USDA Natural Resources
Conservation Service

Ecological site R077EY063TX
Sand Hills 16-24" 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): 077E–Southern High Plains, Breaks

MLRA 77E occurs along moderately sloping breaks and steep escarpments associated with dissecting river systems and erosional margins of the Southern High Plains. Soil temperature regime is thermic and soil moisture regime is ustic bordering on aridic. Loamy and sandy soils are generally well drained, range from shallow to deep, and developed in Ogallala Formation sediments.

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 sandy soils on wind worked dunes. The reference vegetation is a mixture of tall and midgrasses, forbs, and few shrub species and bare ground. Due to the soils, this site may be one of the first affected by prolonged drought. Careful grazing management should be implemented to ensure the dunes remain protected from wind erosion.

Associated sites

R077EY064TX	**Sandy 16-24" PZ** Undulating to rolling loamy sand soils on adjacent positions. Dominantly tallgrasses, forbs, and few shrubs.
R077EY065TX	**Sandy Bottomland 16-24" PZ** Level to slightly undulating very deep sandy soils on lower floodplains. Tallgrasses, forbs, and scattered trees and shrubs.
R077EY066TX	**Sandy Loam 16-24" PZ** Nearly level to hummocky sandy loam soils on adjacent positions. Mainly midgrass species with some tallgrasses, forbs, and scattered shrubs
R077EY053TX	**Gravelly 16-24" PZ** Gently sloping to steep hillslopes, very deep gravelly loams and gravelly sandy loam soils on adjacent positions. Up to 35% of the soil surface covered with gravels. Intermixed midgrasses and shortgrasses and forbs with occasional tallgrasses.
R077EY571TX	**Wet Bottomland 16-24" PZ** Nearly level to slightly concave loamy subirrigated soils on lower adjacent floodplains. The reference vegetation consists of native tallgrasses, forbs, and scattered trees.

Similar sites

R077EY064TX	**Sandy 16-24" PZ** A level to gently sloping topography with lower shrub dominance and greater vegetative surface cover.
R077AY011TX	**Sand Hills 16-22" PZ** A similar site in MLRA 77A with soils formed in a slightly cooler mesic soil temperature regime.
R078CY107TX	**Sand Hills 23-31" PZ** A similar site in MLRA 78C.

Table 1. Dominant plant species

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

Physiographic features

This site is an upland with very sandy, undulating to steep dune 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 feet. The site also occurs slightly higher on the landscape where sandy Ogallala sediments are exposed and reworked into dunes. Soil parent materials for this site are eolian sands.

Table 2. Representative physiographic features

Landforms	(1) Plains > Dune (2) Plains > Dune
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	610–1,372 m
Slope	1–30%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	610–1,372 m
Slope	0–45%

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, evaporation is high, and short-term droughts are common. 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 17 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 21 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 to 24 inches. Growing season averages 190 days. Average first frost is around October 22, and the last freeze of the season occurs around April 15.

Table 4. Representative climatic features

Frost-free period (characteristic range)	146-164 days
Freeze-free period (characteristic range)	184-194 days
Precipitation total (characteristic range)	508-610 mm
Frost-free period (actual range)	144-176 days
Freeze-free period (actual range)	180-198 days
Precipitation total (actual range)	483-660 mm
Frost-free period (average)	156 days
Freeze-free period (average)	189 days
Precipitation total (average)	559 mm

Climate stations used

- (1) GATE [USC00343489], Gate, OK
- (2) FOLLETT [USC00413225], Follett, TX
- (3) CANADIAN [USC00411412], Canadian, TX
- (4) SANFORD DAM [USC00418040], Fritch, TX
- (5) GUYMON MUNI AP [USW00003030], Guymon, OK
- (6) BEAVER [USC00340593], Beaver, OK
- (7) MEADE [USC00145171], Meade, KS
- (8) BOYS RANCH [USC00411000], Vega, TX
- (9) CLARENDON [USW00023072], Clarendon, TX
- (10) LIPSCOMB [USC00415247], Booker, TX
- (11) CHANNING 2 [USC00411649], Channing, TX
- (12) MIAMI [USC00415875], Miami, TX
- (13) COLDWATER [USC00141704], Coldwater, KS

- (14) REYDON 2SSE [USC00347579], Reydon, OK

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. With significant rainfall events, 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.

The Sand Hills ecological site has undulating to steep deep fine sands with high water infiltration rates and low water storage capacity. The soils have no structure and no well defined horizons. 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: Dreyfoos and Tivoli.

Table 5. Representative soil features

Parent material	(1) Eolian sands
Surface texture	(1) Sand (2) Fine sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.03–10.41 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3

Subsurface fragment volume <=3" (0-101.6cm)	0%
Subsurface fragment volume >3" (0-101.6cm)	0%

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 Site is unique in many respects. The site developed in wind worked alluvial or eolian deposits. Lack of soil development and recent climatic conditions have been major influences on plant community development. As a rule, these are very young soils developmentally. In fact, some areas of the Sand Hills site now supporting a plant community 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 from one place to another. Describing the reference plant community for this site is difficult because of the different age of sediments, and the stage of development of the plant community. It may be that age of deposition and soil stability are major factors in this process. For purposes of a site description, it is assumed that the more diverse plant community is more indicative of the reference community that will develop over time.

The reference plant community is a mixture of tallgrasses, perennial forbs and shrubs. A varying amount of annual forbs can be found depending on the moisture situation in a given year. The dominant tallgrasses are sand bluestem (*Andropogon hallii*), giant sandreed (*Calamovilfa gigantea*), little bluestem (*Schizachyrium scoparium*) and the taller dropseed (Sporobolus spp.) species. Lesser amounts of switchgrass (*Panicum virgatum*) and Indiangrass (*Sorghastrum nutans*) can be found where moisture conditions are slightly more favorable. 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 texana*), gaura (Gaura spp.), western ragweed (*Ambrosia psilostachya*), camphorweed (*Heterotheca subaxillaris*), prairie spiderwort (*Tradescantia occidentalis*), sand lilly (*Mentzelia nuda*), and annual wild buckwheat (*Eriogonum annuum*). The major shrubs are sand sagebrush (Artemesia filifolia) and skunkbush sumac (Rhus tribolata). Lesser amounts of sand plum (*Prunus angustifolia*), yucca (Yucca spp.), and southwestern rabbit brush (*Chrysothamnus pulchellus*) are 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. There are just a scattering of tree species present on the site. Western soapberry (*Sapindus saponaria*) and hackberry (Celtis spp.) can occasionally be found in the lower lying areas. 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 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.

Heavy, and sometimes even moderate, rates of grazing with domestic livestock for prolonged periods of time will severely pressure the most palatable plants. Disturbance to the soil surface causes a great increase in annual species. During the grazing and browsing processes, shrubs may be utilized somewhat, but little pressure is placed upon them. The balance between grasses, forbs and shrubs is rather delicate, and one would think that over utilization of the more palatable species would most assuredly favor the shrubs on this site. However, a 20 year study at Woodward, Oklahoma on pastures that were a mixture of Sand Hills and Deep Sand ecological sites found that the canopy cover of sand sagebrush fluctuated more due to weather than to stocking rate (Figure 1). The study found that sand sagebrush canopy cover fluctuations were similar at all stocking rates. An 11 - year study in Colorado found no difference in sagebrush canopy cover between moderate and heavy stocking rates. On the Sand Hills ecological site, stocking rate affects grass and forb availability and diversity but it does not appreciably favor an increase in shrub canopy.

Species diversity is usually desirable for ecological processes. Species diversity is also an important consideration when applying management programs for wildlife and cattle grazing. There are several species of wildlife that frequent this site. The state of the plant community certainly influences the quality of habitat for quail, lesser prairie

chicken, turkey and deer. All of these species prefer a mixture of grass, forbs and shrubs.

Natural fire, no doubt, played a part in the sites' ecology. This is true of nearly all plains sites. Since cover is sparse, and bare areas exist throughout the site, especially in dry years, fuel continuity may not have been sufficient for complete burns. There are historical accounts of fires burning up to the Sand Hills and then dying out. There were undoubtedly times when the site did burn and wildfires have been observed during present days with the results noted. These results are mixed. Some active erosion may take place post-burn, especially if moisture is lacking and the soil is bare in early spring. Many plant bases and seedlings can be cut off by blowing sand. If post-burn rainfall is adequate, erosion can be minimal and recovery can occur. Sand sagebrush strongly sprouts after burning and few plants are killed. Sagebrush canopy cover returns to pre-burn levels in about 3 years, so it is doubtful that a single fire will cause brush suppression that will last over 3 years. The use of prescribed fire should be done with the utmost care on the Sand Hills ecological site. In fact, unless the site is in very good ecological condition, prescribed burning should be avoided. 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. A variety of shrubs, tall grasses and forbs will be more beneficial for wildlife habitat and livestock grazing and will aid in the function of ecological processes such as nutrient cycling and the hydrological cycle.

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 may be crossed. This means that once changes have progressed to some critical point, the balance of the community has been altered to the extent that a return to the former state is not possible, that is, not possible unless some significant form of energy is applied to make the return happen.

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 brush management to decrease the amount of woody shrubs and increase the amount of grasses and forbs. This shift in the 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 upon the present state of the site and upon the desired resultant community. This process occurs on all ecological sites, but some sites are more resistant to change than others.

State and Transition Diagram:
A State and Transition Diagram for the Sand Hills (R077EY063TX) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases. Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

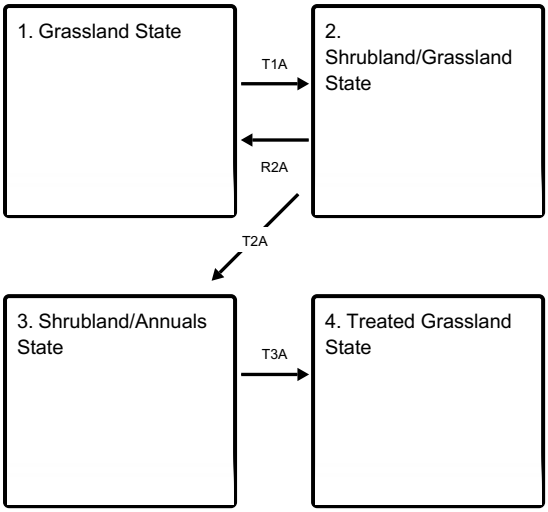
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

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.

State and transition model

Ecosystem states



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

R2A - Reintroduction of historic disturbance return intervals

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

T3A - Chemical and/or physical removal of woody canopy

State 1 submodel, plant communities

1.1. Tallgrass with Forbs and Shrubs Community

State 2 submodel, plant communities

2.1. Shrub Dominant with Grasses Community

State 3 submodel, plant communities

3.1. Shrub Dominant with Annuals Community

State 4 submodel, plant communities

4.1. Mid/Tallgrass with Shrub Community

State 1
Grassland State

This is the reference or diagnostic community for the site. The description is based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work. The site has moderate plant diversity, and in a well managed state can be moderately productive. The major grass species are sand bluestem, little bluestem and giant sandreed. There is a good variety of forbs, both annual and perennial. Shrubs such as sand sagebrush and skunkbush sumac are scattered throughout in a patchy pattern rather than in a continuous canopy.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- sand bluestem (*Andropogon hallii*), grass
- giant calliergon moss (*Calliergon giganteum*), grass

Community 1.1
Tallgrass with Forbs and Shrubs Community

Figure 8. 1.1 Tallgrass with Forbs and Shrubs Community

The reference plant community is a mixture of tall and midgrasses, perennial forbs and shrubs. There is a considerable range in the actual composition from one area of the site to another and from site to site. The site has moderate plant diversity, and in a well managed state can be moderately productive. 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 buckwheat, hairy gaura and sand lily (ten-petal mentzelia) are most prevalent. Sand sagebrush and skunkbush sumac are scattered throughout in a patchy pattern rather than in a continuous canopy. Productivity and diversity are good compared to site potential. The community appears stable and erosion is minimal. The site is good habitat for bobwhite quail, lesser prairie chicken, deer, and in some cases, turkey. Both cover and food supply are attainable. This site is fragile from a livestock grazing standpoint, and must be managed carefully. It is best for summer grazing as the forage species present are more nutritious at that time. The site will never have the potential for forage production that many other sites have and grazing use should always be very judicious. There may be as much or more potential for wildlife habitat than for forage production.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	801	1110	1345
Shrub/Vine	448	605	841
Forb	219	303	404
Tree	22	34	45
Microbiotic Crusts	–	–	–
Total	**1490**	**2052**	**2635**

Figure 10. Plant community growth curve (percent production by month). TX1512, HCPC - Warm Season Natives. "Historic Climax Plant Community

with warm season natives, scattered forbs and woody species.".

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	4	7	19	23	17	8	12	5	2	1

State 2
Shrubland/Grassland State

This Shrubland/Grassland State is dominated by shrubs such as sand sagebrush and skunkbush sumac, with approximately 20% perennial grasses (mainly midgrasses) and numerous annual forbs. It is much less diverse than the reference plant community and total production is somewhat less. Forbs are not as plentiful and the total productivity is generally somewhat less than the presumed historic plant community. The site is limited in forage production for livestock. The tallgrasses have decreased significantly and the shrubs have become very prominent.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- skunkbush sumac (*Rhus trilobata*), shrub

Community 2.1
Shrub Dominant with Grasses Community

Figure 11. 2.1 Shrub Dominant with Grasses Community

This plant community is dominated by shrubs such as sand sagebrush and skunkbush sumac, with approximately 20% perennial grasses (mainly midgrasses) and numerous annual forbs. It is much less diverse than the reference plant community and total production is somewhat less. Forbs are not as plentiful and the total productivity is generally somewhat less than the reference plant community. Although plant diversity is less, quail, deer and prairie chicken still utilize the site. The quality of habitat would be improved if the shrub component was reduced and the tallgrass component increased. The site is limited in forage production for livestock. The tallgrasses have decreased significantly and the shrubs have become very prominent. It may be possible to restore this plant community to a plant community that more closely resembles the reference community, but this will take several years to accomplish. It is possible that prudent brush management could accelerate the return to reference condition in about 2 to 4 years. In this plant community, there is usually a sufficient seed source and old rootstocks of the taller grasses remaining. Under this scenario, the plant community can be manipulated through prescribed grazing with significant rest periods and selective control of annual or perennial weedy forbs. If there is too much shrub removal, the community may be changed to a more grassland state as described in Plant Community 4.1. Careful management will be necessary following any brush management. Achieving a balanced community, indicating a slow return to the reference community, may take five to eight years. Careful grazing management will have to accompany any sort of brush management efforts. The site is stable and erosion is minimal. This community may have more potential for wildlife habitat than for forage production for livestock.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	1087	1457	1664
Grass/Grasslike	224	336	420
Forb	112	168	224
Tree	22	34	45
Microbiotic Crusts	–	–	–
Total	**1445**	**1995**	**2353**

Figure 13. Plant community growth curve (percent production by month). TX1518, Shrub Dominant with 20% grasses and forbs. Shrub dominant with 20 percent perennial grasses and annual forbs..

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/Annuals State

This Shrubland/Annuals State is shrub dominant with annual forbs and annual grasses. Productivity is low and plant diversity is limited. Plant community is dominated by shrubs, mainly sand sagebrush or skunkbush sumac. There are very few perennial grasses present. Annual forbs and grasses prevail and vary in production depending on available moisture. If there are small amounts of perennial grasses remaining, the site may be able to be manipulated by brush management and long rest periods with periodic control of annual forb populations.

Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- skunkbush sumac (*Rhus trilobata*), shrub
- signalgrass (*Brachiaria*), grass

Community 3.1
Shrub Dominant with Annuals Community

Figure 14. 3.1 Shrub Dominant with Annuals Community

Figure 15. 3.1 Shrub Dominant with Annuals Community (2)

This plant community is shrub dominant with annual forbs and annual grasses. Productivity is low and plant diversity is limited. These sites will usually have minor wind erosion from winter and early spring winds affecting bare places where annual vegetation prevailed. These sites are not fully stable. Plant communities are dominated by shrubs, mainly sand sagebrush or skunkbush sumac. There are very few perennial grasses present. Annual forbs and grasses prevail and vary in production depending on available moisture. If there are small amounts of perennial grasses remaining, the site may be able to be manipulated by brush management and long rest periods with periodic control of annual forb populations. Allowing complete rest for two growing seasons would improve the amount of vegetative cover and would probably be a first step in site restoration. After rest is applied, careful brush management to reduce sagebrush and annual competition might be considered. With brush management and rest, it is anticipated that this vegetative state might move towards a mid-seral state of perennial dropseed species and other mid-seral plants. This progression may take 5 to 10 years. Shrubs will also re-establish on these sites. It is doubtful that these sites will return to state 2 within a reasonable timeframe. Reseeding on this site is difficult and is usually not successful. This plant community does not have a great deal of potential for livestock grazing. There may be limited potential for wildlife habitat for bobwhite quail or prairie chicken. Increased diversity is needed for both livestock and wildlife.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	953	1065	1065
Grass/Grasslike	112	224	359
Forb	168	280	314
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**1233**	**1569**	**1738**

Figure 17. Plant community growth curve (percent production by month). TX1526, Shrub Dominant with annual forbs and annual grasses. Shrubs with annual forbs and grasses..

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

State 4
Treated Grassland State

The Treated Grassland State is a tall/midgrass/shrub plant community that is a result of brush management. The grasses will be dominant with a small component of shrubs such as skunkbush sumac and sand sage. This community will eventually, through natural processes, regain the shrub component similar to the reference state.

Dominant plant species

- sand bluestem (*Andropogon hallii*), grass
- dropseed (*Sporobolus*), grass
- grama (*Bouteloua*), grass

Community 4.1
Mid/Tallgrass with Shrub Community

Figure 18. 4.1 Mid/Tallgrass with Shrubs Community

This is a tall/midgrass/shrub plant community that is a result of brush management. The grasses will be dominant with a small component of shrubs such as skunkbush sumac and sand sage. Generally, chemical treatment will not result in total loss of the shrub community unless repeated spraying is done. The photo above is a herbicide treated site. This community will eventually, through natural processes, regain the shrub component similar to the reference state. It is unknown exactly how long this process may take but could be 30 years or longer depending upon weather cycles. Maintaining this particular plant community requires suppression of the shrubs by chemical treatment, prescribed burning, prescribed grazing, or some combination of these management techniques.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1121	1608	2018
Forb	112	224	404
Shrub/Vine	112	202	336
Tree	–	–	–
Microbiotic Crusts	–	–	–
Total	**1345**	**2034**	**2758**

Figure 20. Plant community growth curve (percent production by month). TX1519, Mid/Tallgrasses with Shrubs. "Native, Sandhills, Midgrasses and Tallgrasses with shrubs.".

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

With heavy continuous grazing, no fires and no brush management practices, the Grassland State will transition into the Shrubland/Grassland State.

Restoration pathway R2A
State 2 to 1

With the implementation of various conservation practices such as Prescribed Grazing, Prescribed Burning and Brush Management, the Shrubland/Grassland State will be restored back to the Grassland State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Transition T2A
State 2 to 3

With heavy continuous grazing, no fires, and no brush management, The Shrubland/Grassland State will transition to the Shrubland/Annuals State.

Constraints to recovery. Absence of disturbance, natural regeneration over time and prolonged excessive grazing pressure

Transition T3A
State 3 to 4

With the implementation of various available conservation practices such as Prescribed Grazing, Brush Management, and Pest Management, the Shrubland/Annuals State will transition into a Treated Grassland State.

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	**Tallgrasses**			448–757	
	sand bluestem	ANHA	*Andropogon hallii*	0–252	–
	giant sandreed	CAGI3	*Calamovilfa gigantea*	0–252	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–252	–
2	**Midgrasses**			62–123	
	spike dropseed	SPCO4	*Sporobolus contractus*	0–62	–
	giant dropseed	SPGI	*Sporobolus giganteus*	0–62	–
3	**Tallgrasses**			62–123	
	switchgrass	PAVI2	*Panicum virgatum*	0–62	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–62	–
4	**Midgrasses**			168–280	
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–67	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–67	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–67	–
	signalgrass	BRACH	*Brachiaria*	0–67	–
	sandbur	CENCH	*Cenchrus*	0–67	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–67	–
	gummy lovegrass	ERCU	*Eragrostis curtipedicellata*	0–67	–

	red lovegrass	ERSE	*Eragrostis secundiflora*	0–67	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	0–67	–
	thin paspalum	PASE5	*Paspalum setaceum*	0–67	–
	blowout grass	REFL	*Redfieldia flexuosa*	0–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–67	–
	purple sandgrass	TRPU4	*Triplasis purpurea*	0–67	–
5	**Cool Season grasses**			62–135	
	Schweinitz's flatsedge	CYSC3	*Cyperus schweinitzii*	0–45	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–45	–
	needle and thread	HECO26	*Hesperostipa comata*	0–45	–
Forb					
6	**Forbs**			219–404	
	Forb, annual	2FA	*Forb, annual*	0–101	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–101	–
	field sagewort	ARCAC	*Artemisia campestris ssp. caudata*	0–101	–
	partridge pea	CHFAF	*Chamaecrista fasciculata var. fasciculata*	0–101	–
	whitemouth dayflower	COERE	*Commelina erecta var. erecta*	0–101	–
	woolly prairie clover	DALA3	*Dalea lanata*	0–101	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–101	–
	gilia	GILIA	*Gilia*	0–101	–
	camphorweed	HESU3	*Heterotheca subaxillaris*	0–101	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	0–101	–
	dotted blazing star	LIPU	*Liatris punctata*	0–101	–
	grassland blazingstar	MEST3	*Mentzelia strictissima*	0–101	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–101	–
	pony beebalm	MOPE	*Monarda pectinata*	0–101	–
	gilia beardtongue	PEAM	*Penstemon ambiguus*	0–101	–
	Riddell's ragwort	SERI2	*Senecio riddellii*	0–101	–
	queen's-delight	STSY	*Stillingia sylvatica*	0–101	–
	Virginia tephrosia	TEVI	*Tephrosia virginiana*	0–101	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–101	–
Shrub/Vine					
7	**Shrubs**			448–818	
	sand sagebrush	ARFI2	*Artemisia filifolia*	0–202	–
	southwestern rabbitbrush	CHPU4	*Chrysothamnus pulchellus*	0–202	–
	Oklahoma plum	PRGR	*Prunus gracilis*	0–202	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–202	–
	yucca	YUCCA	*Yucca*	0–202	–
Tree					
8	**Trees**			22–45	
	hackberry	CELTI	*Celtis*	0–22	–
	wingleaf soapberry	SASA4	*Sapindus saponaria*	0–22	–

Animal community

The animal species that utilize this site as habitat are mainly small mammals, song birds, and traditional game species like turkey, bobwhite quail, whitetail deer, mule deer 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 are 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 very 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, Birdwatching, Photography, and 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 – NRI 417 data
NRCS Clipping Data summaries over a 20 year period

Other references

J.R. Bell, RMS, NRCS, Amarillo, Texas (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, 9/12/2023

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	09/04/2007
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.

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

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

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

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 very resistant to surface erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Fine sand single grained surface; 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 capacity is low.

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season tallgrasses >>

    Sub-dominant: Warm-season midgrasses > Shrubs/Vines >

    Other: Forbs

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses due to their growth habit will exhibit some mortality and decadence, though minimal.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1300 to 2400 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:** Sand sagebrush and sand shinoak can be invasive.

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