USDA Natural Resources Conservation Service

Ecological site R083CY007TX
Lakebed

Last updated: 9/19/2023
Accessed: 05/18/2024

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.

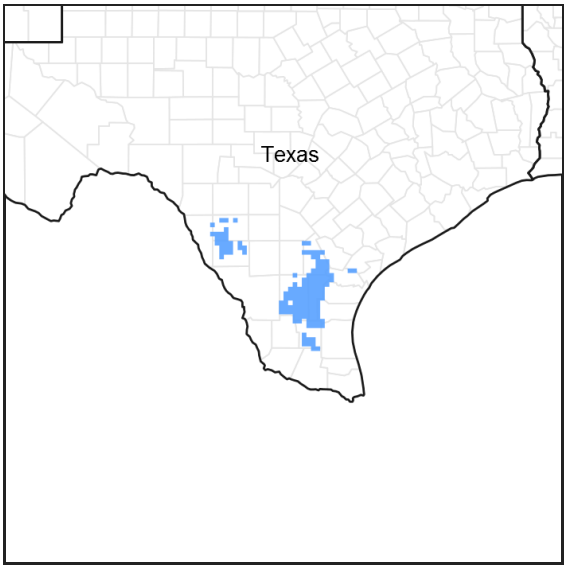


Figure 1. Mapped extent

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): 083C–Central Rio Grande Plain

Major Land Resource Area (MLRA) 83C makes up about 4,275 square miles (11,075 square kilometers). The towns of Freer, George West, and Hebbronville are in this area. The town of Alice is on the east edge of the area. U.S. Highways 59 and 281 cross the area. This area is comprised of inland, dissected coastal plains.

Classification relationships

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

Ecological site concept

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

Associated sites

R083CY004TX	**Shallow Sandy Loam**
R083CY023TX	**Sandy Loam**

Similar sites

R083AY007TX	**Lakebed**
R083DY007TX	**Lakebed**
R083EY007TX	**Lakebed**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Trichloris pluriflora* (2) *Paspalum hartwegianum*

Physiographic features

The sites are found in closed depressions. Ponding occurs up to 12 inches after heavy rainfall events for brief to long periods. Slope ranges from 0 to 1 percent. This area is comprised of inland, dissected coastal plains.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Depression
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	3–244 m
Slope	0–1%
Water table depth	0–203 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83C is subtropical, subhumid on the western boundary and subtropical humid on the eastern boundary. Winters are dry and mild, 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, because of rain showers, 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)	255-291 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	584-660 mm
Frost-free period (actual range)	255-347 days

Freeze-free period (actual range)	365 days
Precipitation total (actual range)	533-660 mm
Frost-free period (average)	283 days
Freeze-free period (average)	365 days
Precipitation total (average)	635 mm

Climate stations used

- (1) CHOKE CANYON DAM [USC00411720], Three Rivers, TX
- (2) MCCOOK [USC00415721], Edinburg, TX
- (3) FREER [USC00413341], Freer, TX
- (4) CALLIHAM [USC00411337], Calliham, TX
- (5) HEBBRONVILLE [USC00414058], Hebbronville, 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

This site contains some areas of both wetland and non wetlands. An onsite investigation is needed to determine wetland criteria.

Soil features

Soils are very deep, somewhat poorly to poorly drained, and very slowly permeable to impermeable. Soil series correlated to this site include: Edroy, Papagua, Realitos, and Tiocano.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock
Surface texture	(1) Clay (2) Fine sandy loam
Family particle size	(1) Fine
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Very slow
Soil depth	203 cm
Available water capacity (0-101.6cm)	12.7–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–3%

Ecological dynamics

Climatic variation and topoedaphic heterogeneity interact to influence vegetation responses to disturbances such as fire and grazing. Plants of the reference plant community evolved with and are generally well adapted to grazing and fire. Prior to European settlement, fires would likely have been frequent, between 5 and 10 years. These fires would have resulted from lightning during the hot, dry summer months or were set by Native Americans. The occurrence of fire promotes grasses while making it difficult for woody plants to achieve dominance. During the Pleistocene, there were significant populations of large-bodied grazers and browsers. Most of these went extinct, so that by the Holocene (about 10,000 years ago) only bison (Bos bison), white-tailed deer (Odocoileus virginianus), and antelope (Antilocapra americana) remained. Archeological evidence indicates that bison occurred in the region, but there is also evidence of centuries of absence. In addition, their numbers may have varied seasonally as herds migrated. When present, bison may have grazed certain areas heavily, but then moved on. Activities of other native herbivores (termites, cutter ants, soil nematodes, kangaroo rats (Dipodomys spp.)) also influenced vegetation productivity and dynamics.

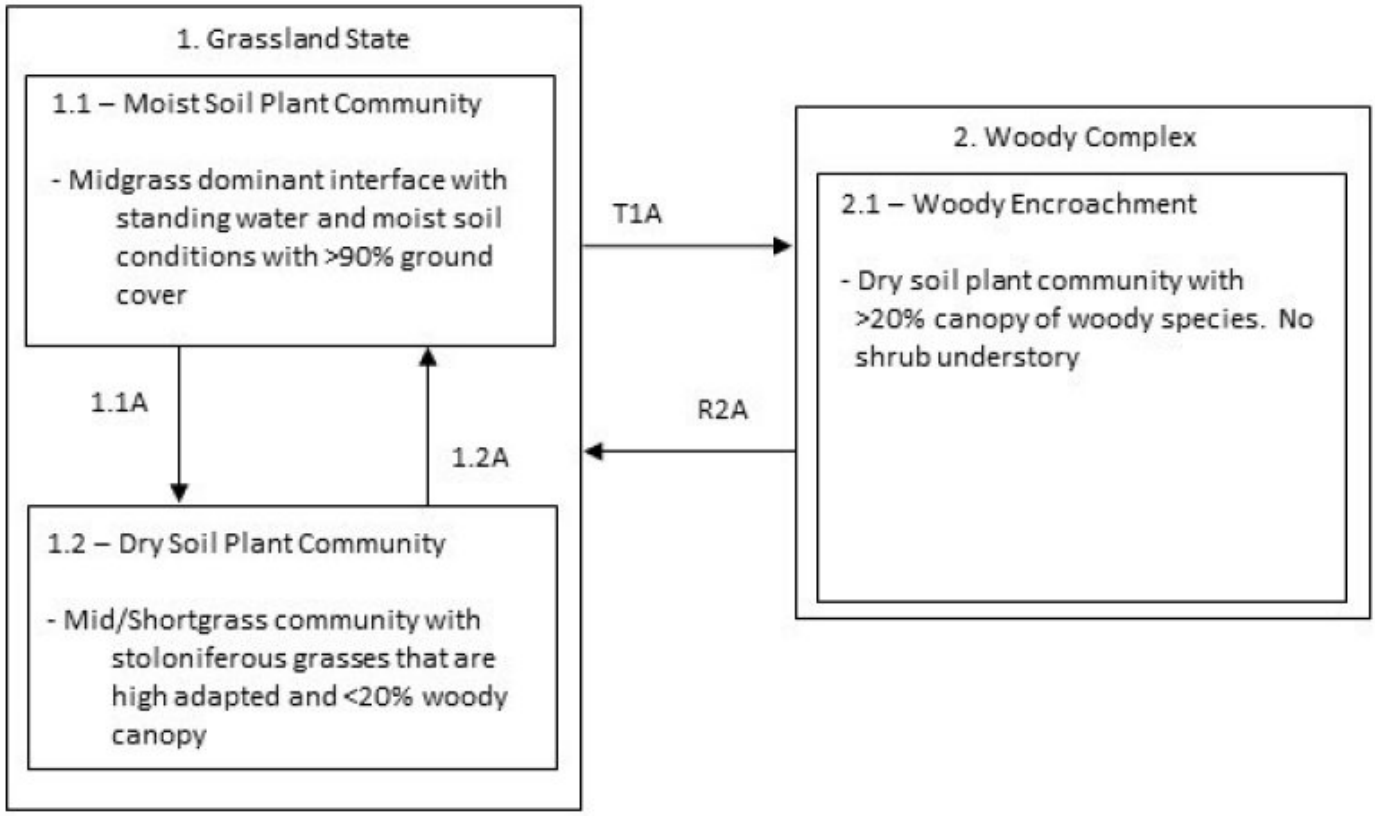
Accounts of earlier explorers and settlers suggest the Rio Grande Plains was likely a mosaic of grasslands, savannahs, shrublands, and woodlands. Historical photographs suggest the nature of the vegetation structure likely varied from place-to-place depending on topography, soil properties and time since the last major disturbances (such as drought or fire). However, the occurrence of extensive grasslands and grassland fauna (antelope, for example) is mentioned in numerous historical accounts. Plants likely at the time of European settlement included little bluestem (*Schizachyrium scoparium*), false Rhodes grass (Chloris crinata), and multiflower false Rhodes grass (Chloris pluriflora), Arizona cottontop (*Digitaria californica*), plains bristlegrass (*Setaria vulpiseta*), and pink pappusgrass (*Pappophorum bicolor*). The composition and productivity of grass communities would have varied with annual rainfall, soil depth and the extent of argillic horizon development. Many sites are now dominated by mesquite (*Prosopis glandulosa*), various acacias (Acacia spp.), granjeno (Celtis pallida), condalia (Condalia obovata), lime prickly ash, and prickly pear (Opuntia spp.). These woody plants are not new arrivals, but are native to the region and have increased in size and abundance within their historic ranges.

Grazing and fire are two factors that critically influence the relative abundance of grasses and woody plants through time. By the early 1800’s cattle and sheep numbers appear to have been quite high in the Rio Grande Plains, resulting in heavy, year-round grazing. The resulting reduction in abundance of late seral grasses lead to a decline in soil organic matter, a reduction in fire frequency/intensity (due to lack of fine fuels), and a shift from midgrass domination to shortgrass, like hooded windmill grass (*Chloris cucullata*), three-awns (Aristida spp.) and forbs, like orange zexmenia (Wedelia hispida), and croton (Croton spp.). These changes would have favored woody plants, most of which are unpalatable to livestock, and enabled them to establish and attain dominance. This would be especially true for leguminous shrubs such as mesquite, whose seeds are widely spread by livestock.

The shift from grass to woody plant domination became the impetus for brush management practices. By the 1950’s, large-scale mechanized clearing was common and by the 1970’s, aerial herbicide applications were widespread. However, by the 1980’s it was clear that brush management practices were often treating symptoms rather than underlying problems and having undesirable environmental consequences, including adverse effects on wildlife populations. Sites cleared of brush regenerated rapidly and often formed thickets that were denser and of lower diversity than the original stands. This realization, coupled with the fact that brush management treatments were typically short-lived, lead to the development of Integrated Brush Management Systems (IBMS). The IBMS approach takes a holistic, large-scale, long-term, whole-farm, ecosystem-based approach to brush management and recognizes multiple-use options for rangeland resources. Shrublands developing on former grasslands have other potential socioeconomic values that should be considered when contemplating brush management. These include alternate classes of livestock, lease hunting, deer and exotic game ranching, and ecotourism.

While shrublands have traditionally been viewed as degraded from a livestock production standpoint, it is important to recognize that they are not necessarily degraded from the ecological perspectives of primary productivity, nutrient cycling and biodiversity. The productivity of shrublands may be comparable to the grassland they replaced. In addition, shrubs modify soils and microclimate to increase levels of organic matter and nutrients in the upper four inches of the soil profile. This nutrient enrichment by shrubs can offset grazing-induced losses of soil nutrients and contribute to enhance grass production when shrub cover is reduced by natural or management-induced means. While the development of shrub communities may have adverse impacts on grasses and grassland fauna, other plants and animals may benefit. Thus, while ecosystem biodiversity certainly changes, it does not necessarily decrease with a shift from grass to woody plant domination.

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

Dominant plant species

- Hartweg's paspalum (*Paspalum hartwegianum*), grass
- buffalograss (*Bouteloua dactyloides*), grass

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

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 11. 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

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- Bermudagrass (*Cynodon dactylon*), grass

Community 2.1
Woody Encroachment

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 13. 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

As a historic tall/midgrass prairie, this site was occupied by bison, antelope, deer, quail, turkey, and dove. This site was also used by many species of grassland songbirds, migratory waterfowl, and coyotes. This site now provides forage for livestock and is still used by quail, dove, migratory waterfowl, grassland birds, coyotes, and deer.

Feral hogs (Sus scrofa) can be found on most ecological sites in Texas. Damage caused by feral hogs each year includes, crop damage by rutting up crops, destroyed fences, livestock watering areas, and predation on native wildlife, and ground-nesting birds. Feral hogs have few natural predators, thus allowing their population to grow to high numbers.

Wildlife habitat is a complex of many different plant communities and ecological sites across the landscape. Most animals use the landscape differently to find food, shelter, protection, and mates. Working on a conservation plan

for the whole property, with a local professional, will help managers make the decisions that allow them to realize their goals for wildlife and livestock.

Grassland State (1): This state provides the maximum amount of forage for livestock such as cattle. It is also utilized by deer, quail and other birds as a source of food. When a site is in the reference plant community phase (1.1) it will also be used by some birds for nesting, if other habitat requirements like thermal and escape cover are near.

Tree/Shrubland (2): This state can be maintained to meet the habitat requirements of cattle and wildlife. Land managers can find a balance that meets their goals and allows them flexibility to manage for livestock and wildlife. Forbs for deer and birds like quail will be more plentiful in this state. There will also be more trees and shrubs to provide thermal and escape cover for birds as well as cover for deer.

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

Hunting and photography are common activities.

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.

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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Approval

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Acknowledgments

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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.

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

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.

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.

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.

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

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:

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.

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

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.

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.

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