

Ecological site R087BY001TX Depression

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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.



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

Depressions occur on isolated flats of upland and terraces. Their drainage patterns are poor and result in long periods of water retention. Their vegetation more closely resembles wetter areas as opposed to the surrounding uplands.

Associated sites

R087BY002TX	Claypan Savannah
R087BY003TX	Sandy Loam

Similar sites

F133BY001TX	Depression
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Table 1. Dominant plant species

Tree	(1) <i>Quercus nigra</i> (2) <i>Quercus phellos</i>
Shrub	Not specified
Herbaceous	(1) <i>Carex</i>

Physiographic features

The landform associated with these sites are closed upland depressions and small drainageways. Slopes range from 0 to 3 percent. The sites are prone to ponding after rainfall events.

Table 2. Representative physiographic features

Landforms	(1) Plains > Depression (2) Plains > Drainageway
Runoff class	Negligible to high
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	76–229 m
Slope	0–3%
Ponding depth	0–15 cm
Water table depth	0–91 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) BONHAM 3NNE [USC00410923], Bonham, TX
- (2) DENISON DAM [USC00412394], Cartwright, TX
- (3) LAKE FORK RSVR [USC00414976], Quitman, TX
- (4) MT VERNON [USC00416119], Mount Vernon, TX

- (5) DURANT [USC00342678], Durant, OK
- (6) CLARKSVILLE 2NE [USC00411772], Clarksville, TX
- (7) MT PLEASANT [USC00416108], Mount Pleasant, TX
- (8) PARIS [USC00416794], Paris, TX
- (9) BOSWELL 1 S [USC00340980], Boswell, OK
- (10) EMORY [USC00412902], Emory, TX

Influencing water features

This is a wet site receiving water from adjacent sites. It often has a perched water table at or near the surface for much of the year. Sites also pond occasionally to frequently.

Wetland description

The soils are considered hydric, although onsite delineations are required to determine if they meet the definition of a wetland.

Soil features

The Depression site consists of very deep, poorly drained, moderately slowly to very slowly permeable soils. They formed in sandy, loamy, and clayey sediments. The Derly series is correlated to the site with a taxonomic classification of fine, smectitic, thermic Typic Glossaqualf. Leagueville is also correlated to the site with a classification of loamy, siliceous, semiactive, thermic Arenic Paleaquult. Both soils are wet with Derly have more clay content in the soil profile while Leagueville is overall more sandy. Ashford and Porum are also correlated to this site.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Silt loam (2) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Poorly drained
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–2%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–6
Soil reaction (1:1 water) (0-101.6cm)	3.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

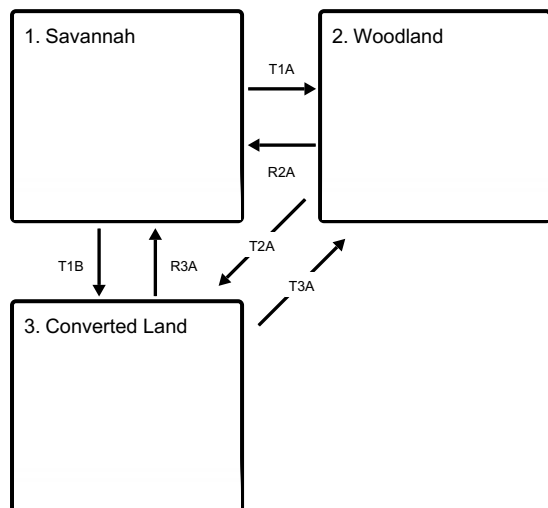
Ecological dynamics

This site resembles a wet prairie occupied by a predominance of hydrophytic plants. The dominant herbaceous

species include sedges (*Carex* sp.), flatsedges (*Cyperus* sp.), rushes (*Juncus* sp.), and smartweeds (*Polygonum* spp.). Tallgrasses like little bluestem (*Schizachyrium scoparium*) and switchgrass (*Panicum virgatum*) may exist on the outer edges of the site. Woody species such as water oak (*Quercus nigra*), willow oak (*Quercus phellos*), elms (*Ulmus* spp.), wax myrtle (*Morella cerifera*), and eastern baccharis occur on the site. The Depression sites are intermingled and surrounded by upland savannahs, so the structure of this site was probably influenced by the herding and grazing effects of bison and cattle. Wildfires occurring during extreme drought may also have played a role in the maintenance of the savannah landscape.

State and transition model

Ecosystem states



T1A - Abandonment, no fire, and/or no grazing management

T1B - Brush management, crop cultivation, pasture planting

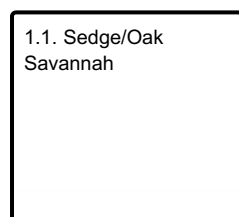
R2A - Prescribed grazing, fire, and/or brush management

T2A - Brush management, crop cultivation, pasture planting

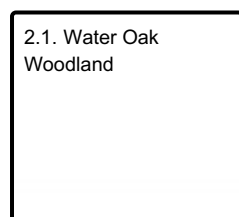
R3A - Prescribed grazing, fire, and/or brush management

T3A - Abandonment, no fire, and/or no grazing management

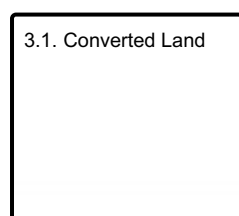
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1 Savannah

One community exists in the Savannah State, the Sedge/Oak Savannah Community. The site is dominated by grass-like species and has a presence of up to 50 percent woody species intermixed.

Community 1.1 Sedge/Oak Savannah

This reference plant community resembles a wet prairie or wet meadow and contains grass-like species including sedges, flatsedges, and rush. Wax myrtle and eastern baccharis are common shrubs found on the site. Water oak, willow oak, elms, and black willow provide up to a 50 percent canopy and occupy locations influenced by wetness. Water oak occurs on the higher/drier upslopes while black willow occurs on the lower/wetter position of the site. Willow oak is intermediate between the two. Fire may play a part in the maintenance of the savannah landscape in years of prolonged drought. This site has the potential to produce heavy fine fuel loads but is usually too wet to have fine fuel moisture conditions conducive for burning. Since this site has such favorable moisture regimes, especially during the summer, grazing and browsing by bison, deer, and cattle probably had more influence on the maintenance of the savannah landscape. Due to the wetness of the site, mechanical brush management is rarely a treatment option for this site. The inability to selectively apply broadcast herbicide normally precludes this treatment option, although individual plant treatment with herbicides may be a viable option. Abandonment of the site allows a transitional shift in vegetation towards a shrub-dominated community that, over time, results in a tree/shrub state. The maintenance of the reference plant community seems to require the presence of grazing and browsing animals and periodic fire when conditions permit.

State 2 Woodland

One community exists in the Woodland State, the Water Oak Community. The site is defined by woody canopy cover over 50 percent. The site has reduced herbaceous production compared to the Savannah State.

Community 2.1 Water Oak Woodland

This is a steady state community that occurs following long periods of little or no management (grazing, burning, or brush control). Water oak, willow oak, black willow, elms, baccharis, and wax myrtle, began to cover greater than 50 percent of the canopy. The woody species become the dominant plants in the community and severely limit herbaceous production through shading. The herbaceous community will still be dominated by sedges and rushes, but in lesser quantities. Available treatment options to move this community back to the Savannah State are limited to tree dozing during drought periods or individual plant treatments with herbicides. Neither of these treatments may be economically feasible.

State 3 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 3.1 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 driver for this transition is abandonment, lack of fire, and/or lack of prescribed grazing. Woody species are allowed to continue to grow until reaching over the threshold of 50 percent. This signifies the transition to the Woodland State.

Transition T1B

State 1 to 3

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 50 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 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

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.

Restoration pathway T3A

State 3 to 2

The Converted Land State will transition to the Woodland State following abandonment of cropping or prescribed grazing of the introduced pasture. Lack of brush management will allow woody species to grow and eventually limit the herbaceous production. Introduced grasses are hard to eliminate, so they may stay part of the community in lesser amounts.

Additional community tables

Animal community

The favorable moisture regimes of this site provide conditions that keep plants green and growing during dry summer months and periods of drought. The site is attractive to domestic livestock as well as many species of wildlife including white-tailed deer, bobcat, raccoon, raptors, rodents, song birds, and feral hogs. Animal species use may change as the plant community changes on this site. Livestock have a higher preference for the site in a

Savannah State where white-tailed deer and feral hogs may prefer the site in a Woodland State. Management should be applied to the site to produce the habitat for the species of concern.

Hydrological functions

This site is a closed depression water coming from the adjacent uplands. Ponding may occur for periods throughout the year.

Recreational uses

This site may be used for wildlife viewing or hunting.

Wood products

In the Woodland State, willow oak and water oak could provide timber products for firewood, cross ties, hardwood flooring, and lumber. The wetness of the site make logging and access to the site by log trucks difficult.

Other products

Fruit from blackberries and grapes may be harvested on this site.

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	05/03/2024
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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

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

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

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

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

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

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

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

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

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:**
