USDA Natural Resources Conservation Service

Ecological site R083EY007TX
Lakebed

Last updated: 9/21/2023
Accessed: 05/19/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

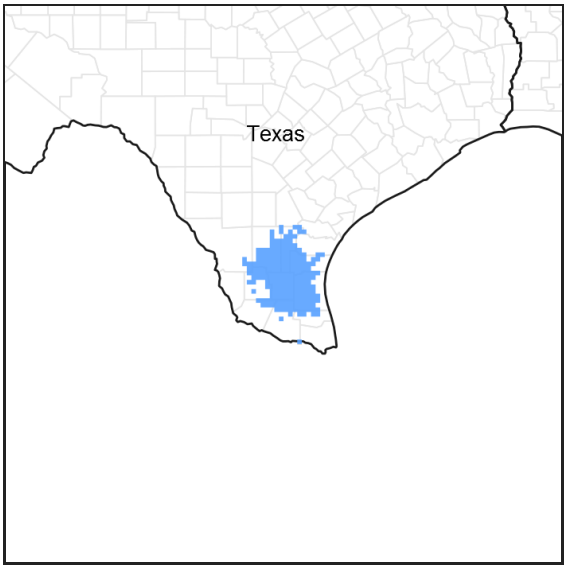


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 083E–Sandsheet Prairie

Major Land Resource Area (MLRA) 83E makes up about 4,300 square miles (11,150 square kilometers). The towns of Falfurrias, Premont, and Sarita are in this area. U.S. Highways 77 and 281 run through the area in a north-south direction.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 83E

Ecological site concept

Lakebeds are shallow depressions that support moist soil plant communities. They stay inundated after heavy rainfall events.

Associated sites

R083EY008TX	**Salty Prairie**
R083EY021TX	**Sandy**
R083EY024TX	**Tight Sandy Loam**

Similar sites

R083AY007TX	**Lakebed**
R083CY007TX	**Lakebed**
R083DY007TX	**Lakebed**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Paspalum hartwegianum* (2) *Panicum virgatum*

Physiographic features

The sites are found in closed depressions on the Sandsheet Prairie on the Sand Plain of South Texas. Ponding occurs up to 12 inches after heavy rainfall events for brief to long periods. Slope ranges from 0 to 1 percent and elevation ranges from 15 to 350 feet.

Table 2. Representative physiographic features

Landforms	(1) Sand plain > Depression (2) Sand plain > Sand sheet
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Rare to frequent
Elevation	3–274 m
Slope	0–1%
Ponding depth	0–30 cm
Water table depth	0–127 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83 has a subtropical subhumid climate. Winters are dry and fairly warm, and the summers are hot and humid. Tropical maritime air masses predominate throughout spring, summer and fall. Modified polar air masses exert considerable influence during winter, creating a continental climate characterized by large variations in temperature. Peak rainfall occurs late in spring and a secondary peak occurs early in fall. Heavy thunderstorm activities increase in April, May, and June. July is hot and dry with little weather variations. Rainfall increases again in late August and September as tropical disturbances increase and become more frequent. Tropical air masses from the Gulf of Mexico dominate during the spring, summer and fall. Prevailing winds are southerly to southeasterly throughout the year except in December when winds are predominately northerly.

Table 3. Representative climatic features

Frost-free period (characteristic range)	235-365 days

Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	610-737 mm
Frost-free period (actual range)	222-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	559-762 mm
Frost-free period (average)	288 days
Freeze-free period (average)	365 days
Precipitation total (average)	660 mm

Climate stations used

- (1) FALFURRIAS [USC00413063], Encino, TX
- (2) SARITA 7 E [USC00418081], Sarita, TX
- (3) HEBBRONVILLE [USC00414058], Hebbronville, TX
- (4) MCCOOK [USC00415721], Edinburg, TX
- (5) RAYMONDVILLE [USC00417458], Raymondville, TX
- (6) KINGSVILLE NAAS [USW00012928], Kingsville, TX

Influencing water features

Following rainfall events this site will pond water for varying lengths of time. Saturation occurs in the upper part of the soil and will have reduced conditions for during the wet months of the year. Water is received from runoff and seepage from adjacent sites. Each site will need to be visited individually to determine wetland criteria.

Wetland description

Following rainfall events this site will pond water for varying lengths of time. Saturation occurs in the upper part of the soil and will have reduced conditions for during the wet months of the year. Water is received from runoff and seepage from adjacent sites. Each site will need to be visited individually to determine wetland criteria.

Soil features

The soils of this ecological site are very deep, somewhat poorly to very poorly drained. In the top 10 inches these soils have moderately rapid permeability but from 10 to 40 inches, they have very slow to slow permeability. They formed in sandy eolian deposits over loamy alluvial sediments. They have a fine sandy loam, loamy fine sand, or fine sand surface textures over a sandy clay loam or sandy clay subsoil. The change between soil textures of the surface horizon and subsoil typically occurs within a depth of 11 inches below the soil surface. Soil surface colors are generally gray to light brownish gray. Soil series correlated to this site include: Bordas and Papagua.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock (2) Eolian deposits–sedimentary rock
Surface texture	(1) Fine sand (2) Loamy fine sand (3) Fine sandy loam
Family particle size	(1) Fine (2) Fine-loamy
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Slow to very slow
Soil depth	203 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–8
Soil reaction (1:1 water) (0-101.6cm)	5.1–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The first crude maps labeled this area of South Texas as Nuevo Santader (1746) and later as the Wild Horse Desert (1850). Now ecologists more commonly refer to it as the Tamaulipan Biotic Province or the Mesquite Acacia Woodland. The Lakebed ecological site can be found throughout the Sandsheet Prairie and Gulf Coast Saline Prairie in closed depressions that pond water after rainfall events. This ecological site is in lower landscape positions which receive surface water runoff and water from throughflow. Throughflow is the horizontal flow of water within the soil layer. There is normally very little surface water in this area, so sites can be very important sources of temporary water and are highly attractive to both wildlife and livestock.

Climate is an important, sometimes downplayed, force that affects the plant communities by impacting general plant composition and diversity at a regional scale. Over the past 130 years three climatic regimes have exhibited distinct weather patterns over the American South West that can be related to the establishment of different kinds of plants (e.g. C4 grasses versus C3 shrubs). Perennial warm season grasses and plants (usually C4) benefit most when spring and summer rainfall is consistent. On the opposite spectrum, mesquite, shrubs, and cool season annuals (usually C3) can take advantage of winter rains and can also conserve energy during hot dry summers.

Droughts are a common occurrence in South Texas and were often documented in letters and historical text. For example, Captain John S. “Rip” Ford mentioned the 1864 drought in his memoirs. He reported thousands of domestic animals dead around South Texas water holes and that the Nueces River was dry for miles. Maria Von Blucher commented in 1872 that, “as a result of the tremendous drought…half of all the cattle in Texas died…at every prominence where one can overlook the Nueces River, one might count more than 3,000 dead cattle.”

Despite the dry climate, this area of Texas was a mid/shortgrass prairie, which was attractive to ranchers and early settlers. In the mid-1800’s the number of grazing animals affecting the ecosystem began to rise dramatically. In general, numbers of wild horses and cattle increased from the 1840’s through the end of the Civil War. Sheep numbers expanded to outnumber both cattle and horses between 1867 and 1900, and peaked at numbers exceeding 2 million. Since that time sheep numbers have fallen dramatically and cattle have become the principal commercial livestock. The January 2013 Texas Livestock Inventory provided by the National Agricultural Statistics Service shows that less than 500,000 head of livestock including cattle, sheep, and goats are currently being raised south of the Nueces River.

Starting in the mid-1800’s the region saw wide anthropogenic changes in several environmental disturbance regimes. Research done to investigate the transition from grassland plant communities to shrubland communities in South Texas indicates that a significant successional change across the region began 100 to 200 years ago, and that stable carbon isotope ratios indicate C3 woody plants currently occupy sites once dominated by C4 grasses. When climate and/or other disturbance regimes change to favor the establishment and spread of woody plants a transition from grassland to shrubland will occur. As grazing use increases past sustainable levels mulch, litter, and other types of ground cover start to decrease, including standing herbaceous material. The plant community structure would also change slowly from a mid/shortgrass prairie to a short grass prairie with an increase in bare

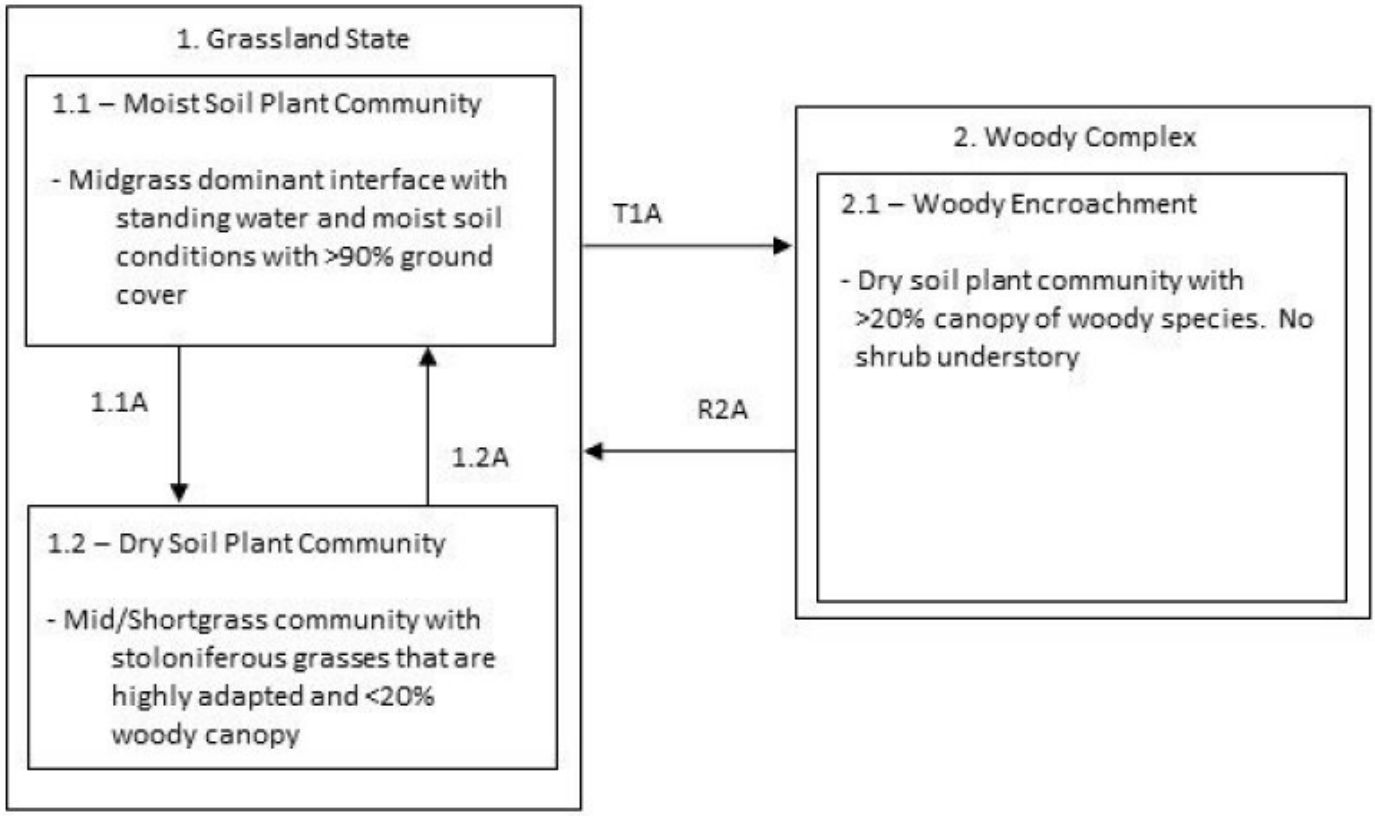
ground, annual forbs, and perennial woody species. This would have had a significant impact on water runoff and infiltration rates as well as soil temperatures and historic fire regimes.

A grassland community has the intrinsic ability to compete with woody species for available water and nutrients in the soil when they are growing in the same space at the same time. Their fibrous and expansive root systems are better adapted to use the top 12 to 16 inches of the soil and there appears to be a critical one to two year period during which mesquite seedlings might be in acute competition with grasses for soil resources. As herbaceous cover decreases bare ground increases, providing more opportunity for woody species to germinate and establish. The amount of herbaceous ground cover can also have a large impact on soil surface temperatures. The higher temperature extremes of bare soil may prevent seed germination of both grasses and shrubs creating a negative feedback loop which is only broken when some type of ground cover is established.

Climate and unsustainable grazing pressure have played large roles in the conversion of South Texas grasslands to what is now called “brush country”, but another important factor is a change in the historic fire regime. The range of woody species has not significantly changed in the past 300 to 500 years, but the stature and density of shrub species has greatly increased. The historic fire regime of South Texas was highly variable with fires every five to thirty years. The variability of fires across the region would have been driven by several factors including fine fuel load but, at a local level, fires would have been frequent enough to prevent woody plant seedlings from maturing and dominating a particular area. Grasses are much better adapted to survive periodic fires and have faster regrowth rates than most shrub species but, once established; brush species in South Texas have shown the tendency to survive fires because of their re-sprouting characteristics.

Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The reference plant community is not necessarily the management goal; other vegetative states may be desired plant communities if the Range Health assessments are in the moderate and above category. The biological processes on this ecological site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this ecological site. They are not intended to cover every situation or the full range of conditions, species, and responses for the ecological site.

State and transition model



Code	Practice
T1A	Lack of water and germination by woody species
R2A	Brush management or natural restoration through inundation
1.1A	Depressions drying and increased grazing pressure
1.2A	Inundation returns and wet-adapted species return

State 1
Grassland

Community 1.1
Moist Soil

Because of a lack of reference communities, the interpretive information for this plant community is derived from previously developed range site descriptions and professional consensus of range trained field staff. This grassland community develops when soils in the shallow depressions of the Sandsheet Prairie maintain a degree of wetness because of periodic rainfall events. Mid/tallgrasses thrive on this ecological site and will follow the waterline as water evaporates out of the ponded areas. Hartweg's paspalum (*Paspalum hartwegianum*) represents a significant proportion of the plant. The forb community will vary based on rainfall and fluctuations in the ponded status of the depression, but commonly include Texas frog fruit (*Phyla nodiflora*) and wood sorrel (Oxalis spp.). Areas of bare ground that are exposed by water evaporation during the fall and winter will typically have more forbs than if the bare ground is exposed during the spring and summer, which will favor grass species. Rattlebush (*Sesbania drummondii*) is a common shrub that will make up a trace amount of the plant composition. The duration of time this ecological site has standing water is highly variable and driven by local weather patterns.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2130	3082	4035
Forb	112	168	224
Shrub/Vine	–	84	168
Tree	–	28	56
Total	**2242**	**3362**	**4483**

Table 6. Ground cover

Tree foliar cover	0-5%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	85-95%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	10-25%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	25-90%
Bare ground	0-10%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0%	0-5%	85-95%	5-10%
>0.15 <= 0.3	0%	0-5%	85-95%	5-10%
>0.3 <= 0.6	0%	0-5%	85-95%	5-10%
>0.6 <= 1.4	0-5%	0-10%	75-85%	5-10%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 9. Plant community growth curve (percent production by month). TX8501, Midgrass Grassland Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	20	5	5	10	10	5	3

Community 1.2
Dry Soil

Figure 10. 1.2 Dry Soil Plant Community

In this phase of the Grassland State (1) species from the surrounding landscape begin to increase in abundance because the shallow depression has dried out and seeds that were carried onto the site by overland water flow and animals will germinate. Perennial forbs that are common on the Sandy and Loamy Sand ecological sites will become a larger part of the plant composition but will be highly variable from location to location. Over time the tall/midgrasses will lose dominance as the ecological site becomes extremely dry and plants like buffalograss (*Bouteloua dactyloides*) and creeping lovegrass (Neeagrostis reptans) will increase and can become the most abundant species. In modern times, this phase of the plant community has become susceptible to the invasion of bermudagrass (*Cynodon dactylon*) and Kleberg bluestem (*Dichanthium annulatum*), which are aggressive grass species that can be introduced into the plant composition and will quickly dominate the plant community.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	897	1569	2242
Forb	560	673	785
Shrub/Vine	112	280	448
Tree	–	112	224
Total	**1569**	**2634**	**3699**

Figure 12. Plant community growth curve (percent production by month). TX8504, Shortgrass Dominant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	20	5	5	10	10	5	3

Pathway 1.1A
Community 1.1 to 1.2

This pathway represents the shallow depressions becoming dry and a reduction in Hartweg's paspalum, the most dominant grass of the reference plant community (1.1). Drought and grazing pressure are the main drivers for this transition. During dry weather this ecological site can become the focus of grazing pressure which will contribute to the reduction of plant species that are not as tolerant of moderate-to-heavy grazing pressure.

Pathway 1.2A
Community 1.2 to 1.1

This transition is driven by water returning to the system. Plants that proliferate in moist soils like Hartweg's paspalum, knotroot bristlegrass (*Setaria parviflora*), and knotgrass (*Paspalum distichum*) will increase in abundance. Taller grasses like switchgrass (*Panicum virgatum*), seacoast bluestem (*Schizachyrium littorale*), and multi-flowered false Rhodesgrass (*Trichloris pluriflora*) will increase along the edges of the ecological site. Other

plants that were recruited from adjoining ecological sites during dry periods will decrease because they are not adapted to survive in moist soil conditions or standing water. Many different species of sedges and rushes will also fill in the plant composition.

State 2
Woody Complex

Community 2.1
Woody Encroachment

Figure 13. 2.1 Woody Encroachment Community

This plant community is typified by the encroachment of woody species on the ecological site. Seed can be introduced by large rainfall events and/or by grazing animals. Mesquite (*Prosopis glandulosa*), huisache (*Acacia farnesiana*), and retama (Parkinsonia aculeate) are the most common species found on this ecological site because of their ability to survive in moist soils. These plants will establish where seed was deposited and continue to expand in numbers as long as growing conditions are conducive. An understory of shrubs does not form under the tree canopy on this ecological site. Grass species and composition will mimic the Grassland State (1). Bermudagrass and Kleberg bluestem are common invasive grasses in this phase and in some cases, may be the most abundant grasses in the plant community.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	897	1569	2242
Tree	112	560	1009
Forb	560	673	785
Shrub/Vine	112	280	448
Total	**1681**	**3082**	**4484**

Figure 15. Plant community growth curve (percent production by month). TX8503, Wooded Grassland Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	20	5	5	10	10	5	3

Transition T1A
State 1 to 2

The transition from the Grassland State (1) to the Woody Complex (2) is driven by the lack of water in the shallow depressions. If conditions are right, woody species can germinate and grow simultaneously within the extent of the ecological site and create mottes of trees that grow with, but do not greatly affect, the herbaceous plant community.

Restoration pathway R2A
State 2 to 1

Land managers may want to restore this ecological site to the Grassland State (1). Once in the Woody Complex (2) mechanical or chemical brush control is usually necessary to remove the trees from the plant community. The Lakebed ecological site naturally controls woody species; if the ecological site has standing water for a long period of time the subsoil is totally saturated and tree mortality will occur because of the anaerobic conditions in the root zone.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Mid/Tallgrasses**			532–1614	
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	168–673	–
	switchgrass	PAVI2	*Panicum virgatum*	168–673	–
	shore little bluestem	SCLI11	*Schizachyrium littorale*	0–504	–
2	**Midgrasses**			852–1412	
	Hartweg's paspalum	PAHA3	*Paspalum hartwegianum*	852–1412	–
3	**Mid/Shortgrasses**			336–605	
	buffalograss	BODA2	*Bouteloua dactyloides*	84–168	–
	saltgrass	DISP	*Distichlis spicata*	84–168	–
	creeping lovegrass	NERE3	*Neeragrostis reptans*	84–168	–
	knotgrass	PADI6	*Paspalum distichum*	84–168	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	84–168	–
4	**Grasslikes**			213–404	
	sedge	CAREX	*Carex*	101–196	–
	spikerush	ELEOC	*Eleocharis*	101–196	–
Forb					
5	**Forbs**			112–224	
	Forb, annual	2FA	*Forb, annual*	28–84	–
	woodsorrel	OXALI	*Oxalis*	28–84	–
	turkey tangle fogfruit	PHNO2	*Phyla nodiflora*	28–84	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	11–45	–
Shrub/Vine					
6	**Shrubs**			0–168	
	poisonbean	SEDR	*Sesbania drummondii*	0–168	–
Tree					
7	**Trees**			0–56	
	sweet acacia	ACFA	*Acacia farnesiana*	0–56	–
	Jerusalem thorn	PAAC3	*Parkinsonia aculeata*	0–56	–
	honey mesquite	PRGLG	*Prosopis glandulosa var. glandulosa*	0–56	–

Animal community

This ecological site is an important component of the wildlife habitat because of the water-receiving position it occupies on the Sandsheet Prairie and Gulf Coast Saline Prairie. They can often be the only sources of standing water, which attracts all types of wildlife in their vicinity. Cattle (Bos spp.) and many species of wildlife make extensive use of this ecological site. White-tailed deer may be found scattered across the prairie, and are found in heavier concentrations where woody cover exists. Feral hogs (Sus scrofa) are present and, at times, become abundant. Coyotes (Canis latrans) are abundant, and probably have replaced the red wolf (Canis rufus) in this mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Geese (family Anatidae) and sandhill cranes (Grus canadensis) abound during winter. Many species of avian predators including northern harriers (Circus cyaneus), red-tailed hawks (Buteo jamaicensis), kestrels (Falco sparverius), white-tailed kites (Elanus leucurus), and, occasionally, swallow-tailed kites (Elanoides forficatus). Many species of grassland birds use the ecological site, including blue grosbeaks (Guiraca caerulea), dickcissels (Spiza americana), eastern meadowlarks (Sturnella magna), and several sparrows, including Cassin's sparrow (Aimophila cassinii), vesper sparrow (Pooecetes gramineus), lark sparrow (Chondestes grammacus), savannah sparrow (Passerculus sandwichensis), grasshopper sparrow (Ammodramus savannarum), and Le Conte's sparrow (Ammodramus leconteii).

Hydrological functions

This ecological site is in a water receiving position and ponded water is common after rainfall events. Because of the level terrain, water erosion is seldom a problem. Saturation occurs in the upper part and will have reducing conditions for some time during the wet months of the year. This is a moist ecological site receiving water from runoff and seepage from adjacent sites. Each site will need to be visited individually to determine wetland criteria.

Recreational uses

The area is often used for hunting and photography.

Wood products

In the Grassland State (1), no wood products are available. In the Wooded Complex, large numbers of mesquite trees and can be cut for firewood and barbecue wood.

Other products

Landowners have the opportunity to explore the many facets of ecotourism, and the potential of the natural resources of their property, to create value from their land.

Inventory data references

The data contained in this document is derived from analysis of inventories, clipping studies, and ecological interpretation from field evaluations.

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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.

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

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** None.

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

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Small-to-medium sized litter may move short distances during intense storms.

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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):** Soil surface is resistant to erosion. Soil stability class range is expected to be 4 to 6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizons are 0 to 12 inches thick; light brownish gray (10YR 6/2) loamy fine sand or fine sandy loam; weak, fine subangular blocky structure; abrubt smooth boundary; SOM is less than three percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** A high canopy cover of bunch, rhizomatous, and stoloniferous grasses will help minimize runoff and maximize infiltration. Grasses should comprise approximately 90 percent of total annual production by weight. Shrubs will comprise about 0 to 5 percent by weight.

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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):** None.

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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: Midgrasses >>

    Sub-dominant: Mid/Tallgrasses > Mid/Shortgrasses >> Grasslikes > Forbs > Shrubs/Vines >> Trees

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Potential for 5 to 15 percent plant mortality of perrenial bunchgrasses during extreme drought.

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14. **Average percent litter cover (%) and depth (in):** Litter is primarily herbaceous.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2,000 to 4,000 pounds per acre.

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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:** Mesquite, huisache, bermudagrass, and Kleberg bluestem are common invaders.

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17. **Perennial plant reproductive capability:** All species should be capable of reproducing, except during periods of prolonged drought conditions.
