USDA Natural Resources Conservation Service

Ecological site R083CY021TX
Sandy

Last updated: 9/19/2023
Accessed: 04/30/2024

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

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

Associated sites

R083CY022TX	**Loamy Sand**

Similar sites

R083EY021TX	**Sandy**
R083AY021TX	**Sandy**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Quercus virginiana*
Herbaceous	(1) *Schizachyrium littorale* (2) *Paspalum plicatulum*

Physiographic features

These soils occur on gently undulating, vegetated sand sheets on inland, dissected coastal plains. Slope ranges from 0 to 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Sand sheet
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	30–290 m
Slope	0–5%
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) HEBBRONVILLE [USC00414058], Hebbronville, TX
- (3) FREER [USC00413341], Freer, TX
- (4) MCCOOK [USC00415721], Edinburg, TX
- (5) CALLIHAM [USC00411337], Calliham, TX

Influencing water features

Water features do not influence this site.

Wetland description

N/A

Soil features

The Nueces series consists of very deep, moderately well to well drained, and moderately slow to moderately rapid permeable soils. They formed in sandy eolian deposits over loamy Quaternary age alluvium. Soil series correlated to this site include: Nueces and Sarita.

Table 4. Representative soil features

Parent material	(1) Eolian sands–sedimentary rock (2) Alluvium–sedimentary rock
Surface texture	(1) Fine sand
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	203 cm
Available water capacity (0-101.6cm)	7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0–2%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
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.

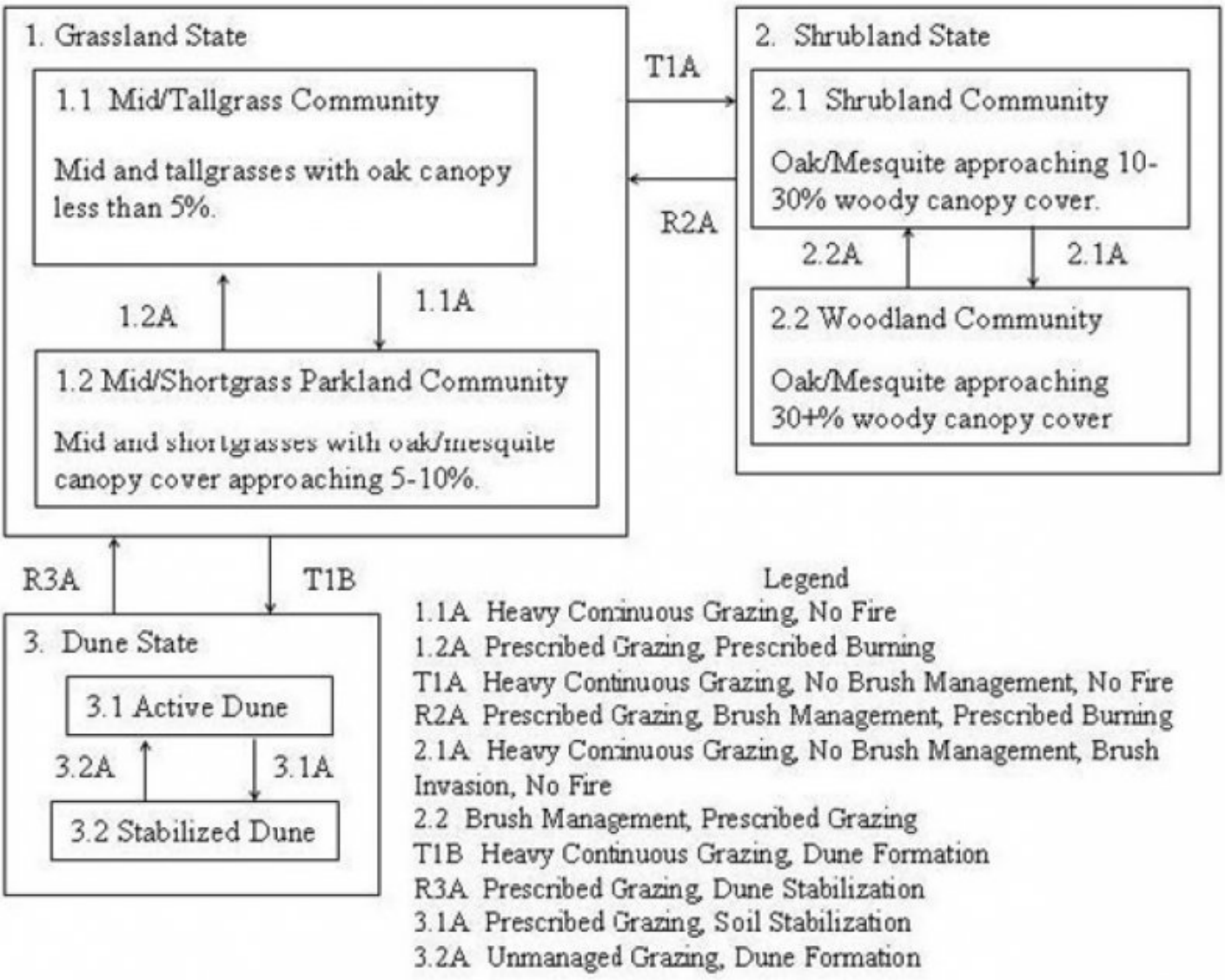
Accounts of earlier explorers and settlers suggest the Rio Grande Plains was likely a mosaic of grasslands, savannahs, shrublands, and woodlands. Historical photographs suggest the nature of the vegetation structure likely varied from place-to-place depending on topography, soil properties and time since 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



State 1
Grassland

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- windmill grass (*Chloris*), grass

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 (*Schizachyrium scoparium* var. littorale) dominates the site, with gulfdune paspalum (*Paspalum monostachyum*) giving way to Pan American balsamscale (*Elionurus tripsacoides*) 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2018	3531	5044
Shrub/Vine	112	196	280
Forb	112	196	280
Tree	–	–	–
Total	**2242**	**3923**	**5604**

Figure 9. 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

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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1793	3138	4483
Shrub/Vine	224	392	560
Forb	224	392	560
Tree	–	–	–
Total	**2241**	**3922**	**5603**

Figure 11. 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 1.2A
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

Dominant plant species

- oak (*Quercus*), shrub
- honey mesquite (*Prosopis glandulosa*), shrub

Community 2.1
Shrubland

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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1569	2746	3923
Shrub/Vine	448	785	1121
Forb	224	392	560
Tree	–	–	–
Total	**2241**	**3923**	**5604**

Figure 13. 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

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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	504	1009	1345
Grass/Grasslike	885	1059	1233
Tree	420	841	1121
Forb	336	504	785
Total	**2145**	**3413**	**4484**

Figure 15. 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

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 16. 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	2522	3923
Forb	45	252	280
Shrub/Vine	11	28	56
Tree	–	–	–
Total	**560**	**2802**	**4259**

Figure 18. 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

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 (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			1121–2522	
	shore little bluestem	SCLI11	*Schizachyrium littorale*	1121–2522	–
2	**Midgrasses**			112–336	
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	56–168	–
	crinkleawn grass	TRACH2	*Trachypogon*	56–168	–
3	**Tallgrasses**			224–673	
	switchgrass	PAVI2	*Panicum virgatum*	112–392	–
	Indiangrass	SONU2	*Sorghastrum nutans*	112–392	–
	big bluestem	ANGE	*Andropogon gerardii*	0–168	–
4	**Midgrass**			112–252	
	tanglehead	HECO10	*Heteropogon contortus*	112–252	–
5	**Midgrass**			112–252	
	fringed signalgrass	URCI	*Urochloa ciliatissima*	112–252	–
6	**Mid/Shortgrasses**			112–252	
	balsamscale grass	ELION	*Elionurus*	56–168	–
	purple dropseed	SPPU3	*Sporobolus purpurascens*	28–84	–
	Texasgrass	VAMU	*Vaseyochloa multinervosa*	28–84	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	28–84	–
7	**Shortgrasses**			112–252	
	hooded windmill grass	CHCU2	*Chloris cucullata*	84–168	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	84–168	–
8	**Mid/Shortgrasses**			112–504	
	sand crabgrass	DIAR7	*Digitaria arenicola*	84–168	–
	fall witchgrass	DICO6	*Digitaria cognata*	84–168	–

	gulfdune paspalum	PAMO4	*Paspalum monostachyum*	84–168	–
Forb					
9	**Forbs**			67–168	
	Texas bullnettle	CNTE	*Cnidoscolus texanus*	28–84	–
	coastal indigo	INMI	*Indigofera miniata*	28–84	–
	dotted blazing star	LIPU	*Liatris punctata*	28–84	–
	sensitive plant	MIMOS	*Mimosa*	28–84	–
	snoutbean	RHYNC2	*Rhynchosia*	28–84	–
10	**Forbs**			45–112	
	Forb, annual	2FA	*Forb, annual*	11–45	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	11–45	–
	croton	CROTO	*Croton*	11–45	–
	snakecotton	FROEL	*Froelichia*	11–45	–
	lantana	LANTA	*Lantana*	11–45	–
	beebalm	MONAR	*Monarda*	11–45	–
Shrub/Vine					
11	**Shrubs/Vines**			112–280	
	live oak	QUVI	*Quercus virginiana*	112–280	–
	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 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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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.

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.

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.

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.

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.

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 5,000 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 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.
