USDA Natural Resources Conservation Service

Ecological site R087BY008TX
Clayey Bottomland

Last updated: 9/21/2023
Accessed: 05/13/2025

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): 087B–Texas Claypan Area, Northern Part

This area is in northeastern Texas (79 percent) and southeastern Oklahoma (21 percent). It makes up about 4,480 square miles (11,610 square kilometers). The towns of Greenville, Sulphur Springs, Paris, Mount Vernon, Canton, and Athens, Texas, and Durant, Oklahoma, are in this MLRA. Interstates 30 and 20 and Highways 69, 70, 80, and 82 cross the area. The Caddo National Grasslands is in the north end of the area.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 87B

Ecological site concept

The Clayey Bottomland has soils that are very deep clays and are associated with flooding regimes. Their heavy-textured soils cause water to drain slowly.

Associated sites

R087BY008TX	**Clayey Bottomland**
R087BY002TX	**Claypan Savannah**
R087BY007TX	**Loamy Bottomland**

Similar sites

R087AY012TX	**Clayey Bottomland**

Table 1. Dominant plant species

Tree	(1) *Quercus nigra*
Shrub	Not specified
Herbaceous	(1) *Carex* (2) *Elymus virginicus*

Physiographic features

This site is nearly level and occurs along major rivers and their tributaries. The sites flood throughout the year, especially during late fall to early spring.

Table 2. Representative physiographic features

Landforms	(1) Plains > Flood plain
Runoff class	High
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Frequent
Ponding frequency	None
Elevation	76–229 m
Slope	0–1%
Water table depth	0–76 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 47 inches in most of this area, but it can be higher or lower depending on the exact location. Most of the rainfall occurs in spring and winter. The average annual temperature is 62 to 66 degrees F. The freeze-free period averages 235 days and frost-free period averages 210 days.

Table 3. Representative climatic features

Frost-free period (average)	210 days
Freeze-free period (average)	235 days
Precipitation total (average)	1,194 mm

Climate stations used

- (1) LAKE FORK RSVR [USC00414976], Quitman, TX
- (2) MT VERNON [USC00416119], Mount Vernon, TX
- (3) PARIS [USC00416794], Paris, TX
- (4) BONHAM 3NNE [USC00410923], Bonham, TX
- (5) DENISON DAM [USC00412394], Cartwright, TX

- (6) BOSWELL 1 S [USC00340980], Boswell, OK
- (7) EMORY [USC00412902], Emory, TX
- (8) DURANT [USC00342678], Durant, OK
- (9) CLARKSVILLE 2NE [USC00411772], Clarksville, TX
- (10) MT PLEASANT [USC00416108], Mount Pleasant, TX

Influencing water features

This site is adjacent to rivers and streams. It receives overflow from watercourses and runoff from higher adjacent sites.

Wetland description

All soils in this site are hydric and may be wetlands, but onsite delineations are required to make certain.

Soil features

The Clayey Bottomland consists of very deep, somewhat poorly drained, very slowly permeable soils on flood plains. The soils formed in clayey alluvium. The soils have high shrink-swell characteristics and crack when dry. When the soils become wet and the cracks close, the permeability becomes impermeable. Soil correlated to this site include: Gladewater, Kaufman, and Texark.

Table 4. Representative soil features

Parent material	(1) Alluvium–mudstone
Surface texture	(1) Clay
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	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
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 5. Representative soil features (actual values)

Drainage class	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

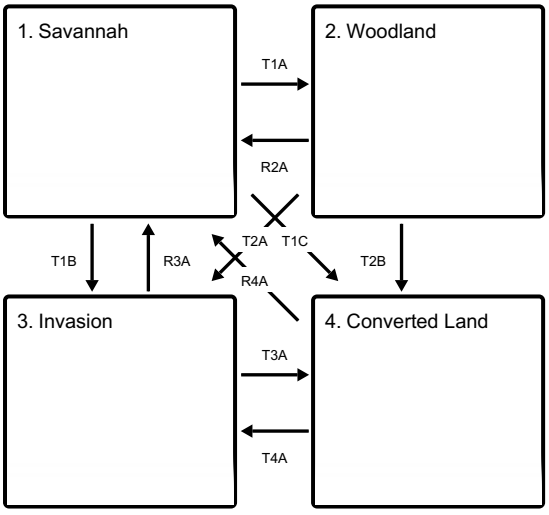
Available water capacity (0-101.6cm)	Not specified
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Natural fertility, presence of shade, proximity to water, and nutritious forage make this site a preferred grazing area. The wet nature of the site protects it from grazing at times, but during dry conditions it is often the first site to be overused. Virginia wildrye (*Elymus virginicus*), eastern gamagrass (*Tripsacum dactyloides*), switchcane (*Arundinaria gigantea*), switchgrass (*Panicum virgatum*), and sedges (Carex spp.) decrease in abundance and are replaced by dallisgrass (*Paspalum dilatatum*), common Bermudagrass (*Cynodon dactylon*), and carpetgrass (*Axonopus fissifolius*) as abusive grazing continues. Shrubs and hardwood saplings invade the site in the absence of proper grazing management and brush management. Prolonged mismanagement or abandonment allows the site to become a hardwood forest dominated by water oak (*Quercus nigra*), willow oak (*Quercus phellos*), overcup oak (*Quercus lyrata*), and cedar elm (*Ulmus crassifolia*) on non-calcareous sites or green ash (*Fraxinus pennsylvanica*), eastern cottonwood (*Populus deltoides*), pecan (*Carya illinoinensis*), cedar elm, and sugarberry (*Celtis laevigata*) on calcareous sites.

State and transition model

Ecosystem states



T1A - Heavy continuous grazing, no brush management, no fire

T1B - Invasion by invasive introduced species

T1C - Brush management, crop cultivation, pasture planting

R2A - Brush management, prescribed grazing, fire

T2A - Invasion by invasive introduced species

T2B - Brush management, crop cultivation, pasture planting

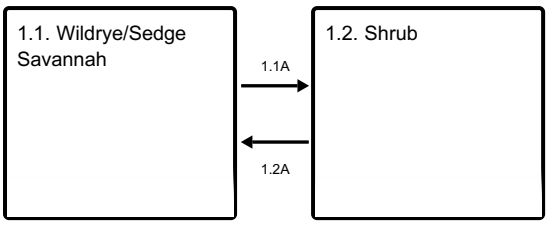
R3A - Brush management, invasive species control, range planting, prescribed grazing

T3A - Brush management, crop cultivation, pasture planting

R4A - Brush management, invasive species control, range planting, prescribed grazing

T4A - Invasion by invasive introduced species

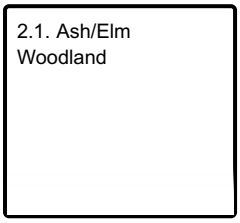
State 1 submodel, plant communities



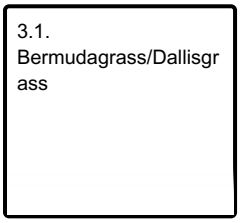
1.1A - Heavy continuous grazing, no brush management, no fire

1.2A - Brush management, prescribed grazing, fire

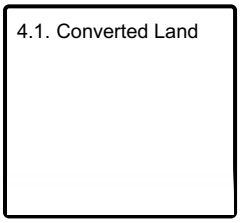
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
Savannah

Two communities exist in the Savannah State: the 1.1 Wildrye/Sedge Savannah Community and the 1.2 Shrub Community. Community 1.1 is characterized by tall and midgrass dominating the understory, with 20 percent woody cover by ash and elm. Community 1.2 is characterized by a an increase in shade tolerant grasses and 20 to 40 percent canopy cover of woody species.

Community 1.1
Wildrye/Sedge Savannah

The reference plant community of this site is a savannah. Oak, elm, hackberry (Celtis spp.), cottonwood, ash, black willow (*Salix nigra*), pecan, and other large trees provide about a 20 percent canopy. The overstory canopy is denser immediately adjacent to the watercourse. The understory includes hawthorn (Crataegus spp.), greenbriar (Smilax spp.), rattan (Calamus spp.), peppervine (Ampelopsis arborea), grape (Vitis spp.), and trumpet creeper (*Campsis radicans*). Sedges, Virginia wildrye, switchcane, broadleaf woodoats (*Chasmanthium latifolium*), and rustyseed paspalum (*Paspalum langei*) are in shaded and wet areas and dominate the herbaceous plant community. Various combinations of beaked panicum (*Panicum anceps*), switchgrass, Indiangrass, big bluestem

(*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), eastern gamagrass, vinemesquite (*Panicum obtusum*), and Florida paspalum (*Paspalum floridanum*) may dominate drier, open areas. Continuous yearlong grazing with no weed or brush management or abandoning the site for several years will tend to move towards a shrub-sapling community. Once woody shrubs and saplings invade the site, brush management in some form must be used to move back toward the savannah state. Prescribed burning is not a viable management tool on this site.

Community 1.2
Shrub

This plant community is a transitional community between the Savannah and Woodland State. It develops in the absence of proper grazing management and mechanical or chemical brush control treatments. It is usually the result of abandonment following cropping or yearly continuous grazing. Trees and shrubs begin to replace the grassland component of the savannah community. In addition to the naturally occurring cedar elm, water oak, hackberry, pecan, cottonwood, and green ash - honey locust (*Gleditsia triacanthos*), Chinese tallow (*Triadica sebifera*), and eastern persimmon (*Diospyros virginiana*) increase in density and canopy coverage (20 to 40 percent). Species whose seeds are windblown (elm, cottonwood, ash) or animal dispersed (persimmon, pecan, Chinese tallow) are the first to colonize and dominate the site. Remnants of Virginia wildrye and eastern gamagrass may still occur but the herbaceous component of the community becomes dominated by lesser producing grasses and forbs. Shade-tolerant species such as broadleaf woodoats, longleaf woodoats (*Chasmanthium sessiliflorum*), Cherokee sedge (*Carex cherokeensis*), ironweed (Veronia baldwinii), buttercup (Ranunculus spp.), and goldenrod (Solidago spp.) are the most abundant species as canopy cover increases. Prescribed burning is not a viable option for returning this community to a savannah due to the moisture content in and lack of quantity of herbaceous fine fuels. Mechanical or chemical brush control as well as prescribed grazing must be applied to move this vegetative state back towards the reference plant community.

Pathway 1.1A
Community 1.1 to 1.2

The Wildrye/Sedge Savannah will transition to the Shrubland Community when continued heavy grazing pressure, no brush management, and/or field abandonment continues. The transition is evident when woody species canopy cover exceeds 20 percent and grasses shift composition to more shade-tolerant species.

Pathway 1.2A
Community 1.2 to 1.1

Restoration back to the Wildrye/Sedge Community requires brush management and prescribed grazing. Mechanical or chemical controls can be used to remove the woody species and shrubs. Prescribed grazing may require destocking and/or deferment.

State 2
Woodland

One community exists in the Woodland State, the Ash/Elm Woodland Community. It is characterized by shade tolerant grasses and an overstory canopy of 40 to 80 percent.

Community 2.1
Ash/Elm Woodland

This plant community is a closed overstory (40 to 80 percent) woodland dominated by green ash, cedar elm, overcup oak, water oak, willow oak, pecan, cottonwood, sycamore (Plantanus occidentalis), and black willow. Understory shrubs and sub-shrubs include yaupon, farkleberry (*Vaccinium arboreum*), possumhaw (*Ilex decidua*), American beautyberry (*Callicarpa americana*), and hawthorn. Woody vines also occur and include Alabama supplejack (*Berchemia scandens*), poison ivy (*Toxicodendron radicans*), grape, greenbrier, trumpet creeper, Virginia creeper (*Parthenocissus quinquefolia*), and peppervine. A herbaceous understory is almost nonexistent but shade tolerant species including longleaf uniola, broadleaf woodoats, sedges, ironweed, ice plant (*Verbesina lindheimeri*), switchcane, eastern gamagrass, and goldenrod may occur in small amounts. Prescribed fire is not a viable treatment option for conversion of this site back to a semblance of the Wildrye/Sedge Savannah. Broadcast

chemical brush control is not a treatment option either, however, individual plant treatment with herbicides on small acreages may be a viable option. Mechanical treatment of this site, along with seeding, is the most viable treatment option although probably not economical.

State 3
Invasion

One community exists in the Invasion State, the Bermudagrass/Dallisgrass Community. It is characterized by an invasion by tame pasture grasses. The invasive species may have been planted for agriculture purposes or they may have invaded from nearby pastures.

Community 3.1
Bermudagrass/Dallisgrass

The herbaceous community is dominated by common Bermudagrass, dallisgrass, carpetgrass, giant ragweed, and annual sumpweed. White clover (Trifloium repens), vetch (*Vicia sativa*), and annual ryegrass (Lolium multiflorum) may also occur. This community develops from years of heavy continuous grazing. Prescribed grazing may shift this community back towards the Wildrye/Sedge Savannah Community, but total restoration may not be possible as invasive species are hard to control.

State 4
Converted Land

The Converted Land State contains one community, the 4.1 Converted Land Community. The state is characterized by the land manager farming crops or planted grasses.

Community 4.1
Converted Land

Conversion of this site to cropland (primarily cotton) occurred from the middle 1800's to the early 1900's. Some remains in cropland today, typically cotton (Gossypium spp.), corn (*Zea mays*), sorghum (Sorghum spp.), and soybeans (*Glycine max*). Ditching, land leveling, and levee construction has significantly changed the topography and hydrology on many acres of this site. While restoration of this site to a semblance of the reference plant community is possible with seeding and prescribed grazing, complete restoration of the reference community in a reasonable time is very unlikely. Following crop production, this site is often planted to native or introduced grasses and legumes for livestock grazing or hay production. Typical species planted include improved Bermudagrass varieties, bahiagrass, switchgrass, dallisgrass, eastern gamagrass, annual ryegrass (Lolium multiflorum), and white clover. Many of the introduced species (bahiagrass, Bermudagrass, and dallisgrass) are invasive - moving by wind, water, and animals. Once established, they are extremely difficult to remove and will hinder the reestablishment of native species. The establishment and maintenance of these species requires cultivation, fertilization, weed control, and prescribed grazing management.

Transition T1A
State 1 to 2

The Savannah State will transition to the Woodland State when continued heavy grazing pressure, no brush management, and/or field abandonment continues. The transition is evident when woody species canopy cover exceeds 40 percent and grasses shift composition to more shade-tolerant species.

Transition T1B
State 1 to 3

The Savannah State will transition to the Invasion State when continuous, yearlong heavy grazing occurs, coupled with the invasion of species like Bermudagrass and Dallisgrass.

Transition T1C

State 1 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

Restoration pathway R2A
State 2 to 1

Restoration back to the Savannah State requires substantial energy inputs. Brush management and prescribed grazing will be needed to shift the community back to the reference state. Mechanical or chemical controls can be used to remove the woody overstory species back below 20 percent. Prescribed grazing may require destocking and/or deferment to manage the understory grasses back to those found in the reference community.

Transition T2A
State 2 to 3

The Woodland State will transition to the Invasion State when invasion by species like Bermudagrass and Dallisgrass occur. These species will invade from nearby pastures and compete with native vegetation.

Transition T2B
State 2 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

Restoration pathway R3A
State 3 to 1

Restoration back to the Savannah State requires substantial energy inputs. If woody species are present, chemical or mechanical brush management will be required. Range planting may be required if invasive species have taken over completely. Total restoration back to the reference community may not be possible due to the challenge of completely removing invasive species from the community.

Transition T3A
State 3 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

Restoration pathway R4A
State 4 to 1

The restoration to State 1 can occur when the land manager ceases agronomic practices. Range planting of native species found in the reference community will be required to bring back a similar community as the State 1 plant composition. The extent of previous soil disturbances will determine how much seedbed preparation will be needed, as well as the ability to be restored. Proper grazing and brush management will be required to ensure success.

Transition T4A
State 4 to 3

The Converted Land State will transition to the Invasion State when continued heavy grazing pressure, no brush management, and/or field abandonment occurs. The transition is evident when forbs, shrubs, and woody species begin to limit the production of planted crops or pasture grasses.

Additional community tables

Animal community

Historically, the Clayey Bottomland site provided habitat to bison, deer, turkey, migratory birds and large predators such as wolves, coyotes, mountain lions, and black bear. White-tailed deer, turkey, fox and gray squirrels, coyotes, bobcats, and migratory birds find suitable habitat in these savannahs today. The favorable moisture regime of this site attracts many species of wildlife during the hot dry summer months when the quality and quantity of forages on upland sites may be lacking. Where old mast producing oaks and pecan trees are present, this site provides habitat for deer, turkey, squirrels, and ducks - especially during the winter. If the site transitions from the Savannah State towards the Woodland State, the quality of the habitat for deer, turkey, squirrels, and migratory birds declines.

Hydrological functions

Peak rainfall periods occur in May and June from frontal passage thunderstorms and in September and October from tropical systems as well as frontal passages. Rainfall amounts may be high (three to five inches per event) and events may be intense. The site is subject to erosion along adjacent stream banks where adequate herbaceous cover is not maintained and on heavy use areas such as roads and livestock trails. Extended periods (60 days) of little to no rainfall during the growing season are common. The site may be periodically inundated from overflow water from adjacent watercourses and may be ponded or saturated for long periods. This site may be a wetland or contain wetland inclusions as oxbows or stream meanders.

Recreational uses

Hunting, camping, bird watching, and equestrian activities are common.

Wood products

Water oak and willow oak provides material for hardwood flooring, plywood, veneer, and crossties. Green ash is used for bats, tool handles, and furniture. Post oak and water oak are used for firewood.

Other products

Fruit from blackberries, grapes, and plums and nuts from pecans are harvested.

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.

Other references

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Contributors

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Approval

Bryan Christensen, 9/21/2023

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
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):**

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5. **Number of gullies and erosion associated with gullies:**

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**