USDA Natural Resources Conservation Service

Ecological site F133BY005TX
Loamy Upland

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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. Locally termed the Pineywoods, the area is dominated by coniferous forest covering 45,450 square miles (117,770 square kilometers or 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.
- CEGL007499 – West Gulf Coastal Plan Shortleaf Pine – Post Oak Forest

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

Soil Survey Staff, 2011.
- Woodland Suitability Group 2o7 and 2w8

Van Kley et. Al., 2007.
- 231.Ea.8.1.30 Shortleaf-southern red oak/Callicarpa-Chasmanthium Loamy Dry-Mesic Uplands
- 231.Ea.9.1.30 Shortleaf-southern red oak/Callicarpa-Chasmanthium Loamy Dry-Mesic Uplands
- 231.Ea.10.1.30 Shortleaf-post oak/Callicarpa-Chasmanthium Loamy Dry-Mesic Uplands
- 231.Ea.11.1.30 Shortleaf-post oak/Callicarpa-Chasmanthium Loamy Dry-Mesic Uplands

Ecological site concept

The Loamy Uplands have very deep loamy soils greater than 80 inches. The ecological sites produce high amounts of plant biomass because of the loamy growing medium with nonrestrictive soil textures through the soil profiles with adequate water-holding capacity. The sites generally have the most robust plant communities of any adjacent sites.

Associated sites

F133BY001TX	**Depression** Sites are lower in the landscape, have poor drainage patterns, and wetter associated plant species.
F133BY002TX	**Seasonally Wet Upland** Sites have poor drainage patterns and wetter associated plant species.
F133BY003TX	**Loamy Over Clayey Upland** Sites have clay textured soils instead of loamy textures.

F133BY004TX	**Loamy Claypan Upland** Sites have an abrupt textural change from loam to clay and are sometimes shallow to bedrock.
F133BY006TX	**Northern Sandy Loam Upland** Sites have deeper soil horizons of sandy and loamy textures. These sites are not as dense in biomass and have lessened accumulations of nutrients due to their sandier nature.
F133BY007TX	**Southern Sandy Loam Upland** Sites have deeper soil horizons of sandy and loamy textures. These sites are not as dense in biomass and have lessened accumulations of nutrients due to their sandier nature.
F133BY012TX	**Wet Terrace** Sites are located on terraces and are overall wetter with poor drainage and associated plant species.
F133BY013TX	**Terrace** Sites are located on the terrace landform.

Similar sites

F133BY006TX	**Northern Sandy Loam Upland** Sites have deeper soil horizons of sandy and loamy textures. These sites are not as dense in biomass and have lessened accumulations of nutrients due to their sandier nature.
F133BY004TX	**Loamy Claypan Upland** Soils have an abrupt textural change from loamy to clayey and are sometimes shallow to bedrock.
F133BY007TX	**Southern Sandy Loam Upland** Sites have deeper soil horizons of sandy and loamy textures. These sites are not as dense in biomass and have lessened accumulations of nutrients due to their sandier nature.
F133BY003TX	**Loamy Over Clayey Upland** Soils have clayey textures throughout their profiles.

Table 1. Dominant plant species

Tree	(1) *Pinus echinata* (2) *Quercus falcata*
Shrub	(1) *Callicarpa americana*
Herbaceous	(1) *Dichanthelium acuminatum*

Physiographic features

The ecological site is on broad flats to moderately sloping uplands. Slopes are predominantly 0 to 8 percent, but can range to 25 percent. Elevations range from 150 to 650 feet. The topography of the area includes summits and side slopes.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Interfluve
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	46–198 m
Slope	0–8%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified

Ponding frequency	Not specified
Elevation	Not specified
Slope	0–25%

Climatic features

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

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

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

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

Table 4. Representative climatic features

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

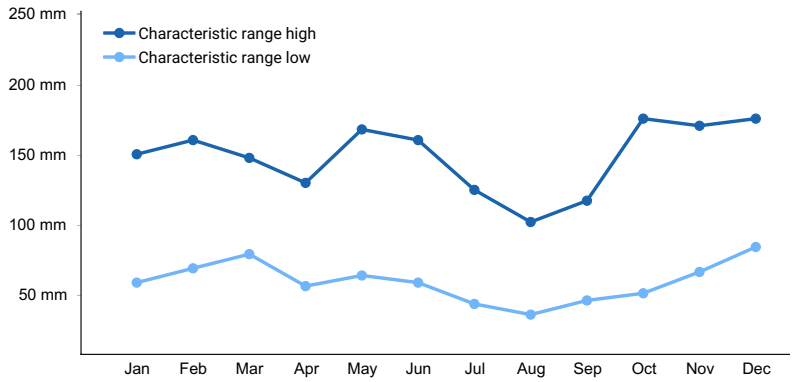


Figure 1. Monthly precipitation range

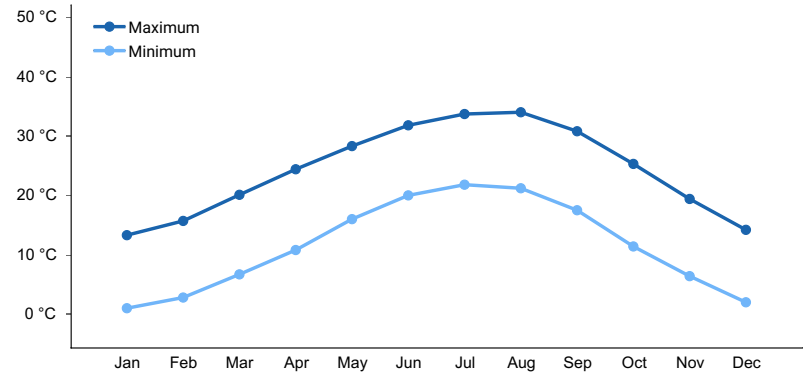


Figure 2. Monthly average minimum and maximum temperature

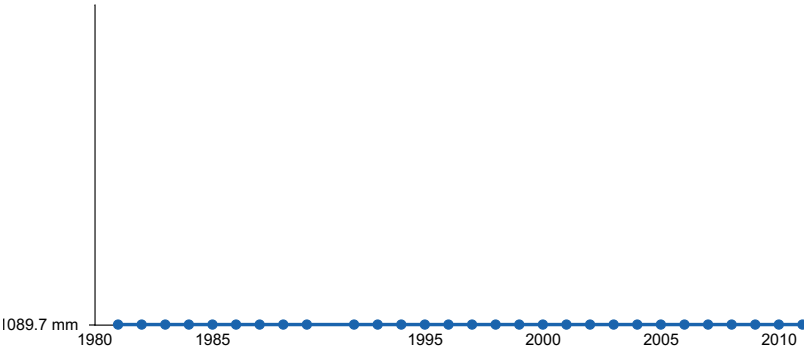


Figure 3. Annual precipitation pattern

Climate stations used

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

Influencing water features

Due to the well-drained nature of the soils, water is typically not a factor to the sites.

Wetland description

Wetlands are not generally associated with the sites.

Soil features

The soils of this site are deep and characterized by loams throughout the soil profile, measured to 80 inches. The soils belong to the alfisol and ultisol orders and have well developed horizons. The Bowie series is a representative soil and consists of very deep, well drained, moderately slowly permeable soils that formed in loamy residuum from Southern Coastal Plain marine deposits. The series is classified as a fine-loamy, siliceous, semiactive, thermic Plinthic Paleudult. Not all soils within the ecological site will have the same taxonomic classification, but produce similar vegetative communities. Other soils are included within the ecological site and all are defined by deep fine-loamy and fine-silty control sections. The soils included are well drained or moderately well drained. Soils that are

moderately well drained have a general increase in clay in the lower horizons. Besides the Bowie series, the Alto, Beauregard, Blevins, Diboll, Elrose, Eylau, Fuller, Gunter, Keatchie, Keithville, Kullit, Latex, Oakwood, Olla, Penning, Rigolette, Rogan, Ruston, Saffell, Sailes, Sawlit, Sawtown, Sawyer, Scottsville, Smithdale, Ulto, and Warnock are correlated to the Loamy Uplands.

Table 5. Representative soil features

Parent material	(1) Marine deposits–sandstone and shale
Surface texture	(1) Fine sandy loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Well drained to moderately well drained
Permeability class	Moderate to moderately slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	13.46–18.03 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

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

Background – Prior to settlement by the Europeans, the reference state for the Loamy Uplands was a Shortleaf Pine/Red Oak (*Pinus echinata*/*Quercus falcata*) Woodland. Remnants of this presumed historic plant community still exist where natural conditions are replicated through conservation management techniques. Evidence of the reference state is found in accounts of early historic explorers to the area, historic forest and biological survey teams, as well as recent ecological studies in the last 30 years. The age of this woodland community varies, and has a diverse understory of grasses and forbs.

Settlement Management – As human settlement increased throughout the area, so did the increase in logging and

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

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

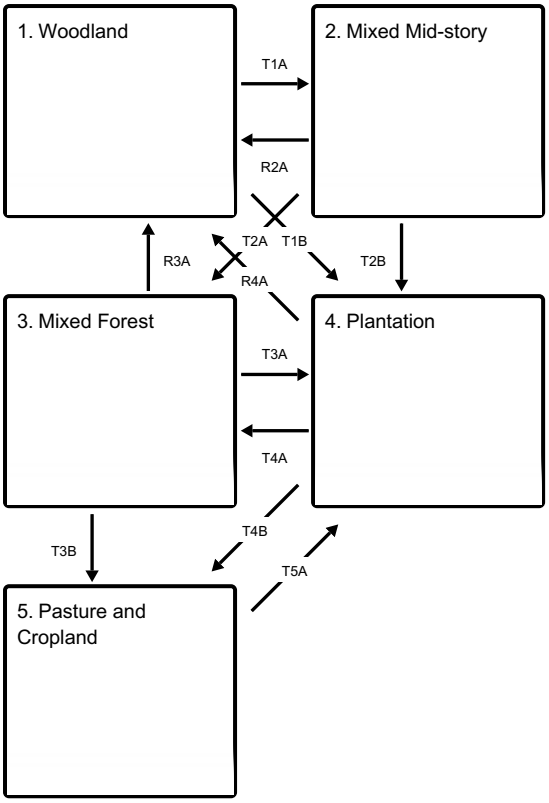
Fire Regimes – Fire was a natural and important disturbance throughout the Western Gulf Plain. Fire occurred naturally from lightning strikes and by Native Americans for game movement. The reference community developed with a frequency of fire every 3 to 5 years. Fires usually occurred in early spring, removing senescent vegetation, recycling nutrients and minerals, and spurring new plant growth. Late summer fires occurred as well, but with a different community effect. Summer fires burned hotter and with more intensity, greatly suppressing the shrub canopy layer. The summer fires also shifted the ecological site transitional state by decreasing grass densities and increasing forb densities. The topography, fuel loads, and other conditions caused patchy burns throughout the region resulting in mosaic patterns of plant communities and a heterogeneous landscape.

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

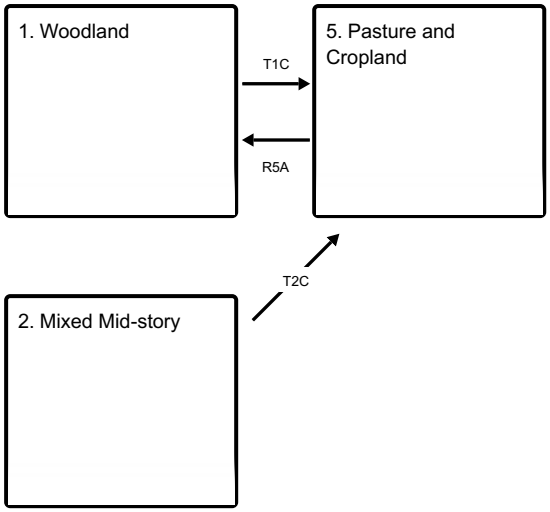
Plant Community Interactions – The deep loamy soils provide an excellent growing medium with very little restrictions. No special plant adaptions are necessary to persist in these soils, as compared to plants adapted to overly saturated (wetlands) or overly droughty (deep sands) conditions. Because of the high desirability for plants to grow on the ecological site, great competition exists between plants as they try and occupy space, rapidly taking advantage of sunlight. High amounts of biomass are produced and, left unchecked through management or natural frequencies of fire, the understory is quickly occupied by shrubs and understory saplings. Little bare ground exists in natural conditions and high amounts of litter accumulate. The sites typically support a basal area of trees from 80 to 120 square feet result in 65 to 85 percent canopy cover. Mature stands of pines will attain heights over 100 feet. The sites are characterized by high productivity of all plant types.

State and transition model

Ecosystem states



States 1, 5 and 2 (additional transitions)



T1A - Fire suppression, no management

T1B - Clearcut, site preparation, tree planting

T1C - Clearcut, grass/crop planting

R2A - Selective timber harvest, prescribed burns

T2A - Fire suppression, no management

T2B - Clearcut, site preparation, tree planting

T2C - Clearcut, grass/crop planting

R3A - Selective timber harvest, mid-story shrub control, prescribed burns

T3A - Clearcut, site preparation, tree planting

T3B - Clearcut, grass/crop planting

R4A - Gap-phase regeneration or clearcut with tree planting

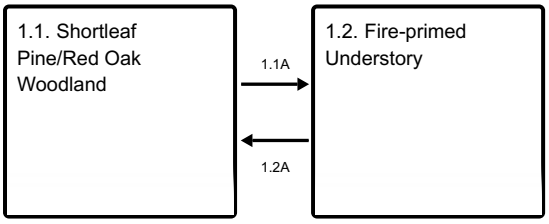
T4A - Fire suppression, no management

T4B - Clearcut, grass/crop planting

R5A - Tree planting, mid-story shrub control, prescribed burns

T5A - Clearcut, site preparation, tree planting

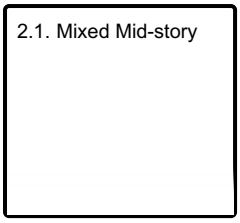
State 1 submodel, plant communities



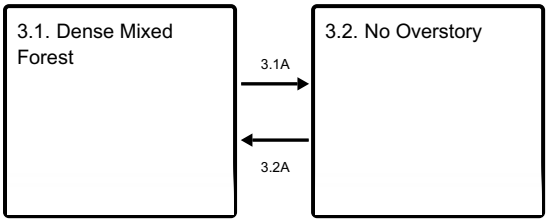
1.1A - Natural development between fire

1.2A - Fire (3-5 year interval)

State 2 submodel, plant communities



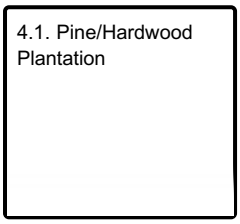
State 3 submodel, plant communities



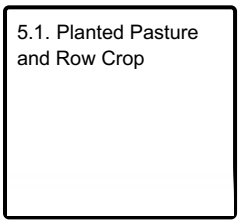
3.1A - Fire suppression, no management

3.2A - Clearcut or natural disturbance

State 4 submodel, plant communities



State 5 submodel, plant communities



State 1
Woodland

There are two communities in the Woodland State: Shortleaf Pine/Red Oak Woodland Community (1.1) and the Fire-primed Understory Community (1.2). State 1 has a moderate overstory cover (65 to 85 percent) of primarily shortleaf pine and red oak. The understory is heavily vegetated with grasses, forbs, and shrubs. In large part to the overall productivity of the site, high levels of biomass exist and very little bare ground. Plants grow quickly and search to colonize every useable space. Natural disturbances of fires, lightning strikes, hurricanes (wind throw), ice events (rare), and beetle infestations aid in maintaining the uneven-age structure. Understory saplings are constantly growing and trying to occupy space, but the natural canopy spacing is kept intact by periodic fires ranging from 3 to 5 years. Representative basal areas range from 80 to 120 square feet per acre. The basal area and canopy cover generally increase at a parallel rate.

Community 1.1
Shortleaf Pine/Red Oak Woodland

The Shortleaf Pine/Red Oak Woodland (1.1) is the first community in State 1. Litter accumulation is moderate and understory vegetation is naturally dense. The overstory canopy is dominated by shortleaf pine and red oaks, and are usually in higher densities (total basal area) than the adjacently surrounding upland sites. The overstory canopy can also be interspersed with post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), white oak (*Quercus alba*), and black hickory (*Carya texana*). The sites can be dominated by shortleaf pines, 100 percent canopy cover, but range as low as 60 percent with the oak and hickories comprising the rest of the overstory. Given time to mature, the sites produce tall, straight overstory pines which can reach heights above 100 feet. This community is characterized by a dense ground layer with relatively no bare ground (less than 5 percent). Needleleaf rosette grass (*Dichanthelium aciculare*) is a highly abundant grass throughout the herbaceous understory. Other grasses seen, though not as dominant are longleaf woodoats (*Chasmanthium sessiliflorum*), variable panicgrass (*Dichanthelium commutatum*), and little bluestem (*Schizachyrium scoparium*). Forbs occupying the site include flowering spurge (*Euphorbia corollata*), hairy small-leaf ticktrefoil (*Desmodium ciliare*), and downy milkpea (*Galactia volubilis*). The shrub layer of the community is very conspicuous, containing numerous American beautyberry (*Callicarpa americana*) and yaupon (*Ilex vomitoria*).

Table 6. Ground cover

Tree foliar cover	0-20%
Shrub/vine/liana foliar cover	5-25%
Grass/grasslike foliar cover	50-75%
Forb foliar cover	5-25%
Non-vascular plants	0%
Biological crusts	0%
Litter	15-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0-5%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	3-15%	5-50%	5-50%	1-20%
>0.15 <= 0.3	1-15%	5-40%	25-50%	3-10%
>0.3 <= 0.6	1-15%	10-40%	25-75%	3-5%
>0.6 <= 1.4	1-10%	3-25%	5-50%	1-3%
>1.4 <= 4	1-15%	1-10%	–	–
>4 <= 12	3-70%	–	–	–
>12 <= 24	40-70%	–	–	–
>24 <= 37	10-70%	–	–	–
>37	–	–	–	–

Community 1.2
Fire-primed Understory

The Fire-primed Understory (1.2) phase has an increased accumulation of previous years' growth of grasses, forbs, and shrubs, increasing the fuel load for fire. The shrub layer is on the verge of occupying the entire understory. Litter has built up, bare ground has lessened, and last year's vegetative growth may still be seen on the ground layer. Under natural conditions, only fire tolerant saplings will grow into the overstory of State 1.

Pathway 1.1A
Community 1.1 to 1.2

Shortleaf Pine/Red Oak Woodland **Fire-primed Understory**

The driver for the community shift is time since the last fire. As post-fire time increases, so does the foliar cover by shrub species. As the grasses and forbs age, their senesced leaves increase fine fuel levels.

Pathway 1.2A
Community 1.2 to 1.1

Fire-primed Understory

Shortleaf Pine/Red Oak Woodland

The driver for the community shift is fire. As fire burns through the understory, it encourages a diverse herbaceous layer while suppressing shrubs and tree seedlings.

State 2
Mixed Mid-story

One community exists in the Mixed Mid-story (2) State: the Mixed Mid-story Community (2.1). This community represents a transitioning state between the historical climax community (State 1) and the steady-state of the Mixed Forest (State 3). Without fire or management, the understory is quickly overtaken by shrubs and saplings which shade out grasses and forbs. The site begins to lose diversity amongst vegetative types.

Community 2.1
Mixed Mid-story

Encroachment by fire intolerant species like sweetgum (Liquidambar stryacifula), red maple (*Acer rubrum*), and loblolly pine begin to grow in the mid-story. Added foliar cover by the shrubs and saplings reduce the light penetration to the lower growing herbaceous species. The shading reduces the diversity of the environment. Both factors combine to allow only the most dominant species to propagate. Longleaf woodoats, yaupon, and American beautyberry quickly become the most dominant understory vegetation. Tree seedlings have grown higher and are beginning to escape the effects of fire and will become part of the overstory given more time with lack of management. The species present in the reference community will still be found, only in lesser amounts because the canopy cover is creating a better environment for fire-intolerant and shade-loving species.

Table 8. Ground cover

Tree foliar cover	5-20%
Shrub/vine/liana foliar cover	20-45%
Grass/grasslike foliar cover	5-25%
Forb foliar cover	0-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	35-75%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%

Bedrock	0%
Water	0%
Bare ground	0-3%

Table 9. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	1-5%	3-35%	1-5%	1-5%
>0.15 <= 0.3	1-15%	3-50%	3-25%	1-20%
>0.3 <= 0.6	1-15%	3-50%	3-10%	1-15%
>0.6 <= 1.4	3-10%	10-50%	0-5%	0-5%
>1.4 <= 4	5-50%	20-75%	–	–
>4 <= 12	15-70%	5-15%	–	–
>12 <= 24	40-70%	–	–	–
>24 <= 37	10-70%	–	–	–
>37	–	–	–	–

State 3
Mixed Forest

There are two communities in the Mixed Forest State: the Mixed Forest Community (3.1) and the No Overstory Community (3.2). The Mixed Forest community represents a steady-state for the Loamy Uplands. Without fire or management, the site begins to lose the vegetative indicators that make the ecological site unique. The plant communities will stay constant without disturbance or intervention.

Community 3.1
Dense Mixed Forest

The Dense Mixed Forest Community has crossed a threshold in which normal environmental events cannot transition the community back to the reference state (State 1). The crossing of this threshold represents a closure in the overstory canopy, which limits the productivity of the ground layer. The canopy closure is filled in by any sapling that could gain a foothold in an earlier state. Water oak (*Quercus nigra*), willow oak (Quercus phellows), red maple, and sweetgum are especially common invaders into the community. The limited ground layer does not provide enough fuel to harbor a burn with the intensity found in State 1. Hardwood litter usually covers the ground, also retarding fire in this state. The understory plant layer only contains remnants of the reference community and possibly no reference community indicator species. Sparse amounts of shade tolerant species, like longleaf woodoats, poison ivy, and greenbriers (Smilax sp.) may be the only ground-layer species. Some shrubs may still persist, but not as dense as found in States 1 or 2. Because the site lacks the diversity of the reference state, the

wildlife diversity will be limited to generalist species, species that require a closed canopy, and those species seeking refuge. This ecological state requires management to restore the reference community. Selective timber harvest to reduce the basal area is the first step to allow the understory to return. More frequent than natural prescribed burns (1 to 3 years) will help suppress the hardwood regeneration, but only after understory fuel levels are adequate. Intense summer fires may also be required. The suppression of unwanted overstory seedlings will allow the reference plant community to establish.

Table 10. Ground cover

Tree foliar cover	0-15%
Shrub/vine/liana foliar cover	5-20%
Grass/grasslike foliar cover	0-10%
Forb foliar cover	0-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	50-90%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0-5%

Table 11. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-5%	5-15%	0-10%	0-10%
>0.15 <= 0.3	0-5%	5-10%	0-5%	0-5%
>0.3 <= 0.6	0-5%	5-10%	0-5%	0-5%
>0.6 <= 1.4	10-20%	5-15%	0-3%	0-3%
>1.4 <= 4	10-35%	0-5%	–	–
>4 <= 12	50-85%	0-5%	–	–
>12 <= 24	65-95%	–	–	–
>24 <= 37	10-85%	–	–	–
>37	–	–	–	–

Community 3.2
No Overstory

The No Overstory Community (3.2) is a result of natural environmental disturbances or clearcutting the overstory trees. The plant communities from State 1 may return initially, but if the natural disturbance of fire or overstory stand management do not occur, the site will transition into a Mixed Forest Community (3.1)

Pathway 3.1A
Community 3.1 to 3.2

Dense Mixed Forest **No Overstory**

The driver for the shift is a natural disaster or clearcut situation. Examples of natural disasters include hurricane, wind throw, tornadoes, severe ice storms, or severe fires. Following timber harvest by clearcut, little of the reference state vegetation remains. Primary vegetative succession occurs post clearcut.

Pathway 3.2A
Community 3.2 to 3.1

No Overstory **Dense Mixed Forest**

The driver for the community shift is time and lack of fire. Shrubs and tree saplings will not be suppressed without return fire intervals.

State 4
Plantation

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

Community 4.1
Pine/Hardwood Plantation

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

State 5
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 5.1
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 State 1 to State 2 is a result of time and long periods (greater than 5 years) of no fire and/or forest management practices. Without fire to suppress tree seedlings, biomass and diversity is lost from the grass and forb layers of the system.

Transition T1B

State 1 to 4

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 5

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

Restoration pathway R2A
State 2 to 1

The driver for restoration is fire and understory shrub and tree suppression. Enough fuel is still left in this community to carry a fire through the site. More frequent burns (1 to 2 years) may be required to suppress the woody vegetation. Timber stand improvement practices should be used on undesirables and some species may have escaped the effective fire height and will have to be selectively cut down to return to the reference state.

Transition T2A
State 2 to 3

The transition from a Mixed Mid-story (State 2) to the Mixed Forest (State 3) is a result of time and long periods (greater than 20 years) of no fire and/or no forest management. Without fire to suppress fire intolerant trees, they become part of the overstory canopy. The overstory is so saturated that the understory herbaceous layer is almost non-existent. As the overstory canopy closes, the under and mid-story are occupied only by shade tolerant species.

Transition T2B
State 2 to 4

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 T2C
State 2 to 5

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

Restoration pathway R3A
State 3 to 1

Restoration of this community to the reference state begins with a selective timber harvest. Removing unwanted trees opens up the canopy, allowing sunlight penetration to the ground. Years of overstory growth have limited the fuel necessary to have an effective fire. Time will be needed to encourage understory growth. Once the herbaceous layer has established, more frequent than natural burns (1 to 3 years) may be required to suppress the woody vegetation.

Transition T3A
State 3 to 4

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 pine trees.

Transition T3B
State 3 to 5

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 can be accomplished in different ways depending on goals. One option is to create canopy openings by reducing the number of overstory trees. Then, restore the resulting canopy gaps with species from the reference state's (State 1) understory. Restoring the understory may include planting shortleaf pine and oak species found in the reference state. This method keeps the woodland structure intact and slowly changes the species composition.

Transition T4A
State 4 to 3

This community transition is caused by neglecting the plantation understory. Without fire, mowing, or herbicides, unwanted understory saplings can begin to grow into the overstory.

Transition T4B
State 4 to 5

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 R5A
State 5 to 1

This restoration path can be accomplished by planting a mix of oak and pine species to their natural frequencies (see State 1 – Overstory Composition table), trying to attain a 65 to 85 percent mature overstory canopy. Management will be required to control unwanted species by burning, mowing, and/or herbicides. Controlling introduced pasture grasses is difficult, with complete control likely not attainable. The herbaceous understory will take time to develop, but this process can be expedited if adapted plant material seed is available.

Transition T5A
State 5 to 4

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

Additional community tables

Table 12. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
shortleaf pine	PIEC2	*Pinus echinata*	Native	–	60–100	–	–
southern red oak	QUFA	*Quercus falcata*	Native	–	0–30	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	0–20	–	–
post oak	QUST	*Quercus stellata*	Native	–	0–10	–	–
black hickory	CATE9	*Carya texana*	Native	–	0–5	–	–

Table 13. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
needleleaf rosette grass	DIAC	*Dichanthelium aciculare*	Native	–	10–50
variable panicgrass	DICO2	*Dichanthelium commutatum*	Native	–	5–25
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	0–20
longleaf woodoats	CHSE2	*Chasmanthium sessiliflorum*	Native	–	5–20
Forb/Herb					
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	–	5–15
dogfennel	EUCA5	*Eupatorium capillifolium*	Native	–	0–7
flowering spurge	EUCO10	*Euphorbia corollata*	Native	–	1–5
Nuttall's wild indigo	BANU2	*Baptisia nuttalliana*	Native	–	0–5
St. Andrew's cross	HYHY	*Hypericum hypericoides*	Native	–	0–5
hairy small-leaf ticktrefoil	DECI	*Desmodium ciliare*	Native	–	1–5
slender yellow woodsorrel	OXDI2	*Oxalis dillenii*	Native	–	0–3
whitemouth dayflower	COER	*Commelina erecta*	Native	–	0–3
downy milkpea	GAVO	*Galactia volubilis*	Native	–	0–3
nettleleaf noseburn	TRUR2	*Tragia urticifolia*	Native	–	0–1
Fern/fern ally					
western brackenfern	PTAQ	*Pteridium aquilinum*	Native	–	0–5
Shrub/Subshrub					
American beautyberry	CAAM2	*Callicarpa americana*	Native	–	20–65
yaupon	ILVO	*Ilex vomitoria*	Native	–	10–50
sawtooth blackberry	RUAR2	*Rubus argutus*	Native	–	3–15
parsley hawthorn	CRMA5	*Crataegus marshallii*	Native	–	0–10
farkleberry	VAAR	*Vaccinium arboreum*	Native	–	0–5
rusty blackhaw	VIRU	*Viburnum rufidulum*	Native	–	0–5
Vine/Liana					
summer grape	VIAE	*Vitis aestivalis*	Native	–	5–15
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	–	5–15
saw greenbrier	SMBO2	*Smilax bona-nox*	Native	–	1–5
cat greenbrier	SMGL	*Smilax glauca*	Native	–	1–5
laurel greenbrier	SMLA	*Smilax laurifolia*	Native	–	1–5

Animal community

Turkey and quail will utilize the site to some degree, but in combination with other sites. The grass layer is well-suited to provide nesting habitat, and the presence of mature oaks will provide roosting areas. As long as the canopy is open, such as those found in the reference conditions, a diverse forb layer will create an abundance of insects. The insects provide high-quality protein in their diet, especially for newly hatched chicks.

Deer will utilize the site as the community matures and browse the saplings and desired shrubs. As with most deer habitat, deer utilize a large array of ecological sites throughout their life. Well-managed browse, cover, and natural food sources provide the best habitat.

Migratory song birds and woodpeckers use the site as well. Locations with fire and snags will typically have a higher diversity of birds. Fruits from the shrub species (American beautyberry and yaupon) are readily consumed by birds as well.

Grazing animals primarily use grasses as their food source. While grasses can be in abundance on the Loamy Uplands, the sites will have to be specifically managed for grazing to produce enough biomass. Reduction of basal area, below 60 square feet per acre, will create more openings for light to penetrate to the ground layer, therefore allowing more biomass to be produced.

Hydrological functions

Due to the texture of the soils, the Loamy Uplands are typically well drained and have little runoff, therefore absorbing most of the rainfall. Hydrology is basically absent from these upland soils unless excessive amounts of precipitation occur.

Recreational uses

Much of this land is leased for deer hunting purposes.

Wood products

These deep soils are on uplands and have a high potential for woodland management, both pine and hardwood. The 50-year site index for loblolly pine averages 90 feet (60 feet on a 25-year curve), but ranges from 85 to 100 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 330 board feet (Doyle Rule), 2.64 tons, or 129 cubic feet per acre per year. Management can substantially increase this yield. The only problem associated with these soils is the somewhat limited access and equipment operability during wet periods when rutting can be a moderate concern. Short-term restrictions may be necessary at these times and harvesting and other operations may need to be suspended during such periods when rutting can be severe. Site preparation operations should be limited to the dry months and planting should be planned for the drier part of the planting season. The use of herbicides for site preparation should take into consideration the slow drainage and high water table on these soils. Applications should not be made during wet periods.

Other products

Fruits, nuts, acorns, and seeds of the trees, shrubs, vines, and herbaceous plants are used for food, jellies, and jam.

Table 14. 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
shortleaf pine	*PIEC2*	75	95	119	139	50	–	–	
loblolly pine	*PITA*	85	100	119	139	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.

Type locality

Location 1: Shelby County, TX	
Latitude	31° 45′ 13″
Longitude	-93° 58′ 24″
General legal description	Sabine National Forest

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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):

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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:

---

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:**
