USDA Natural Resources
Conservation Service

# Ecological site R077AY666TX
# Sandy 16-22" PZ

Last updated: 9/11/2023
Accessed: 11/09/2024

## 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.

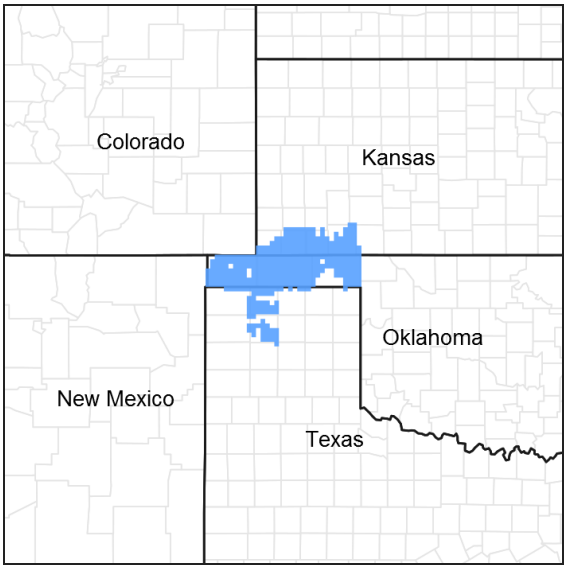



**Figure 1. Mapped extent**

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): 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

This site occurs on nearly level to rolling loamy sand soils. Reference vegetation consists of tallgrasses, midgrasses, forbs, and shrubs. In the absence of periodic fire, woody species canopy may increase. Abusive grazing practices may lead to a decline in the more palatable tallgrass species.

## Associated sites

| | |
|---|---|
| R077AY011TX | **Sand Hills 16-22" PZ**<br>Undulating to steep, poorly developed sandy soils on dunes. Structureless subsoils of sand and loamy sand. Combination of tall grasses and shrubs dominant, with with areas of bare ground. |
| R077AY012TX | **Sandy Loam 16-22" PZ**<br>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. |

## Similar sites

| | |
|---|---|
| R077EY064TX | **Sandy 16-24" PZ**<br>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) *Andropogon hallii*<br>(2) *Schizachyrium scoparium* |

## Physiographic features

The Sandy site occurs on nearly level to rolling soils on sand sheets and dunes. Due to the topography of this site, runoff can be both generated and received. This generally depends on the amount of vegetative cover and intensity of precipitation events.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Plains > Sand sheet<br>(2) Plains > Dune<br>(3) Plains > Interdune |
| Runoff class | Very low to medium |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 2,500–4,500 ft |
| Slope | 0–10% |
| Aspect | Aspect is not a significant factor |

**Table 3. Representative physiographic features (actual ranges)**

| | |
|---|---|
| Runoff class | Very low to medium |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 2,300–4,990 ft |
| Slope | 0–10% |

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

## Influencing water features

No streams are found within the site. Non-stream characteristics: Soils associated with this sites allow for moderately rapid to moderate infiltration. In years with above average rainfall, some water may percolate beyond the root zone and recharge aquifers. Maximum amounts of water are available to plants. Small rainfall events may have a visible effect on vegetation.

## 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.

These are very deep soils derived from eolian sands from the early Holocene and late Pleistocene age. They are moderate to low in fertility, have low to moderate available water capacity, moderately rapid to moderate permeability rates, and very low to moderate runoff. Plant roots easily penetrate the soil. These soils yield water to plants easily and are susceptible to wind and water erosion without good vegetative cover.

Representative soil components for this site include: Bigbow loamy fine sand, Eva loamy fine sand, and Dalhart loamy fine sand.

**Table 5. Representative soil features**

| | |
|---|---|
| Parent material | (1) Eolian sands |
| Surface texture | (1) Loamy fine sand<br>(2) Loamy sand |
| Family particle size | (1) Coarse-loamy<br>(2) Fine-loamy |
| Drainage class | Well drained to somewhat excessively drained |
| Permeability class | Moderate to moderately rapid |
| Soil depth | 80 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-40in) | 3.4–7.7 in |
| Calcium carbonate equivalent (0-40in) | 0–25% |
| Electrical conductivity (0-40in) | 0–1 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 0 |
| Soil reaction (1:1 water) (0-40in) | 6.1–8.4 |
| Subsurface fragment volume <=3" (0-40in) | 0–2% |
| Subsurface fragment volume >3" (0-40in) | 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 soils, topographic location, climate, periodic droughts and fire influenced the stabilization of the reference plant community on this site as was the case on most all High Plains ecological sites. The plant community as found by European settlers in the early 1800’s developed under the prevailing climate over time along with the soils in their topographic location. Grazing and/or browsing by local and nomadic wildlife influenced the plant community as well. The resulting plant community was the Tallgrass/Midgrass Community (1.1), which consisted of tall and

midgrasses, associated forbs and scattered woody shrubs. The dominant tallgrasses were sand bluestem (*Andropogon hallii*) and little bluestem (Schizachrium scoparium). The midgrasses that were present include sideoats grama (*Bouteloua curtipendula*), sand lovegrass (*Eragrostis trichodes*), dropseeds (Sporobolus spp.), sand paspalum (Paspalum strumarium), fall witchgrass (*Digitaria cognata*), hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*), silver bluestem (*Bothriochloa laguroides*), plains bristlegrass (*Setaria leucopila*), red lovegrass (*Eragrostis secundiflora*), gummy lovegrass (*Eragrostis curtipedicellata*), sandbur (Cenchrus insertus), hooded windmillgrass (*Chloris cucullata*) and perennial three-awns (Aristida spp.). Some cool-season grasses occur in small amounts such as Canada wildrye (*Elymus canadensis*) and needle & thread (Heterostipa comata). Typically associated forbs included western ragweed (*Ambrosia psilostachya*), dotted gayfeather (*Liatris punctata*), annual wild buckwheat (Polgenum convolvulus), queens delight (*Stillingia sylvatica*), prairie clover (*Dalea purpurea*), catclaw sensitivebriar (*Mimosa aculeaticarpa* var. biuncifera), golden dalea (*Dalea aurea*), camphorweed (Heterotheca pilosa), sand lily (*Mentzelia decapetala*), gaura (Gaura spp.), prairie spiderwort (*Tradescantia occidentalis*), erect dayflower (*Commelina erecta*) and numerous annual forbs. Woody species include sand sagebrush (Artemesia filifolia), skunkbush sumac (*Rhus aromatica*), sand plum (*Prunus angustifolia*), yucca (*Yucca glauca*) and southwestern rabbitbrush (*Chrysothamnus pulchellus*). Nutrient cycling, the water cycle, water-shed protection and biological functions are functioning at their peak.

Natural fire likely played an important role in the function of most plains sites, especially the tall grass communities. Tallgrasses such as sand bluestem and little bluestem were dependent upon fire to stimulate them and remove old growth that would accumulate on the soil surface. Fire also kept shrubs from getting too thick. Fire helped to keep a balance between the grasses, forbs and shrubs. Wildlife habitat was improved by opening up canopies and stimulating forb growth. The deep rooted species that grow on the site are not easily damaged by fire. Shrubs usually resprout, but are suppressed for a time allowing grasses to dominate. If periodic fire does not occur, then the woody plants will slowly increase and with grazing pressure can begin to dominate the site. Since fire is not always available to be applied, then practices such as brush management may necessary from time to time to help keep the community in balance.

Periodic overgrazing and trampling by migrating herds of bison and resident herds of pronghorn antelope probably occurred during drought periods. However, long rest periods followed once the large herds of bison and antelope moved out of the area, allowing the resilient grassland to re-establish itself and maintain its climax community structure. The major forces influencing transition from the historic climax community is continued overgrazing by livestock and the decrease in the frequency and intensity of fire. As livestock and wildlife numbers increase and grazing use exceeds a plants ability to sustain defoliation, the more palatable and generally more productive species decline in stature, productivity and density.

The productive capacity of this site is moderately high if good management is applied. The tallgrasses are fairly sensitive to overgrazing and will begin to decrease if continuous heavy grazing is applied. They respond to rest very well and if grazed moderately and rested periodically toward the mid to late growing season, they will generally persist. If excessive grazing continues ecological retrogression occurs. As retrogression proceeds, the tallgrasses give way to an increase in midgrasses such as sideoats grama, dropseed species and perennial threeawns. The better quality forbs are replaced with less palatable species such as gaura, western ragweed, annual wild buckwheat and camphorweed and there will be an increase in annual forbs. Sand sagebrush and skunkbush can increase to >20% of the total plant community, on some sites yucca plants may start to increase. The decrease in density and stature of the tall grass vegetation and increase in density of the woody vegetation brings about a new plant community, a Midgrass/Shrub Community (2.1).

In the Midgrass/Shrub Community (2.1), the transition back to near reference is reversible with proper grazing management, brush and pest management. Prescribed burning could be used if the conditions allow. The production of vegetation has shifted from mostly herbaceous vegetation to more woody, although the herbaceous vegetation biomass is still the largest amount. Nutrient cycling, the water cycle, watershed protection and biological functions have changed little.

If long-term heavy grazing continues, a threshold will be crossed to a Shrub Dominant/Annuals Community phase (3.1). In this degraded state, typical vegetation will be annuals, western ragweed, perennial threeawn, red lovegrass, gummy lovegrass, sandbur and a significant canopy of sand sagebrush, yucca and possibly skunkbush. The loss of herbaceous cover and increased bare ground encourages accelerated erosion. Nutrient cycling, the water cycle, watershed protection and biological functions have been severely reduced. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration of

phase (3.1) will require prescribed grazing with rest periods during the growing season, re-seeding bare areas with adapted native grass species, and chemical and/or mechanical brush management and some form of pest management. With the reduced amounts of grass fuel, prescribed burning is usually not an option in this phase.

The sandy site is not particularly resistant to heavy grazing but exhibits amazing resilience. If even a small seed source of the tallgrasses remains and some old root crowns are still viable, then recovery is possible with minimal re-seeding. Recovery can occur fairly rapid if the competitive plants are controlled and proper grazing management is applied. Full recovery and maintenance of the reference community requires continued proper grazing management as well as occasional brush and pest management.

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.

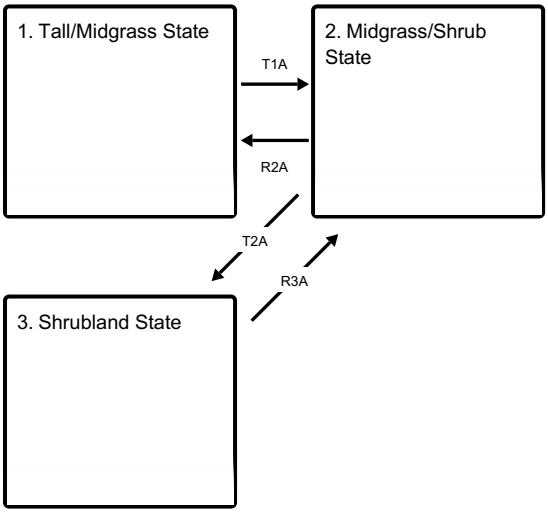
STATE AND TRANSITIONAL PATHWAYS: (DIAGRAM)
The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would 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 or due to natural occurrences or both. At some point in time thresholds are crossed. This means that once changes have progressed to some certain 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 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 other sites. Also, some sites are more resilient, that is, they tend to be able 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.

As it relates to this site, the plant community balance is more fragile than some of the short grass sites are. This balance is necessary for the community to function properly. Tall grasses are not as resistant to grazing as short and mid grass 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** - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

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

**R3A** - Adequate rest from defoliation coupled with brush management

**State 1 submodel, plant communities**

1.1. Tall and Midgrass Community

**State 2 submodel, plant communities**

2.1. Midgrass/Shrubs/Annual Forbs Community

**State 3 submodel, plant communities**

3.1. Shrub Dominant Community

## State 1
## Tall/Midgrass State

Dominated by tall and midgrasses with few perennial forbs and scattered shrubs. Dominant tallgrasses include sand and little bluestem. Dominant shrubs include sand sagebrush and sand shinoak with lesser amounts of skunkbush, sand plum, and southwest rabbitbrush.

### Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- sand bluestem (*Andropogon hallii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

## Community 1.1
## Tall and Midgrass Community

**Figure 8. 1.1 Tall/Midgrass Dominant Community**

The interpretive plant community for this site is this "reference" plant community. It is a mixture of tall/midgrasses, forbs, and a few woody shrubs. The major tallgrass species are sand bluestem and little bluestem. The midgrasses include sideoats grama, sand lovegrass, sand paspalum, fall witchgrass, hairy grama, blue grama, dropseed species, perennial three-awns, hooded windmillgrass and gummy and red lovegrass. Cool-season grasses are Canada wildrye and needle & thread. There were numerous perennial forbs present (see group production below) and a few scattered shrubs such as sand sagebrush, skunkbush sumac, yucca and an occasional sand plum thicket. The plant community's ecological processes were in balance with the environment. Most energy and nutrient cycling was contained in the narrow grass/soil interface and evapo-transpiration was minimal. Maintenance of the HCPC requires continued proper grazing management as well as occasional brush and pest management.

**Table 6. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 1120 | 1240 | 1360 |
| Shrub/Vine | 210 | 230 | 250 |
| Forb | 70 | 80 | 90 |
| Tree | 0 | 0 | 0 |
| **Total** | **1400** | **1550** | **1700** |

**Figure 10. Plant community growth curve (percent production by month). TX0529, Tall/Midgrasses with forbs/shrubs. Tall and midgrass dominant with few shrubs and forbs..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 6 | 9 | 21 | 24 | 14 | 6 | 11 | 4 | 2 | 1 |

## State 2
## Midgrass/Shrub State

As retrogression proceeds, the tallgrasses give way to an increase in midgrasses such as sideoats grama, dropseed species and perennial three-awn. The better quality forbs are replaced with less palatable species such as gaura, western ragweed, annual wild buckwheat and camphorweed and there will be an increase in annual forbs. Sand sagebrush, yucca and skunkbush can increase to >20% of the total plant community.

### Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- sand lovegrass (*Eragrostis trichodes*), grass
- ragweed (*Ambrosia*), other herbaceous

## Community 2.1
## Midgrass/Shrubs/Annual Forbs Community

**Figure 11. 2.1 Midgrass/Shrubs/Annual Forbs Community**

This plant community represents the first phase in the transition of the Midgrass/Shrub Community (2.1) toward the Shrub Dominant Community (3.1). As retrogression proceeds, the tallgrasses give way to an increase in midgrasses such as sideoats grama, dropseed species and perennial three-awn. The better quality forbs are replaced with less palatable species such as gaura, western ragweed, annual wild buckwheat and camphorweed and there will be an increase in annual forbs. Sand sagebrush, yucca and skunkbush can increase to >20% of the total plant community. The production of vegetation has shifted from mostly herbaceous vegetation to more woody, although the herbaceous vegetation biomass is still the largest amount. Nutrient cycling, the water cycle, watershed protection and biological functions have changed little. Proper grazing and brush management can easily maintain this phase and prevent the transition toward the Shrub Dominant Community phase (3.1).

**Table 7. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 800 | 900 | 1000 |
| Shrub/Vine | 300 | 350 | 400 |
| Forb | 100 | 150 | 200 |
| Tree | 0 | 0 | 0 |
| **Total** | **1200** | **1400** | **1600** |

**Figure 13. Plant community growth curve (percent production by month). TX0524, Midgrasses/Annual Forbs/Shrubs. Midgrasses, Annual forbs and Shrubs. Few tall grasses, increased midgrasses, and increasing shrub cover..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 6 | 9 | 21 | 24 | 14 | 6 | 11 | 4 | 2 | 1 |

## State 3
## Shrubland State

There are annual grasses and forbs in understory and very few perennial grasses remaining. Even in this state, a few old root crowns of perennial grasses remain. There may be sufficient seed sources for recovery to the Tall/Midgrass State or Midgrass/Shrub State.

### Dominant plant species

- sand sagebrush (*Artemisia filifolia*), shrub
- soapweed yucca (*Yucca glauca*), shrub
- sumac (*Rhus*), shrub

## Community 3.1

## Shrub Dominant Community

**Figure 14. 3.1Shrub Dominant Community**

The Shrub Dominant Community (3.1) is a shrub community with sand sagebrush, yucca and possibly skunkbush being the primary woody plants. The understory consists of annual grasses and forbs with very few perennial grasses remaining. Few if any reference community grasses and forbs are present. There will be a high percentage of bare ground scattered throughout the site. Herbaceous forage production is less than half of the reference community. The moisture regime is less than normal because of evapo-transpiration losses and bare ground has increased. Nutrient cycling, the water cycle, watershed protection and biological functions have decreased substantially. Major energy and economic inputs are required to change the Shrub Dominant Community (3.1) back to near reference conditions. Brush and pest management, prescribed grazing, and perhaps range seeding will be necessary at a major expense. This site is not particularly resistant to heavy grazing but exhibits amazing resilience. If even a small seed source of the tallgrasses remains and some old root crowns are still viable, then recovery is possible with minimal re-seeding. Recovery can occur fairly rapid if the competitive plants are controlled and proper grazing management is applied. Full recovery and maintenance of the reference community requires continued proper grazing management as well as occasional brush and pest management.

**Table 8. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 800 | 1000 | 1500 |
| Forb | 250 | 300 | 350 |
| Shrub/Vine | 250 | 300 | 300 |
| Tree | 50 | 50 | 50 |
| **Total** | **1350** | **1650** | **2200** |

**Figure 16. Plant community growth curve (percent production by month). TX0525, Shrub/Annuals Dominant. Invasion of shrubs such as sagebrush has formed a shrubland and dominate the site. The understory consists of annual forbs and grasses. Bare ground has increased to (>40%)..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 3 | 15 | 25 | 22 | 10 | 8 | 10 | 4 | 1 | 1 |

## Transition T1A
## State 1 to 2

The tallgrasses are fairly sensitive to overgrazing and will begin to decrease if continuous heavy grazing is applied. They respond to rest very well and if grazed moderately and rested periodically toward the mid to late growing season, they will generally persist. As retrogression proceeds, the tallgrasses give way to an increase in midgrasses. The better quality forbs are replaced with less palatable species. Sand sagebrush and skunkbush can increase to >20% of the total plant community, on some sites yucca plants may start to increase.

### Restoration pathway R2A
### State 2 to 1

With the application of various conservation practices such as Prescribed Grazing, Brush Management, and Pest Management, the Midgrass/Shrub State (2.1) can be reverted back to the Tall/Midgrass State (1.1).

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Grazing |
| Integrated Pest Management (IPM) |

### Transition T2A
### State 2 to 3

If long-term abusive grazing continues, along with no fires and no brush management, a threshold will be crossed to a Shrub Dominant Community phase (3.1) from the Midgrass/Shrub State (2.1).

### Restoration pathway R3A
### State 3 to 2

With the application of various conservation practices such as Prescribed Grazing, Brush Management, Pest Management, and Range Planting, the Shrubland State (3.1) can be reverted back to the Midgrass/Shrub State (2.1).

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Grazing |
| Range Planting |
| Integrated Pest Management (IPM) |

## Additional community tables

**Table 9. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Tallgrasses** | | | 375–500 | |
| | sand bluestem | ANHA | *Andropogon hallii* | 375–500 | – |
| | little bluestem | SCSC | *Schizachyrium scoparium* | 375–500 | – |
| 2 | **Midgrasses** | | | 185–310 | |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 185–310 | – |
| | sand lovegrass | ERTR3 | *Eragrostis trichodes* | 185–310 | – |
| | thin paspalum | PASE5 | *Paspalum setaceum* | 185–310 | – |
| 3 | **Mid/Shortgrasses** | | | 125–185 | |
| | Wright's threeawn | ARPUW | *Aristida purpurea var. wrightii* | 125–185 | – |
| | hairy grama | BOHI2 | *Bouteloua hirsuta* | 125–185 | – |
| | silver beardgrass | BOLAT | *Bothriochloa laguroides ssp. torreyana* | 125–185 | – |
| | coastal sandbur | CESP4 | *Cenchrus spinifex* | 125–185 | – |
| | hooded windmill grass | CHCU2 | *Chloris cucullata* | 125–185 | |

| | | | | | |
|---|---|---|---|---|---|
| | hooded windmill grass | CHCU2 | *Chloris cucullata* | 125–185 | – |
| | fall witchgrass | DICO6 | *Digitaria cognata* | 125–185 | – |
| | gummy lovegrass | ERCU | *Eragrostis curtipedicellata* | 125–185 | – |
| | red lovegrass | ERSE | *Eragrostis secundiflora* | 125–185 | – |
| | large-spike bristlegrass | SEMA5 | *Setaria macrostachya* | 125–185 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 125–185 | – |
| 4 | **Midgrasses** | | | 25–60 | |
| | spike dropseed | SPCO4 | *Sporobolus contractus* | 25–60 | – |
| | giant dropseed | SPGI | *Sporobolus giganteus* | 25–60 | – |
| 5 | **Cool-season grasses** | | | 25–60 | |
| | Canada wildrye | ELCA4 | *Elymus canadensis* | 25–60 | – |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 25–60 | – |
| 6 | **Shortgrass** | | | 10–60 | |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 10–60 | – |
| **Forb** | | | | | |
| 7 | **Forbs** | | | 70–90 | |
| | Forb, annual | 2FA | *Forb, annual* | 70–90 | – |
| | Cuman ragweed | AMPS | *Ambrosia psilostachya* | 70–90 | – |
| | whitemouth dayflower | COER | *Commelina erecta* | 70–90 | – |
| | golden prairie clover | DAAU | *Dalea aurea* | 70–90 | – |
| | prairie clover | DALEA | *Dalea* | 70–90 | – |
| | eastern daisy fleabane | ERAN | *Erigeron annuus* | 70–90 | – |
| | beeblossom | GAURA | *Gaura* | 70–90 | – |
| | camphorweed | HESU3 | *Heterotheca subaxillaris* | 70–90 | – |
| | dotted blazing star | LIPU | *Liatris punctata* | 70–90 | – |
| | blazingstar | MENTZ | *Mentzelia* | 70–90 | – |
| | littleleaf sensitive-briar | MIMI22 | *Mimosa microphylla* | 70–90 | – |
| | queen's-delight | STSY | *Stillingia sylvatica* | 70–90 | – |
| | prairie spiderwort | TROC | *Tradescantia occidentalis* | 70–90 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Shrub** | | | 140–170 | |
| | sand sagebrush | ARFI2 | *Artemisia filifolia* | 140–170 | – |
| 9 | **Shrubs** | | | 70–80 | |
| | leadplant | AMCA6 | *Amorpha canescens* | 70–80 | – |
| | Oklahoma plum | PRGR | *Prunus gracilis* | 70–80 | – |
| | fragrant sumac | RHAR4 | *Rhus aromatica* | 70–80 | – |
| | soapweed yucca | YUGL | *Yucca glauca* | 70–80 | – |

## 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. 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

This site captures much of the water that falls on it. The sandy soil infiltrates water rapidly. There is negligible runoff. Some water will percolate past the root zone and find its way into shallow aquifers. This site and the Sand Hills (Dune) site are primary recharge areas.

## Recreational uses

Hunting, Camping, Hiking, Birdwatching, Photography, Horseback Riding.

## Wood products

None

## Other products

None

## Other information

None

## Inventory data references

References are based on long-term observations of well-managed ranges, range inventory data, and numerous historical accounts of vegetation present at time of settlement.

## Other references

J.R. Bell, NRCS-RMS (retired)
Natural Resources Conservation Service Range Site Descriptions
USDA-Natural Resources Conservation Service Soil Surveys
Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press
Hatch, Brown and Ghandi, Vascular Plants of Texas ( An Ecological Checklist ) Texas A&M Exp. Station, College Station, Texas

Site Author(s): Clint Rollins , NRCS-RMS, Amarillo

## Contributors

Clint Rollins, RMS
J.R. Bell
Mark Moseley
Steven McGowen, MLRA Office Leader, NRCS, Woodward, OK

## 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 | 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.

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):** 20-25%

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 erosion.

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

single grained surface; very low SOM.

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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 >

    Other: Cool-season grasses > Forbs > Shrubs

    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):** 1,500 - 2,000 lbs/ac

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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 during periods of prolonged drought conditions, heavy natural herbivory, or intense wildfires.

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