USDA Natural Resources Conservation Service

Ecological site R083EY021TX
Sandy

Last updated: 9/21/2023
Accessed: 04/26/2024

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.

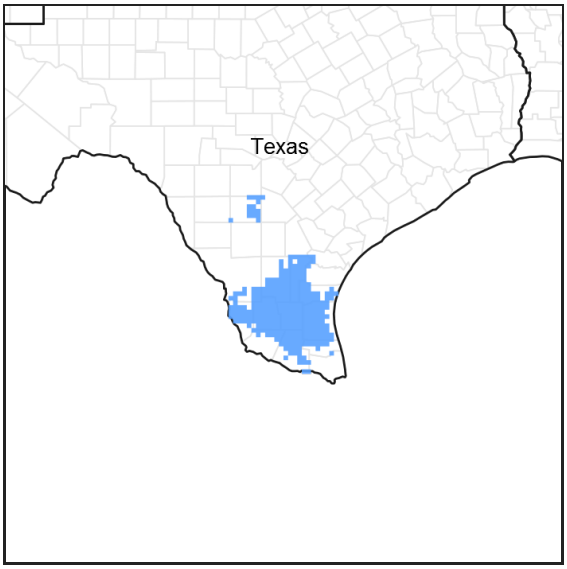

Figure 1. Mapped extent

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

Sandy ecological sites have sandy surface textures and the ability to form active dunes if vegetation is denuded.

Associated sites

R083EY008TX	**Salty Prairie**

R083EY014TX	**Sandy Flat**
R083EY023TX	**Sandy Loam**
R083EY007TX	**Lakebed**
R083EY020TX	**Sand Hills**
R083EY024TX	**Tight Sandy Loam**

Similar sites

R083AY021TX	**Sandy**
R083CY021TX	**Sandy**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Quercus virginiana*
Herbaceous	(1) *Schizachyrium littorale* (2) *Sorghastrum nutans*

Physiographic features

The Sandy ecological sites are found on nearly level to gently sloping soils on the sandsheet in the Sandsheet Prairie of the South Texas Sand Plain. They formed in sandy eolian deposits over loamy alluvium. Slopes range from 0 to 5 percent. Elevation ranges from 15 to 600 feet.

Table 2. Representative physiographic features

Landforms	(1) Sand plain > Sand sheet (2) Sand plain > Dune
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	20–500 ft
Slope	0–5%
Water table depth	24–80 in
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)	24-29 in

Frost-free period (actual range)	222-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	22-30 in
Frost-free period (average)	288 days
Freeze-free period (average)	365 days
Precipitation total (average)	26 in

Climate stations used

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

Influencing water features

Permeability is moderately rapid to rapid above the moderately slowly permeable subsoil. This site has an ustic soil moisture regime. A perched water table may persist on top of the argillic horizon for a few days after a heavy rainfall event.

Wetland description

N/A.

Soil features

The soils are very deep, somewhat poorly to excessively well drained with moderate to moderately slow permeability. Redoximorphic features are present in the upper part of the argillic. Other features include sandy surface textures and moderately acid to neutral soil reaction. The sodicity range is elevated due to the addition of the natric horizon in some of the soils. Soil series correlated to this site include: Atiras, Estella, Nueces, Padrones, and Sarita.

Table 4. Representative soil features

Parent material	(1) Eolian sands–sedimentary rock (2) Alluvium–sedimentary rock
Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–4 in
Calcium carbonate equivalent (0-40in)	0–5%

Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–20
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The plant communities of this site are dynamic and community composition may vary dramatically with variations in annual rainfall, grazing, and fire. During dry periods the amount of bare ground increases. Bare ground may predominate during droughts. Shortgrasses such as hairy grama (*Bouteloua hirsuta*), thin paspalum (*Paspalum setaceum*), fringed signalgrass (Brachiaria ciliatissima), red lovegrass (*Eragrostis secundiflora*), sandbur (Cenchrus spp.), and forbs increase in abundance at the expense of the taller grasses. During wet years, tallgrasses such as seacoast bluestem (*Schizachyrium scoparium* var. littorale) increase in abundance. The shortgrasses and forbs form a multi-layered community.

In 1834, Jean Luis Berlandier referred to the region as a “wilderness of plains covered with small forests of oaks.” Berlandier remarked that it was grazed by cattle (Bos spp.) and large herds of wild horses (Equas caballus). In the 1840’s and 1850’s, parts of Nueces, Kleberg, Brooks and Kenedy Counties were known as the “Wild Horse Desert.” Wild horses were reported in other portions of the Rio Grande Plains as early as 1821. Bartlett in 1853 noted in Kleberg county thousands of wild horses fleeing a prairie fire.

Property lines of Spanish and Mexican land grants were often laid out from one live oak (*Quercus virginiana*) motte to another. Some of the live oaks are more than 300 years old. Scattered mesquites (*Prosopis glandulosa*) also occur, the oldest presently about 250 years old. Historically, fire was an important factor. Wildfires are common on this site at present, and Native Americans set periodic fires for hunting and reducing insects. Natural fires, and fires set by Native Americans, reduced woody plant cover, kept live oak mottes scattered and isolated, and maintained the open stretches of grassland witnessed by Berlandier. White-tailed deer (Odocoileus virginianus) and pronghorns (Antilocapra americana) were the major large herbivores on this site at the time of colonization by Europeans. In 1846 McClintock reported “thin bushes on the sands of Kleberg County at wide intervals and thousands of deer.” The extent to which bison (Bos bison) utilized the site is unknown.

The reference plant community is a grassland with scattered live oak mottes and occasional mesquite trees. Seacoast bluestem is the prevailing dominant. Gulfdune paspalum (*Paspalum monostachyum*) is a co-dominant with seacoast bluestem on moderately drained flats and swales. Gulfdune paspalum declines dramatically in abundance in the drier microhabitats of well-drained flats and ridges where seacoast bluestem becomes the primary dominant. Gulfdune paspalum also declines in abundance with declining annual rainfall away from the coast. Pan-American balsamscale (Elyonurus tripsacoides) becomes a co dominant with seacoast bluestem in areas more than 25 to 30 miles from the coast. Other important associated grasses include big bluestem, brownseed paspalum (*Paspalum plicatulum*), Indiangrass (Sorghastrum spp.), switchgrass (*Panicum virgatum*), and thin paspalum. The reference community supports a diverse understory of perennial legumes and forbs.

Continued overuse by livestock results in a decline of seacoast bluestem, gulfdune paspalum, and other perennial grasses. This causes an increase in forbs, particularly camphor daisy (*Rayjacksonia phyllocephala*), partridgepea (Chamaecrista fasciculate), and crotons (Croton spp.). Camphor daisy has increased in recent history and now dominates this site, forming 10 to 20 percent of the canopy cover, even under good to excellent range conditions. Camphor daisy was apparently absent from the site as recently as 1963. Pan-American balsamscale, three-awns (Aristida spp.), and thin paspalum increase in abundance with heavy grazing, but decline on severely grazed rangeland. On severely grazed rangeland, seacoast bluestem is virtually absent. Sandbur, fringed signalgrass, red lovegrass, camphor daisy, and other forbs dominate severely grazed sites. Overuse results in a large amount of bare ground, which results in blowing sand. Blowing sand further accelerates community degradation. Live oak

mottes expand and coalesce forming continuous oak forests with continued overuse. The oak colonies often become short and thicketized with high stem density, rather than forming large, single-trunked trees. Mesquite increases with continued overuse. Once the mesquites reach sufficient size, understory shrubs including granjeno (Celtis pallida), brasil (*Condalia hookeri*), and lime prickly-ash (*Zanthoxylum fagara*) establish underneath.

Active sand dunes occur on this site. Overuse by livestock exacerbates dune formation. Continuous dunes sometimes cover several square miles. The dunes add to landscape diversity, but pose management problems because they migrate across the landscape and may cover fences, roads, buildings, and other structures. Cutting, mulching, and lightly incorporating native hay near a sand dune is an effective method of stabilizing dunes.

State and transition model

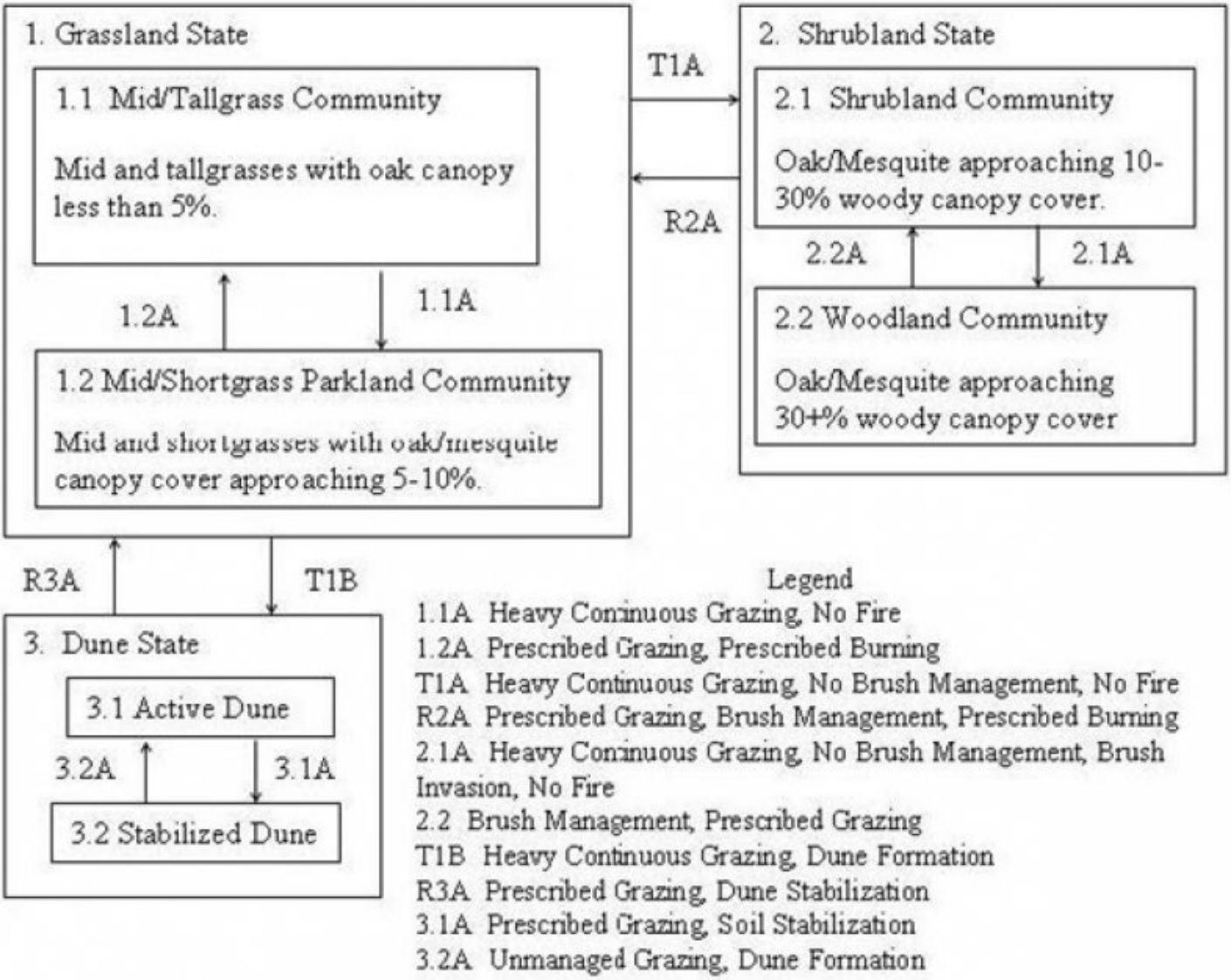

Figure 8. STM

State 1
Grassland

Community 1.1
Mid/Tallgrass

The reference plant community for the site is open grassland composed of mid and tallgrasses with scattered live oaks. Live oaks shade less than five percent of the site. Seacoast bluestem dominates the site, with gulfdune paspalum giving way to Pan American balsamscale as distance increases from the coast. Recurrent fire was a natural process that maintained the plant community. Application of prescribed fire at appropriate intervals and proper grazing management can maintain the open grassland community. Heavy grazing and elimination of fire

results in a change in plant community composition from the 1.1 Mid/Tallgrass Community with scattered live oaks to the 1.2 Mid/Shortgrass Parkland. Mesquite will continue to increase with continued heavy grazing and absence of periodic fire.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1800	3150	4500
Shrub/Vine	100	175	250
Forb	100	175	250
Tree	0	0	0
Total	**2000**	**3500**	**5000**

Figure 10. Plant community growth curve (percent production by month). TX8513, Mid/Tallgrass Community. Mid and tallgrasses dominate the site with few forbs and shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	15	5	10	15	10	5	5

Community 1.2
Mid/Shortgrass Parkland

Figure 11. 1.2 Mid/Shortgrass Parkland Community

The Mid/Shortgrass Parkland community results from expansion of oak mottes or increased density of mesquite. Heavy grazing removes the grass fuel that could have sustained the use of fire. The dominant grass species include midgrasses, particularly seacoast bluestem, gulfdune paspalum, Pan American balsamscale, and shortgrasses including sandbur, fringed signalgrass, red lovegrass, and thin paspalum. Forbs are an important component, particularly camphor daisy, partridgepea, and crotons. Bare ground increases under heavy grazing. Implementation of proper grazing management and prescribed burning at periodic intervals will reduce woody canopy cover and shift the community back toward an open grassland. Continued heavy grazing and absence of fire creates opportunity for expansion of live oak mottes and establishment of mesquite. Droughts will hasten the process. If left unchecked, this will eventually trigger a transition from the 1.2 Mid/Shortgrass Parkland to 2.1 Oak/Mesquite Woodland. Once this transition has occurred, grazing management alone will not restore this community to one of the Grassland States. Brush management is required to go back to the Grassland State.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1600	2800	4000
Shrub/Vine	200	350	500
Forb	200	350	500
Tree	0	0	0
Total	**2000**	**3500**	**5000**

Figure 13. Plant community growth curve (percent production by month). TX8514, Mid/Shortgrass Parkland Community. Mid and shortgrasses dominate while oak mottes and density of mesquite are expanded..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	15	5	10	15	10	5	5

Pathway 1.1A
Community 1.1 to 1.2

Heavy continuous grazing and lack of fire cause the site to transition the 1.2 Mid/Shortgrass Parkland Community.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing and re-introduction of fire will transition the community back to the 1.1 Mid/Tallgrass Community.

State 2
Shrubland

Community 2.1
Shrubland

Figure 14. 2.1 Shrubland Community

The Shrubland Community results from a transition from the Grassland State (1) to a new state dominated by woody plants. A threshold has been crossed. This transition occurs through expansion and coalescence of live oak mottes and establishment of mesquite and other woody species. Running or “thicketized” live oak composes part of the live oak cover. Sandbur, fringed signalgrass, red lovegrass, thin paspalum, camphor daisy, partridgepea, and crotons are the major herbaceous species in the Shrubland Community. A considerable amount of bare ground is present. Brush management coupled with prescribed grazing is necessary to shift the oak or mesquite shrubland back to the Grassland State. Once the woody plants become established, grazing management alone will not reverse the trend toward the Woodland Community. Continued selective brush management will be needed to maintain the Shrubland Community in the desired density of woody plants.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1400	2450	3500
Shrub/Vine	400	700	1000
Forb	200	350	500
Tree	0	0	0
Total	**2000**	**3500**	**5000**

Figure 16. Plant community growth curve (percent production by month). TX8506, Shrubland Community, 10-30% canopy. Expansion and coalescence of live oak mottes, and establishment of mesquite and associated woody species while grass species decline..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Community 2.2
Woodland

Figure 17. 2.2 Woodland Community

The Woodland community develops from the Shrubland Community when there is no brush management as the woody plants age. Woody canopy is greater than 30 percent. Running or “thicketized” live oak with high stem densities composes a significant portion of the woody cover. Mesquite density increases and mottes with an understory of subordinate shrubs such as granjeno, brasil, and lime prickly ash develop. Brush management is necessary to shift the oak or mesquite woodland back to a previously described plant community. Herbaceous vegetation is scant, and is composed of shortgrasses and early successional forbs. Any brush management activities should be done with prescribed grazing.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	450	900	1200
Grass/Grasslike	790	945	1100
Tree	375	750	1000
Forb	300	450	700
Total	**1915**	**3045**	**4000**

Figure 19. Plant community growth curve (percent production by month). TX8507, Woodland Community, 30+% canopy. Woody canopy is greater

than 30%..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Pathway 2.1A
Community 2.1 to 2.2

Shrubland **Woodland**

Continued heavy grazing, no fire, and no brush management will transition the site to the 2.2 Woodland Community.

Pathway 2.2A
Community 2.2 to 2.1

Woodland **Shrubland**

Brush management is required to reduce the woody canopy less than 30 percent. Care is required because the sandy soils have a tendency to form dunes.

State 3
Dune

Community 3.1
Active Dune

Formation of active sand dunes results from continued heavy grazing of the Grassland (1) State. Climatic factors, such as hurricanes, can also exacerbate dune formation. Vegetation is absent from the active dune itself. Active dunes migrate with the prevailing wind from southeast to northwest. Rest and implementation of proper grazing management are required to allow plants to establish and stabilize active dunes. Cutting, mulching, and lightly incorporating native hay near a sand dune is an effective method of stabilizing dunes.

Figure 20. Plant community growth curve (percent production by month). TX8516, Active Dune Community. Dunes are active and migrate with the wind. Vegetation are absent from the active dunes. Surrounding areas will have low successional grasses and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	15	5	10	15	10	5	5

Community 3.2
Stabilized Dune

Stabilized dunes undergo a successional process with snake cotton (Froelichia spp.), sunflowers (Helianthus spp.), and croton in the initial stages of succession. Eventually the dunes can develop into a plant community similar to the Grassland State, but it can take many years. Heavy grazing however will negate any gains made and will precipitate reformation of an active dune.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	450	2250	3500
Forb	40	225	250
Shrub/Vine	10	25	50
Tree	0	0	0
Total	**500**	**2500**	**3800**

Figure 22. Plant community growth curve (percent production by month). TX8515, Stabilized Dune Community. Stabilized dunes undergo a successional process with snake cotton, sunflowers, and croton in the initial stages of succession..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	15	5	10	15	10	5	5

Pathway 3.1A
Community 3.1 to 3.2

Deferred grazing and re-colonization by early successional plants will stabilize the dunes. Incorporating hay into the dunes will also help stabilize the dunes.

Pathway 3.2A
Community 3.2 to 3.1

Unmanaged grazing will lead to increased bare ground and lowered plant health. This can cause the active dunes to reform and move across the landscape.

Transition T1A
State 1 to 2

With continued heavy grazing and no fire, the site will transition to the Shrubland State. The shrubs and brush exceed a 10 percent canopy cover and the herbaceous understory is greatly reduced.

Transition T1B
State 1 to 3

If the site is grazed heavy enough without rest, the site can transition the Dune State. Without herbaceous cover, bare ground increases and active dunes can form, moving across the landscape.

Restoration pathway R2A
State 2 to 1

Brush management, prescribed grazing, and the return of fire can restore the plant community to the Grassland State. Care should be taken to minimally disturb the soils, due to their ability to form active dunes.

Restoration pathway R3A
State 3 to 1

Stabilization of dunes is required to restore the Grassland State. Stabilization can occur naturally by first colonization of first successional herbaceous species or active restoration by cutting, mulching, and lightly incorporating native hay.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			1000–2250	
	shore little bluestem	SCLI11	*Schizachyrium littorale*	1000–2250	–
2	**Midgrasses**			100–300	
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	50–150	–
	crinkleawn grass	TRACH2	*Trachypogon*	50–150	–
3	**Tallgrasses**			200–600	
	switchgrass	PAVI2	*Panicum virgatum*	100–350	–
	Indiangrass	SONU2	*Sorghastrum nutans*	100–350	–
	big bluestem	ANGE	*Andropogon gerardii*	0–150	–
4	**Midgrass**			100–225	
	tanglehead	HECO10	*Heteropogon contortus*	100–225	–
5	**Midgrass**			100–225	
	fringed signalgrass	URCI	*Urochloa ciliatissima*	100–225	–
6	**Mid/Shortgrasses**			100–225	
	balsamscale grass	ELION	*Elionurus*	50–150	–
	purple dropseed	SPPU3	*Sporobolus purpurascens*	25–75	–
	Texasgrass	VAMU	*Vaseyochloa multinervosa*	25–75	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	25–75	–
7	**Shortgrasses**			100–225	
	hooded windmill grass	CHCU2	*Chloris cucullata*	75–150	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	75–150	–
8	**Mid/Shortgrasses**			100–450	
	sand crabgrass	DIAR7	*Digitaria arenicola*	75–150	–
	fall witchgrass	DICO6	*Digitaria cognata*	75–150	–
	gulfdune paspalum	PAMO4	*Paspalum monostachyum*	75–150	–
Forb					
9	**Forbs**			60–150	
	Texas bullnettle	CNTE	*Cnidoscolus texanus*	25–75	–
	coastal indigo	INMI	*Indigofera miniata*	25–75	–
	dotted blazing star	LIPU	*Liatris punctata*	25–75	–
	sensitive plant	MIMOS	*Mimosa*	25–75	–
	snoutbean	RHYNC2	*Rhynchosia*	25–75	–
10	**Forbs**			40–100	
	Forb, annual	2FA	*Forb, annual*	10–40	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	10–40	–
	croton	CROTO	*Croton*	10–40	–
	snakecotton	FROEL	*Froelichia*	10–40	–
	lantana	LANTA	*Lantana*	10–40	–
	beebalm	MONAR	*Monarda*	10–40	–
Shrub/Vine					
11	**Shrubs/Vines**			100–250	
	live oak	QUVI	*Quercus virginiana*	100–250	–

	live oak	QUVI	*Quercus virginiana*	100–200	–
	mesquite	PROSO	*Prosopis*	0–1	–

Animal community

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

Water infiltration into the surface is rapid in the fine sands of the site. Therefore, runoff and soil erosion from water is seldom a problem on the site.

Recreational uses

Ecotourism and hunting are popular activities.

Inventory data references

The data in this document was obtained by reviewed historical accounts, research reports, limited clipping data, and from the experience of range-trained personnel.

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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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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):** 0 to 5 percent bare ground. Small and non-connected areas.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** Due to the sandy properties of the soil, severe soil erosion by wind can occur.

7. **Amount of litter movement (describe size and distance expected to travel):** Under normal rainfall, little litter movement should be expected; however, litter of all sizes may move long distances. Minimal and short.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface under reference conditions is resistant to erosion. Stability class range is expected to be 5 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0 to 3 inches, very pale brown (10YR 7/3) fine sand, brown (10YR 5/3) moist; single grain; loose; common fine roots; slightly acid; clear smooth boundary.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High canopy, basal cover and density with small interspaces should make rainfall impact negligible. This site has well drained soils, deep with level to gently sloping (0 to 5 percent) which produces negligible runoff and water erosion.

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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):** No evidence of compaction.

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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: Warm-season tallgrasses >

    Sub-dominant: Warm-season midgrasses >

    Other: Forbs > Shrubs

    Additional: Forbs make up five percent species composition while shrubs make up five percent.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Perennial grasses will naturally exhibit a minor amount (less than five percent) of senescence and some mortality every year.

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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 5,000 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 and burgrass are the primary invaders. Other invaders include King Ranch bluestem, Guineagrass, lotebush, pricklypear, yucca, spiny hackberry, live oak, and brasil.

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17. **Perennial plant reproductive capability:** All perennial species should be capable of reproducing every year unless disrupted by extended drought, overgrazing, wildfire, insect damage, or other events occuring immediately prior to, or

during the reproductive phase.