Ecological site R077AY011TX
Sand Hills 16-22" PZ

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General information

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

Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 077A–Southern High Plains, Northern Part

MLRA 77A is characterized by nearly level plains with playa depressions and sloping breaks along rivers and creeks. Soils are generally deep, fine-textured, and occur in a mesic soil temperature regime.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur on windblown sand dunes. Reference vegetation consists of tall and midgrasses, forbs and shrubs. In the absence of periodic fire, shrub canopy may increase. These sites are quite sensitive to wind erosion if abusive grazing practices are allowed.

Associated sites

R077AY012TX	**Sandy Loam 16-22" PZ** Nearly level to gently sloping soils with fine-loamy argillic horizons formed on low dunes and sand sheets in lower in positions. Midgrass and shortgrass dominant with few woody shrubs.
R077AY666TX	**Sandy 16-22" PZ** Gently undulating to rolling soils on sand sheets and dunes with surface textures of loamy fine sand and coarse-loamy or fine-loamy argillic horizons. Tall- and midgrass dominant with few forbs and shrubs. Sandy sites have higher production potential and lower amounts of bare ground.

Similar sites

R077EY063TX	**Sand Hills 16-24" PZ** A similar site in MLRA 77E with soils formed in a slightly warmer thermic soil temperature regime.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia filifolia*
Herbaceous	(1) *Calamovilfa gigantea* (2) *Andropogon hallii*

Physiographic features

This site is an upland with very sandy, undulating to rolling topography. Generally, the position on the landscape is adjacent to major streams that cut through the Ogallala formation, but higher in elevation by some 50 to 200 hundred feet. The site also occurs slightly higher on the landscape where sand sheets and dune fields have developed through eolian sand migration. Soil parent materials for this site are eolian sands.

Table 2. Representative physiographic features

Landforms	(1) Plains > Dune
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	2,500–4,500 ft
Slope	3–15%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	2,300–4,990 ft
Slope	1–25%

Climatic features

Climate is a cold semi-arid steppe (Koppen-Geiger classification BSk). Summers are hot and winters are cold. Temperature extremes are common. Humidity is generally low, and short-term droughts are common. Humidity is generally low and evaporation high. Average annual wind speed is 12 mph with highest winds in early spring. The prevailing wind direction is south. Summertime brings strong high pressure systems that build into heat domes with highs in the upper 90 to mid-100 degree F range. Evaporation in summer is high and open pan evaporation exceeds 6 feet per year. Early autumn temperatures are mild, with Canadian and Pacific cold fronts bringing cold air in mid-

autumn throughout winter. Arctic air can settle in and dominate for several weeks during winter with very cold air in place for 2 to 3 weeks at a time.

Most of the precipitation comes in the form of rain from May through September. Rainfall events often occur as intense showers of relatively short duration. Snowfall average is about 15 inches but is also variable from 8 to 36 inches annually. Long term droughts are likely to occur every 15 to 20 years and may last 4 to 5 years. Mean precipitation is around 19 inches but varies significantly from year to year. Rainfall amounts over the last 100 years have varied from as little as 9 inches to as much as 37 inches. The probability is about 70% that precipitation will fall between 14 inches and 23 inches. Growing season averages 180 days. Average first frost is around October 17, and the last freeze of the season occurs around April 21.

Table 4. Representative climatic features

Frost-free period (characteristic range)	143-156 days
Freeze-free period (characteristic range)	175-190 days
Precipitation total (characteristic range)	18-21 in
Frost-free period (actual range)	138-163 days
Freeze-free period (actual range)	169-194 days
Precipitation total (actual range)	18-22 in
Frost-free period (average)	150 days
Freeze-free period (average)	182 days
Precipitation total (average)	19 in

Climate stations used

- (1) ELKHART [USC00142432], Elkhart, KS
- (2) LIBERAL [USC00144695], Liberal, KS
- (3) BOISE CITY 2 E [USC00340908], Boise City, OK
- (4) PERRYTON [USC00416950], Perryton, TX
- (5) STRATFORD [USC00418692], Stratford, TX
- (6) HUGOTON [USC00143855], Hugoton, KS
- (7) GOODWELL 2 E [USW00003055], Goodwell, OK
- (8) SPEARMAN [USC00418523], Spearman, TX
- (9) DUMAS [USC00412617], Dumas, TX

Influencing water features

Infiltration of precipitation into the soil is rapid and even small rainfall events can supply plant available moisture. No surface water features are present. In isolated places near streams, there may be very small areas where the water table is within a few feet of the surface. With significant rainfall events, some recharge to the water table may occur from this site.

Wetland description

Soils in this ecological site are not part of wetland ecosystems.

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusions of areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

This site consists of very deep, excessively drained, rapidly permeable soils formed in sandy eolian sediments. Undulating to rolling, deep fine sands with high water infiltration rates and low water storage capacity. The soils have no subsoil structure and no well defined horizonation. Fertility is very low but plant available water is high. Surface temperatures on bare sand are very high and plant establishment is difficult. Wind erosion is an ever present problem unless cover is adequate to stabilize the fragile sands.

Representative soil components for this site include: Optima.

Table 5. Representative soil features

Parent material	(1) Eolian sands
Surface texture	(1) Fine sand (2) Loamy fine sand (3) Loamy sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	0.9–3.4 in
Calcium carbonate equivalent (0-40in)	0–1%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–7.8
Subsurface fragment volume <=3" (0-40in)	0%
Subsurface fragment volume >3" (0-40in)	0%

Table 6. Representative soil features (actual values)

Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	Not specified

Calcium carbonate equivalent (0-40in)	Not specified
Electrical conductivity (0-40in)	Not specified
Sodium adsorption ratio (0-40in)	Not specified
Soil reaction (1:1 water) (0-40in)	Not specified
Subsurface fragment volume <=3" (0-40in)	Not specified
Subsurface fragment volume >3" (0-40in)	Not specified

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

The Sand Hills ecological site is unique in many respects. The site developed in wind-worked alluvial or eolian deposits. The lack of soil development and recent climatic conditions has had a major influence on the plant community development. As a rule, these are developmentally very young soils. In fact, some areas of the Sand Hills site now supports a plant community which were bare dunes as recently as 50 to 60 years ago. On the other hand, some sites appear to be more mature and support a more diverse plant community that appears to be more stable. So, different stages of plant community development can be observed over the range of the site. Describing a reference plant community for this site is difficult because of the different ages of sediments, and the stage of development of the plant community. It may be that the age of soil deposition and soil stability are major factors in this process. For the purposes of a site description, it is assumed that the more diverse plant community is more indicative of the reference plant community that developed over time and was observed by European settlers. Tallgrass/Shrub/Forb Community (1.1) is a mixture of tallgrasses (50-60 percent), shrubs (40-50 percent) and perennial forbs (10-15 percent). A varying amount of annual forbs can be found depending on the moisture situation in a given year. The dominant tallgrasses were sand bluestem (*Andropogon hallii*), giant sandreed (*Calamovilfa gigantea*), little bluestem (*Schizachyrium scoparium*) and the taller dropseed species (Sporobolus spp.). Lesser amounts of switchgrass (*Panicum virgatum*) and Indiangrass (*Sorghastrum nutans*) can be found where moisture conditions are slightly more favorable. Usually Indiangrass occurs where finer textured lens occur in the subsoil. A good variety of forbs exists but the amount varies greatly from year to year. The more commonly found forb species are queen's delight (*Stillingia sylvatica*), gaura (Gaura spp.), western ragweed (*Ambrosia psilostachya*), camphorweed (*Heterotheca subaxillaris*), sand lily (*Mentzelia strictissima*), and annual wild buckwheat (*Eriogonum annuum*). The major shrubs were sand sagebrush (*Artemisia filifolia*) and skunkbush sumac (*Rhus aromatica*). Lesser amounts of sand plum (*Prunus angustifolia*) and southwestern rabbitbrush (*Chrysothamnus pulchellus*) were usually present. The woody shrubs are more stable from year to year and can better withstand the climatic extremes; therefore it is probable that shrubs were a major component of the historic plant community. In dryer years the grasses and forbs decline somewhat and in wet years the forb growth can be profuse. With abundant early spring moisture, annual wild buckwheat can be the dominant herbaceous plant present. With good summer moisture, the taller grasses become more visible and produce a larger portion of total biomass. The environment in the Sand Hills is harsh and those plant species that are deep rooted, soil stabilizing and drought tolerant have the advantage. The shrubs and the taller grasses, along with certain tap rooted forbs, best fit that description.

The plant community on this site is somewhat influenced by moisture and aspect. North and east aspects will support a slightly different plant community than the south and west aspects. Production levels can be slightly higher on the north and east aspects.

Natural fire no doubt played a part in the sites' ecology, as is true of nearly all plains sites. Since cover is sparser than adjacent sites and bare areas exist throughout the site, fuel continuity may not have always been sufficient for a complete burn. There are historical accounts of fires having burned up to the sand hills and dying out. There were

undoubtedly times when the site did burn and present day observations bear this out. These results are varied. Some post-burn erosion will certainly take place, especially if moisture is deficient and the soil is bare in early spring. Many plant bases and seedlings are cut off by blowing sand. However, if post-burn rainfall is adequate, erosion can be minimal, and recovery can and will take place. It is common for recovery to take 3 growing seasons and possibly 4 to reach equilibrium. Biomass is reduced for at least 3 years, but after that, a moderate shift toward grass vegetation with shrub suppression that last several years will usually result.

Abusive grazing with domestic livestock for prolonged periods will usually see the most palatable plants pressured severely. As retrogression proceeds, this site will move towards the Shrub (>80 percent)/Midgrass and Forb (<20 percent) Dominant Community (2.1). Tallgrasses will decline and midgrass species will increase along with a dramatic increase in the shrub component. Heavy disturbance by hoof action to the soil surface can cause an increase in annual species. There will be a marked increase in western ragweed, dropseed species, threeawns, and a wide variety of lower successional species. Sand sagebrush and skunkbush sumac will increase dramatically. Bare areas may become more numerous and wind erosion will increase.

During the grazing/browsing process, the shrubs may be utilized somewhat, but little pressure is placed upon them. The balance between grass, forbs and shrubs is rather delicate, and over utilization of the more palatable species will most assuredly favor the shrubs. The plant community will be less diverse. In this phase, ecological processes have changed somewhat, but the pathway back toward the reference community can be initiated through prescribed grazing, selective brush and pest management. The use of prescribed fire should be done with the utmost care on this site, as generally there is not enough fine fuel to carry an effective fire. There are other tools that can be used with less risk. Very careful use of herbicides can sometimes be used to suppress shrub growth without destabilizing the site. Care should be taken to avoid treating the tops of dunes and areas of poor cover.

If heavy continuous grazing continues along with periodic droughts, retrogression will move the plant community towards the Shrub (>90 percent)/Annuals (>10 percent) Dominant Community (3.1). In extreme cases, shrubs will dominate with mainly annual forbs and grasses being present. Sand sagebrush and skunkbush sumac canopy will continue to increase, on some sites yucca (*Yucca glauca*) may increase to become a high percentage of the total plant community. Numerous bare areas will be scattered throughout the site. The rolling mini-dune areas may show signs of wind erosion from the lack of deep rooted grass cover. The plant community can become so degraded that it cannot reverse the transition without extensive energy and management inputs. At this point, a major threshold has been crossed. Restoration of the Shrub/Annuals Dominant Community (3.1) requires re-seeding, prescribed grazing (3 - 5 consecutive year's deferment during the growing season) as well as extensive brush and pest management.

The shrub dominant community is generally a stable community but diversity of species must consider all of the ecological processes and in the management of the site for wildlife. Several species of wildlife frequent the site and the state of the plant community certainly influences the quality of habitat for quail, pronghorn and mule deer. All of these species prefer a mixture of grass, forbs and shrubs. A variety of shrubs, tall grasses and forbs will be more beneficial for wildlife habitat, livestock grazing, and will aid in the function of the ecological processes such as nutrient cycling, and the hydrological cycle.

NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

STATE AND TRANSITIONAL PATHWAYS: (DIAGRAM)

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

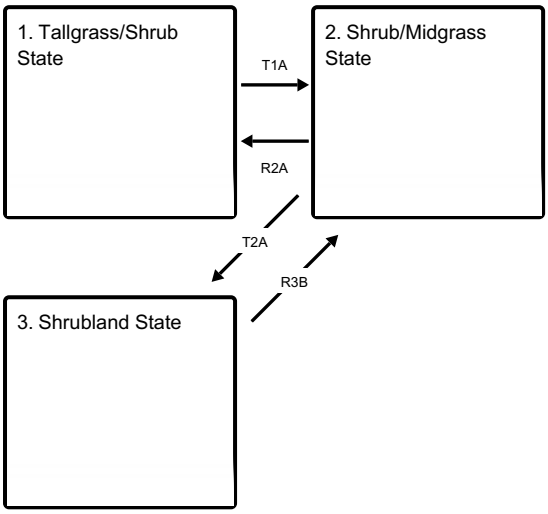
As a site changes in the structure and makeup of the plant community, the changes may be due to management, natural occurrences or both. At some point in time thresholds are crossed. Once changes have progressed to a certain point, the balance of the community has been altered to the extent that a return to the former state is not possible unless some form of energy is applied to make it happen. These changes take place on all ecological sites, but some sites support communities that are more resistant to change than others. Also, some sites are more resilient, and tend to heal or restore themselves more easily. Usually, changes in management practices alone,

such as grazing techniques, will not be sufficient to restore former plant communities. An example of energy input might be the implementation of chemical or mechanical brush management to decrease the amount of woody shrubs and increase the amount of grasses and forbs. This shift in community balance could not be brought about with grazing alone. The amount of energy required to bring about a change in plant community balance may vary a great deal depending on the present state and upon the desired result.

The plant community balance of this site is more fragile than some of the shortgrass sites. This balance is necessary for the community to function properly. Tallgrasses are not as resistant to grazing as short and midgrass species. The soil is more fragile since it is sandy and can result in plant and soil disturbance from hoof action. If cover is very poor, wind erosion will occur.

State and transition model

Ecosystem states



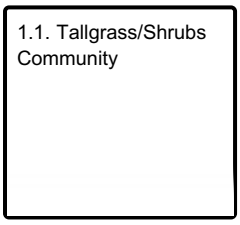
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Reintroduction of historic disturbance regimes, may be coupled with rangeland seeding

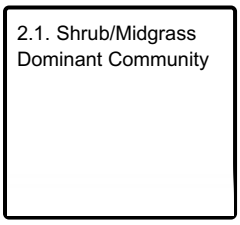
T2A - Absence of disturbance and natural regeneration over time, coupled with excessive grazing pressure

R3B - Removal of woody canopy and adequate rest from defoliation

State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities

3.1. Shrub Dominant Community

State 1
Tallgrass/Shrub State

Tallgrass/Shrub/Forb Community (1.1) is a mixture of tallgrasses (50-60 percent), shrubs (40-50 percent) and perennial forbs (10-15 percent). A varying amount of annual forbs can be found depending on the moisture situation in a given year. The dominant tallgrasses were sand bluestem, giant sandreed, little bluestem and the taller dropseed species.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- giant sandreed (*Calamovilfa gigantea*), grass
- sand bluestem (*Andropogon hallii*), grass

Community 1.1
Tallgrass/Shrubs Community

Figure 8. 1.1 Tallgrass/Shrubs Community

The reference community is tallgrasses (50-60%), shrubs (40-50%), and perennial forbs (10-15%). There is a considerable range in the actual composition from one part of the site to another and from site to site. The aspect also played a roll in the plant composition, north and easterly aspects were slightly more productive than the south and westerly aspects. The site has moderate diversity and in a well managed state it can be moderately productive. Warm season plants dominate the site. The major grass species are sand bluestem, little bluestem and giant sandreed. There is a good variety of forbs, both annual and perennial. Queen’s delight, annual wild buck-wheat, gaura and sand lily are most prevalent. Sand sagebrush and skunkbush sumac are scattered throughout in a patchy pattern rather than a continuous canopy. The community’s ecological processes were in balance with the environment.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1000	1200	1400
Shrub/Vine	200	235	270
Forb	60	75	90
Microbiotic Crusts	0	0	0
Tree	0	0	0
Total	**1260**	**1510**	**1760**

Figure 10. Plant community growth curve (percent production by month). TX0533, Tallgrass/Shrubs Community. A diverse mix of tall grasses, forbs and shrubs occupy this community. There is a good variety of forbs, both annual and perennial. Shrubs are scattered throughout in a patchy pattern rather than a continuous canopy..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	4	14	22	21	18	10	5	2	0

State 2
Shrub/Midgrass State

The plant community is dominated by shrub canopy(>80%) such as sand sagebrush and skunkbush with approximately 20 % perennial grasses (mainly midgrasses) and numerous annual and perennial forbs. Some tallgrass remnants are scattered throughout the site.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- fragrant sumac (*Rhus aromatica*), shrub
- sideoats grama (*Bouteloua curtipendula*), grass

Community 2.1
Shrub/Midgrass Dominant Community

Figure 11. 2.1 Shrub/Midgrass Dominant Community

This community represents the first phase in the transition of the Shrub/Midgrass Dominant Community (2.1) towards the Shrub Dominant Community (3.1). The plant community is dominated by shrub canopy (>80%) such as sand sagebrush and skunkbush with approximately 20 % perennial grasses (mainly midgrasses) and numerous annual and perennial forbs. Some tallgrass remnants are scattered throughout the site. Bare ground is starting to increase. It is much less diverse than the reference community and total production is somewhat less. Diversity is less and although quail, deer and prairie chicken still utilize the community, the quality of habitat would be improved if the shrub component was reduced. Nutrient and energy cycling has shifted toward woody plants and evapo-

transpiration losses have increased. The site is limited in forage production for livestock. Response to reducing the competition from shrubs will usually be good because there is usually a sufficient seed source and dormant root crowns of the tall grasses remaining. Without brush management and proper grazing, the woody species will continue to increase in size and canopy cover. Careful grazing management will have to accompany any sort of brush management efforts.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	800	965	1130
Grass/Grasslike	150	175	200
Forb	50	60	70
Microbiotic Crusts	0	0	0
Tree	0	0	0
Total	**1000**	**1200**	**1400**

Figure 13. Plant community growth curve (percent production by month). TX0534, Shrub Dominant with Midgrasses and Annual Forbs. Shrub dominant (>80%) with midgrasses and annual forbs (20%)..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	7	8	12	24	20	15	4	5	3	2	0

State 3
Shrubland State

The Shrub Dominant/Annual Forbs/Few Grasses community has >90% woody canopy of sand sagebrush and skunkbush sumac, on some sites yucca will be a high percent of the total canopy. Annual forbs and grasses make up approximately 10% or less of the total composition with numerous bare areas scattered throughout the site.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- fragrant sumac (*Rhus aromatica*), shrub
- yucca (*Yucca*), shrub

Community 3.1
Shrub Dominant Community

Figure 14. 3.1 Shrub Dominant Community

The Shrub Dominant Community has (>90%) woody canopy of sand sagebrush and skunkbush sumac, on some sites yucca will be a high percent of the total canopy. Annual forbs and grasses make up approximately (10%) or

less of the total composition with numerous bare areas scattered throughout the site. This site will have some erosion taking place from winter and early spring winds in the bare places where annual vegetation prevails. Productivity is low and so is diversity. In this state the site does not have a great deal of potential for livestock grazing and provides little wildlife benefits other than cover. A definite threshold has been crossed and the shrubs will remain dominant unless high energy inputs are applied, generally in the form of careful brush and pest management to reduce their dominance and provide a release of grasses and forbs. Reseeding on this site is difficult and not usually successful. Two growing seasons complete rest would improve the amount of vegetative cover and would probably be a good first step. After rest is applied, then careful brush management to reduce sand sagebrush, skunkbush and possibly yucca as well as pest management to control annual weed competition should be applied.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	850	1075	1200
Forb	30	45	60
Grass/Grasslike	20	30	40
Microbiotic Crusts	0	0	0
Tree	0	0	0
Total	**900**	**1150**	**1300**

Figure 16. Plant community growth curve (percent production by month). TX0535, Shrub Dominant with Annual Forbs and Few Grasses. Shrub Dominant (90%) with Annual Forbs and Few Grasses (10%)..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	7	9	12	24	18	14	4	5	4	3	0

Transition T1A
State 1 to 2

The Tallgrass/Shrub State can transition to the Shrub/Midgrass State if the plant community is grazed heavy and continuously, no fire, and no brush management practices are implemented.

Restoration pathway R2A
State 2 to 1

With the implementation of various conservation practices such as Prescribed Grazing and Brush Management, the Shrub/Midgrass State can revert back to the Tallgrass/Shrub State.

Conservation practices

Brush Management
Prescribed Grazing

Transition T2A
State 2 to 3

With continued heavy grazing pressure, no fires, no brush management, and no pest management, the Shrub/Midgrass State transitions to the Shrubland State.

Restoration pathway R3B
State 3 to 2

The Shrubland State can be restored to the Tallgrass/Shrub State with the implementation of associated

conservation practices including Prescribed Grazing, Brush Management, and Pest Management over a four to five-year period.

Conservation practices

Brush Management
Prescribed Grazing
Integrated Pest Management (IPM)

Restoration pathway R3B
State 3 to 2

The Shrubland State can be restored to the Tallgrass/Shrub State with the implementation of associated conservation practices including Prescribed Grazing, Brush Management, and Pest Management over a four to five-year period.

Conservation practices

Brush Management
Prescribed Grazing
Integrated Pest Management (IPM)

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	**Tallgrasses**			400–800	
	sand bluestem	ANHA	*Andropogon hallii*	250–500	–
	little bluestem	SCSC	*Schizachyrium scoparium*	100–200	–
	giant sandreed	CAGI3	*Calamovilfa gigantea*	50–100	–
2	**Midgrasses**			50–140	
	sideoats grama	BOCU	*Bouteloua curtipendula*	50–140	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	50–140	–
	thin paspalum	PASE5	*Paspalum setaceum*	50–140	–
3	**Shortgrasses**			50–140	
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	50–140	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	50–140	–
	coastal sandbur	CESP4	*Cenchrus spinifex*	50–140	–
	fall witchgrass	DICO6	*Digitaria cognata*	50–140	–
	gummy lovegrass	ERCU	*Eragrostis curtipedicellata*	50–140	–
	red lovegrass	ERSE	*Eragrostis secundiflora*	50–140	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	50–140	–
	fringed signalgrass	URCI	*Urochloa ciliatissima*	50–140	–
4	**Cool-season grasses**			20–70	
	Canada wildrye	ELCA4	*Elymus canadensis*	20–70	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	20–70	–
5	**Tallgrasses**			0–30	

	switchgrass	PAVI2	*Panicum virgatum*	0–30	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–30	–
6	**Midgrasses**			50–140	
	spike dropseed	SPCO4	*Sporobolus contractus*	50–140	–
	giant dropseed	SPGI	*Sporobolus giganteus*	50–140	–
Forb					
7	**Forbs**			60–90	
	Forb, annual	2FA	*Forb, annual*	60–90	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	60–90	–
	golden prairie clover	DAAU	*Dalea aurea*	60–90	–
	prairie clover	DALEA	*Dalea*	60–90	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	60–90	–
	beeblossom	GAURA	*Gaura*	60–90	–
	bluebowls	GIAC4	*Giliastrum acerosum*	60–90	–
	camphorweed	HESU3	*Heterotheca subaxillaris*	60–90	–
	dotted blazing star	LIPU	*Liatris punctata*	60–90	–
	grassland blazingstar	MEST3	*Mentzelia strictissima*	60–90	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	60–90	–
	evening primrose	OENOT	*Oenothera*	60–90	–
	gilia beardtongue	PEAM	*Penstemon ambiguus*	60–90	–
	queen's-delight	STSY	*Stillingia sylvatica*	60–90	–
Shrub/Vine					
8	**Shrubs**			150–200	
	sand sagebrush	ARFI2	*Artemisia filifolia*	150–200	–
	fragrant sumac	RHAR4	*Rhus aromatica*	150–200	–
9	**Shrubs**			50–70	
	southwestern rabbitbrush	CHPU4	*Chrysothamnus pulchellus*	50–70	–
	Oklahoma plum	PRGR	*Prunus gracilis*	50–70	–

Animal community

The animal species that utilize this site as habitat are mainly small mammals, song birds, and traditional game species like bobwhite and scaled quail, mule deer, pronghorn antelope and lesser prairie chicken. The combination of grasses, forbs and woody shrubs that occur in the plant community provide suitable habitat for all the above species, at least at some time during the year. Water in the form of surface ponds or springs is not usually present nor is there any flowing streams found within the site itself. Species that require daily watering may move in and out of the site. Predators such as coyotes and bobcats may utilize the site for hunting prey and to hide during the day. If the site is a shrub dominant community, then diversity is decreased and the wildlife habitat will usually be less desirable.

Hydrological functions

Almost no water moves off site. Precipitation infiltrates rapidly. Water in excess of plant needs percolates into shallow aquifers and may manifest itself as spring flow further down in the geologic formation. Recharge may be the greatest contribution the site makes in the water cycle.

Recreational uses

Hunting, Camping, Hiking, Bird watching, Photography, Horseback Riding.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

NRCS FOTG – Section II of the FOTG Range Site Descriptions and numerous historical accounts of vegetative conditions at the time of early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations for support documentation.

Inventory Data References: (documents)

NRCS FOTG – Section II - Range Site Descriptions
NRCS Clipping Data summaries over a 20 year period

Other references

J.R. Bell , USDA-NRCS Rangeland Management Specialist (retired)
Natural Resources Conservation Service - Range Site Descriptions
USDA-Natural Resources Conservation Service - Soil Surveys & Website soil database
Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press
Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
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Approval

Bryan Christensen, 9/11/2023

Acknowledgments

Site Development and Testing Plan
Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	05/13/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 35-40%

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

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

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Not resistant to surface erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Fine sanc single grain surface and very low SOM.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density with small interspaces should make rainfall impact minimal. This site has rapid permeability, runoff is slow and available water holding capacity is low.

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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: Warm-season tallgrasses >

    Sub-dominant: Warm-season midgrasses > Shrubs >

    Other: Forbs > Cool-season grasses

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,300 to 1,800 pounds per acre of total annual production.

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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:** Sand sagebrush and sand shinoak.

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17. **Perennial plant reproductive capability:** All plant species should be capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory or intense wildfires.
