oak/White Oak community vary from facultative to upland according to the U.S. Army Corps' Wetland Delineation Manual (2010). Understory indicators include; Indian woodoats, longleaf woodoats (*Chasmanthium sessiliflorum*), partridgeberry, Carolina elephantsfoot (*Elephantopus carolinianus*), and American beautyberry (*Callicarpa americana*).

Table 5. Ground cover

Tree foliar cover	5-25%
Shrub/vine/liana foliar cover	5-25%
Grass/grasslike foliar cover	10-40%

Forb foliar cover	3-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0-25%
Bare ground	5-25%

Table 6. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-15%	5-40%	3-10%
>0.15 <= 0.3	5-30%	3-20%	5-35%	3-10%
>0.3 <= 0.6	0-15%	3-15%	3-65%	3-15%
>0.6 <= 1.4	0-5%	0-5%	3-35%	0-3%
>1.4 <= 4	5-10%	0-3%	0-10%	–
>4 <= 12	5-35%	0-5%	–	–
>12 <= 24	50-95%	0-3%	–	–
>24 <= 37	15-50%	0-1%	–	–
>37	–	–	–	–

Community 1.2
Stream Bank

Community 1.2, the Stream Bank Community, represents the closest community to the stream and lowest micro-relief in the reference state. Flooding is common, but brief, so the plants do not stay inundated with water for extremely long periods. Therefore, obligate plant species do exists, but more commonly facultative to facultative wet plants persist. These species are better able to handle anoxic conditions during prolonged submergence. Slender woodoats (*Chasmanthium laxum*), giant cane (*Arundinaria gigantea*), blunt broom sedge (*Carex tribuloides*), and King Solomon's-seal (*Polygonatum biflorum*) are all common indicators of Community 1.2. Even though the communities are usually easily defined by distance from the stream bottom, both communities can occur within feet of each other as relief changes by the slightest amount. As the streams find new paths, old braided stream channels throughout the site can hold pockets water. Also, floodwaters scour and deposit new soil throughout the landscape. The activity of the water causes the soil to be highly variable through the delineation.

Because of the soil variability, the sites should be viewed on a landscape level instead of small, individual plots (acres instead of square feet). Bare soil is seen in greater amounts than the adjacent uplands in the loamy stream bottomlands as floods remove excessive litter buildup. Communities within State 1 affected by a canopy-clearing disturbance (usually high winds) 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, sweetgum will colonize the canopy because of their rapid growth and ability to grow into the crown early. If the advanced oak regeneration is not present, a 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 10 to 20 years. More common is treefall because of windthrow. The rooting systems in the bottoms are oftentimes shallow. In combination with some mortality because of prolonged flooding, downed trees and upright snags in the Stream Bottomlands occur frequently.

Pathway 1.1A
Community 1.1 to 1.2


Water Oak/White Oak Forest


Stream Bank

The drivers for the community shift are a closer proximity to the stream or more frequent flooding. As community 1.1 stays wetter, the vegetative species begin to resemble those of community 1.2. Species found in the Stream Bank Community are able to withstand anoxic conditions for longer periods of time. A shift may not occur for years, or even decades. Stream channels choose the least path of resistance and cut new paths through the soil. Old stream channels are commonly seen.

Pathway 1.2A
Community 1.2 to 1.1


Stream Bank


Water Oak/White Oak Forest

The driver for the community shift is further distance to the stream or shorter flood duration. As Communities 1.2 stay drier for longer, their vegetative species are occupied by those in Community 1.1. Species found in the Water Oak/White Oak Forest Community (1.1) do not tolerate flooding as well as the other communities, thus the drier soil conditions assist in the establishment of plants in Community 1.1. A shift may not occur for years, or even decades. Stream channels choose the least path of resistance and cut new paths through the soil. Old stream channels are commonly seen.

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.

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 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.

State 4
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 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 the reference (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 because of 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 because of the land manager converting to agricultural production. Merchantable timber is harvested by clearcut, then the site is prepared and planted to either a planted grass for grazing livestock or row crops for food and fiber.

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 because of 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 because of the land manager converting to agricultural production. Merchantable timber is harvested by clearcut, then the site is prepared and planted to either a planted grass for grazing livestock or row crops for food and fiber.

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 because of 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 because of 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 because of 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 because of 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							
water oak	QUNI	*Quercus nigra*	–	–	35–75	–	–
white oak	QUAL	*Quercus alba*	–	–	35–75	–	–
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	35–75	–	–
loblolly pine	PITA	*Pinus taeda*	–	–	15–50	–	–
American beech	FAGR	*Fagus grandifolia*	–	–	15–35	–	–
red maple	ACRU	*Acer rubrum*	–	–	5–15	–	–
southern red oak	QUFA	*Quercus falcata*	–	–	1–10	–	–
shortleaf pine	PIEC2	*Pinus echinata*	–	–	1–10	–	–
southern magnolia	MAGR4	*Magnolia grandiflora*	–	–	1–5	–	–
blackgum	NYSY	*Nyssa sylvatica*	–	–	1–5	–	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
longleaf woodoats	CHSE2	*Chasmanthium sessiliflorum*	–	–	5–40
variable panicgrass	DICO2	*Dichanthelium commutatum*	–	–	5–35
needleleaf rosette grass	DIAC	*Dichanthelium aciculare*	–	–	0–5
Indian woodoats	CHLA5	*Chasmanthium latifolium*	–	–	0–5
Forb/Herb					
partridgeberry	MIRE	*Mitchella repens*	–	–	5–50
eastern poison ivy	TORA2	*Toxicodendron radicans*	–	–	5–25
hairy bedstraw	GAPI2	*Galium pilosum*	–	–	1–15
Carolina elephantsfoot	ELCA3	*Elephantopus carolinianus*	–	–	1–15
St. Andrew's cross	HYHY	*Hypericum hypericoides*	–	–	1–10
Canadian blacksnakeroot	SACA15	*Sanicula canadensis*	–	–	0–10
Canada goldenrod	SOCA6	*Solidago canadensis*	–	–	0–10
mayapple	POPE	*Podophyllum peltatum*	–	–	0–5
beechdrops	EPVI2	*Epifagus virginiana*	–	–	0–3
early blue violet	VIPA18	*Viola ×palmata*	–	–	0–1
Texas dutchman's pipe	ARRE3	*Aristolochia reticulata*	–	–	0–1
Shrub/Subshrub					
American beautyberry	CAAM2	*Callicarpa americana*	–	–	5–25
two-wing silverbell	HADI3	*Halesia diptera*	–	–	5–15
southern arrowwood	VIDE	*Viburnum dentatum*	–	–	1–10
American witchhazel	HAVI4	*Hamamelis virginiana*	–	–	1–10
yaupon	ILVO	*Ilex vomitoria*	–	–	0–10
common sweetleaf	SYTI	*Symplocos tinctoria*	–	–	0–5
farkleberry	VAAR	*Vaccinium arboreum*	–	–	0–5
Carolina laurelcherry	PRCA	*Prunus caroliniana*	–	–	0–5
Tree					

red maple	ACRU	*Acer rubrum*	–	–	5–15
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	5–15
American hornbeam	CACA18	*Carpinus caroliniana*	–	–	1–10
water oak	QUNI	*Quercus nigra*	–	–	1–5
winged elm	ULAL	*Ulmus alata*	–	–	1–5
red mulberry	MORU2	*Morus rubra*	–	–	1–5
white oak	QUAL	*Quercus alba*	–	–	1–5
flowering dogwood	COFL2	*Cornus florida*	–	–	0–3
hophornbeam	OSVI	*Ostrya virginiana*	–	–	0–3
American beech	FAGR	*Fagus grandifolia*	–	–	0–1
Vine/Liana					
muscadine	VIRO3	*Vitis rotundifolia*	–	–	1–5
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	–	–	1–5
cat greenbrier	SMGL	*Smilax glauca*	–	–	1–5
roundleaf greenbrier	SMRO	*Smilax rotundifolia*	–	–	1–5
lanceleaf greenbrier	SMSM	*Smilax smallii*	–	–	1–5
evening trumpetflower	GESE	*Gelsemium sempervirens*	–	–	1–5
crossvine	BICA	*Bignonia capreolata*	–	–	1–5

Table 10. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
slender woodoats	CHLA6	*Chasmanthium laxum*	–	–	5–40
giant cane	ARGI	*Arundinaria gigantea*	–	–	1–20
blunt broom sedge	CATR7	*Carex tribuloides*	–	–	1–15
greater bladder sedge	CAIN12	*Carex intumescens*	–	–	1–10
leathery rush	JUCO4	*Juncus coriaceus*	–	–	1–3
Forb/Herb					
partridgeberry	MIRE	*Mitchella repens*	–	–	5–25
eastern poison ivy	TORA2	*Toxicodendron radicans*	–	–	5–20
smooth Solomon's seal	POBI2	*Polygonatum biflorum*	–	–	5–20
smallspike false nettle	BOCY	*Boehmeria cylindrica*	–	–	1–10
St. Andrew's cross	HYHY	*Hypericum hypericoides*	–	–	1–10
looseflower water-willow	JUOV	*Justicia ovata*	–	–	0–10
beechdrops	EPVI2	*Epifagus virginiana*	–	–	0–3
Missouri violet	VIMI3	*Viola missouriensis*	–	–	0–1
Jack in the pulpit	ARTR	*Arisaema triphyllum*	–	–	0–1
Fern/fern ally					
common ladyfern	ATFI	*Athyrium filix-femina*	–	–	0–5
Shrub/Subshrub					
American beautyberry	CAAM2	*Callicarpa americana*	–	–	5–25
two-wing silverbell	HADI3	*Halesia diptera*	–	–	5–15
southern arrowwood	VIDE	*Viburnum dentatum*	–	–	1–10
American witchhazel	HAVI4	*Hamamelis virginiana*	–	–	1–10

common sweetleaf	SYTI	*Symplocos tinctoria*	–	–	0–5
farkleberry	VAAR	*Vaccinium arboreum*	–	–	0–5
Carolina laurelcherry	PRCA	*Prunus caroliniana*	–	–	0–5
Tree					
red maple	ACRU	*Acer rubrum*	–	–	5–15
sweetgum	LIST2	*Liquidambar styraciflua*	–	–	5–15
American hornbeam	CACA18	*Carpinus caroliniana*	–	–	1–10
American holly	ILOP	*Ilex opaca*	–	–	1–10
Alabama supplejack	BESC	*Berchemia scandens*	–	–	0–5
green ash	FRPE	*Fraxinus pennsylvanica*	–	–	0–5
water oak	QUNI	*Quercus nigra*	–	–	1–5
loblolly pine	PITA	*Pinus taeda*	–	–	1–5
southern magnolia	MAGR4	*Magnolia grandiflora*	–	–	0–1
blackgum	NYSY	*Nyssa sylvatica*	–	–	0–1
Vine/Liana					
crossvine	BICA	*Bignonia capreolata*	–	–	1–5
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	–	–	1–5
cat greenbrier	SMGL	*Smilax glauca*	–	–	1–5
roundleaf greenbrier	SMRO	*Smilax rotundifolia*	–	–	1–5
lanceleaf greenbrier	SMSM	*Smilax smallii*	–	–	1–5
evening trumpetflower	GESE	*Gelsemium sempervirens*	–	–	1–5
muscadine	VIRO3	*Vitis rotundifolia*	–	–	1–5
Nonvascular					
sphagnum	SPHAG2	*Sphagnum*	–	–	0–3

Animal community

The historic animal community is relatively similar to the community in the natural 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 Creek Bottomlands would have provided the bears with nutrition/food in the form of soft and hard mast (American beautyberries and acorns). Other apex predators like the mountain lion and wolf have disappeared in a similar manner.

The Creek 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.

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 Creek 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.

Recreational uses

The most popular recreational use is hunting for white-tail deer 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.

Table 11. 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
loblolly pine	*PITA*	95	103	138	148	–	–	–	
sweetgum	*LIST2*	90	100	109	119	–	–	–	
green ash	*FRPE*	75	85	52	62	–	–	–	

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: Nacogdoches County, TX	
Latitude	31° 29′ 31″
Longitude	94° 46′ 37″

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Contributors

Tyson Hart

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	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:

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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:**
