USDA Natural Resources Conservation Service

# Ecological site R077EY055TX
# Hardland Slopes 16-24" PZ

Last updated: 9/12/2023
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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

Hardland Slopes ecological site is a narrow transitional site usually found above draws and below escarpments of rough breaks with steep slopes. Reference vegetation is a shortgrass plant community with some midgrasses, forbs, and few woody species. Runoff is high due to steep slopes. Abusive grazing and/or removal of fire may impact the plant community composition and productivity.

## Associated sites

| | |
|---|---|
| R077EY051TX | **Clay Loam 16-24" PZ**<br>Nearly level to gently sloping plains, divides, side slopes and upland terraces with very deep clay loam soils. Short grasses and midgrasses with scattered forbs and few shrubs. |
| R077EY052TX | **Draw 16-24" PZ**<br>Nearly level to very gently sloping very deep loamy soils on lower draw landscapes. Tall and midgrass species with forbs and few woody plants |
| R077EY061TX | **Mixedland Slopes 16-24" PZ**<br>Very gently to moderately steeply sloping, very deep coarse-loamy soils on lower hillslopes. Tallgrasses and midgrasses dominate with forbs, and few shrub species. |
| R077EY053TX | **Gravelly 16-24" PZ**<br>Gently sloping to steep hillslopes, very deep gravelly loams and gravelly sandy loam soils on lower positions. Up to 35% of the soil surface covered with gravels. Intermixed midgrasses and shortgrasses and forbs with occasional tallgrasses. |
| R077EY057TX | **Limy Upland 16-24" PZ**<br>Gently sloping to moderately sloping loamy soils with highly calcareous subsoils on similar positions. Short and mid-grass dominate and with few tall grasses, perennial and annual forbs, and few woody species present. |
| R077EY062TX | **Breaks 16-24" PZ**<br>Strongly sloping to very steep, shallow, loamy soils often intermixed with rock outcrops on higher positions. A mixture of grasses, forbs, shrubs, and a few trees with bare ground. Many rocks and cobbles on the surface. |

## Similar sites

| | |
|---|---|
| R077EY057TX | **Limy Upland 16-24" PZ**<br>Limy Upland is more calcareous thoughout the soil profile and occupy a different position on the landscape. Limy Upland supports more sideoats grama and other midgrasses whereas Hardland slopes are dominantly blue grama. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | (1) *Bouteloua gracilis*<br>(2) *Bouteloua dactyloides* |

## Physiographic features

This site is classified as an upland. Slope gradients are most commonly 3 to 8% but they can range from 0 to 20%. This site is found along nearly level to moderately steep side slopes along draws and benches below escarpments.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Plains > Hillslope<br>(2) Plains > Valley side<br>(3) Plains > Alluvial fan |
| Runoff class | Negligible to high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 610–1,372 m |
| Slope | 0–20% |
| Aspect | Aspect is not a significant factor |

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

| | |
|---|---|
| Runoff class | Negligible to high |
| 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) BOYS RANCH [USC00411000], Vega, TX
- (3) BEAVER [USC00340593], Beaver, OK
- (4) CANADIAN [USC00411412], Canadian, TX
- (5) FOLLETT [USC00413225], Follett, TX
- (6) SANFORD DAM [USC00418040], Fritch, TX
- (7) GUYMON MUNI AP [USW00003030], Guymon, OK
- (8) MEADE [USC00145171], Meade, KS
- (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

Well drained soils with negligible to high runoff. No influencing water features.

## 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 deep to very deep, well drained, moderate permeability, moderately alkaline soils on nearly level to moderately steep terrain. It occurs on side slopes along draws and on benches and footslopes below the upper caprock escarpment. Slopes range from 0 to 20%, but are dominantly 3 to 8%. They commonly have light brown loam or clay loam surfaces and clay loam subsurface layers, and available water holding capacity is moderate. The fertility is moderate to high and when proper management is applied the root zone is easily penetrated by plant roots.

Representative soil components for this site include: Berda, Berthoud, and Paloduro.

**Table 5. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium |
| Surface texture | (1) Loam<br>(2) Clay loam<br>(3) Fine sandy loam |
| Family particle size | (1) Fine-loamy |
| Drainage class | Well drained |
| Permeability class | Moderate |
| Soil depth | 102–203 cm |
| Surface fragment cover <=3" | 0–5% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-101.6cm) | 8.64–20.07 cm |
| Calcium carbonate equivalent (0-101.6cm) | 1–14% |
| Sodium adsorption ratio (0-101.6cm) | 0–2 |

| | |
|---|---|
| Soil reaction (1:1 water) (0-101.6cm) | 7.4–8.4 |
| Subsurface fragment volume <=3" (0-101.6cm) | 0–10% |
| Subsurface fragment volume >3" (0-101.6cm) | 0–1% |

## 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. Hardland Slopes ecological site is a narrow transitional site usually found along draws and below escarpments of rough breaks with steep slopes. Runoff is high due to percent slopes.

The reference plant community for this site is a shortgrass dominated community with a few midgrasses present in small depressional areas and moisture dependent forbs. Very few woody plants were present on this site although an occasional yucca (Yucca spp.) would be present. The dominant grass species is blue grama (*Bouteloua gracilis*) with a lesser amount of buffalograss (*Bouteloua dactyloides*). In low depressions that catch and hold a little moisture, western wheatgrass (*Pascopyrum smithii*) and vine mesquite (*Panicum obtusum*) may occur.

The major perennial forbs are scarlet globemallow (*Sphaeralcea coccinea*), scurfpea (Psoralidium teniuflorum), Engelmanndaisy (*Engelmannia peristenia*), dotted gayfeather (*Liatris punctata*), sagewort spp. (Artemesia spp.) and catclaw sensitivebriar (*Mimosa aculeaticarpa* var. biuncifera). Annual forbs are more abundant in years of above normal precipitation and consist of several different species. Forbs on this site normally make up 4 – 8 % of the total composition.

Natural fires played a major role in maintaining the plains grasslands. In general, woody plants were suppressed and grasses perpetuated. Although fire was significant in maintaining the shortgrass plains, it was probably more important to the maintenance of the tall and midgrass prairies. Fire in combination with a favorable growing season will generally tend to sustain the perennial shortgrass community. Fire in combination with drought can be a transitional pathway that can result in some plant community changes, at least for a period of several years. Research shows that blue grama that has not been grazed for several years can actually be damaged quite significantly by fire; especially if that fire happens to occur in the summer.

When this site is continually overgrazed by livestock, the vigor and production of vegetation decline. The sideoats grama (*Bouteloua curtipendula*), western wheatgrass and desirable forbs will decrease. Blue grama will take a sod bound appearance with continued close grazing and buffalograss will increase. The lower production and reduced cover will result in increased runoff and decreased infiltration. This site is subject to gully erosion when vegetative cover is poor. A good grass cover has a positive influence on infiltration and deep percolation of rainfall. The loss of soil organic matter has a negative impact on infiltration, and soil compaction. More rainfall is directed to overland flow, which causes increased soil erosion. Pedestaling, terracettes, and water flow patterns are range health indicators that will be present when this site begins to deteriorate.

This site can be invaded by pricklypear (Opuntia/Cylindropuntia spp.), broom snakeweed (*Gutierrezia sarothrae*) and yucca which can increase in density if poor management continues. Once in poor condition, this site can be difficult to restore to its original productive state.

The shortgrasses that dominate this site are so resistant to grazing that it is uncommon for them to actually be killed out, but they can be weakened dramatically. Rest and possibly controlling any invading competition will usually restore this site within a few years provided that grazing management is applied. This site is resilient provided abuse is not long term.

State and Transition Diagram:
A State and Transition Diagram for the Hardland Slopes (R077EY055TX) 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.

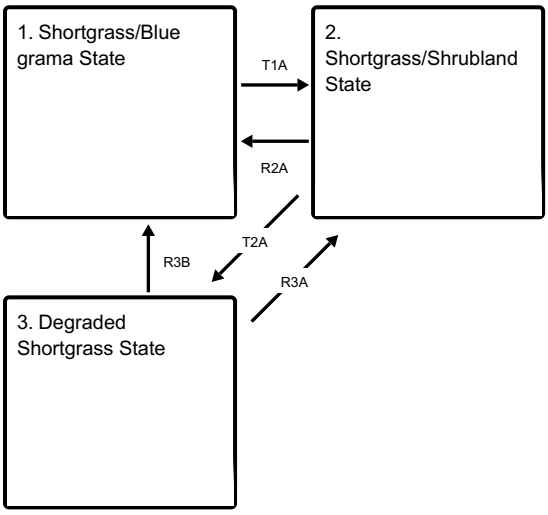
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every 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, may be coupled with excessive grazing pressure

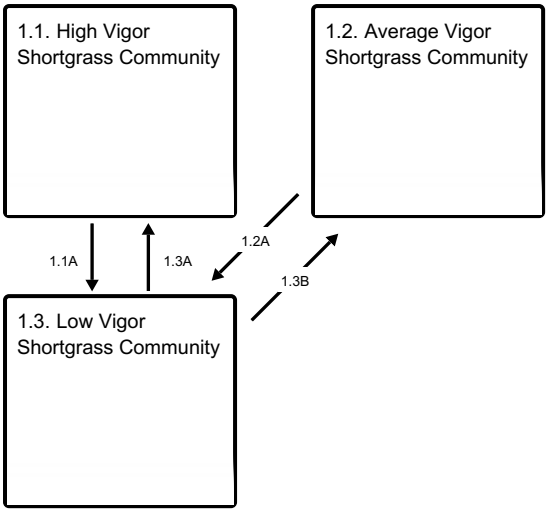
**R2A** - Reintroduction of historic disturbance regimes, may be coupled with rangeland seeding

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

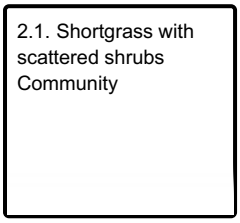
**R3B** - Reintroduction of historic disturbance regimes, may require rangeland seeding and other management practices

**R3A** - Reintroduction of historic disturbance regimes, may require rangeland seeding and other management practices

**State 1 submodel, plant communities**




**State 2 submodel, plant communities**




**State 3 submodel, plant communities**


## State 1
## Shortgrass/Blue grama 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 high vigor shortgrass community (1.1) is dominated by shortgrasses such as blue grama and buffalograss with a smaller midgrass component. This site is very productive if runoff can be minimized. Yucca, plains pricklypear and broom snakeweed are the principal woody species making up less than 5% of the total plant community. Relatively few forbs are present on this site. The average vigor shortgrass community (1.2) is dominated by shortgrasses such as sodbound blue grama with increasing amounts of buffalograss. There is a low annual production potential. The low vigor shortgrass community (1.3) is dominated by low production species such as blue grama and buffalograss. There is an invasion of other shortgrasses such as three-awn and silver bluestem. There is also an increase of annual forbs.

### Dominant plant species

- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

## Community 1.1
## High Vigor Shortgrass Community

**Figure 8. 1.1 High Vigor Shortgrass Community**

The plant community described here is the reference plant community present at the time of settlement. This is a transitional site dominated by shortgrasses with a smaller midgrass component. Blue grama is the dominant grass making up 50 - 60% of the total grass production. Buffalograss and sideoats grama are next in importance making up 10 – 20% of the composition. Other midgrasses include vine mesquite and western wheatgrass which occur in micro-depressions where moisture collects. This site is very productive if runoff can be minimized. Yucca, plains pricklypear and broom snakeweed are the principal woody species making up less than 5% of the total plant community. Relatively few forbs are present on this site. This plant community evolved through the absence of grazing by large herbivores and with fire frequency of every 10-20 years.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 807 | 1539 | 2270 |
| Forb | 45 | 87 | 129 |
| Shrub/Vine | 34 | 67 | 101 |
| Tree | 9 | 16 | 22 |
| Microbiotic Crusts | – | – | – |
| **Total** | **895** | **1709** | **2522** |

**Figure 10. Plant community growth curve (percent production by month). TX1506, Shortgrass dominant. Warm season native perennial grasses with shortgrasses as being dominant..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 3 | 8 | 25 | 30 | 12 | 4 | 8 | 4 | 3 | 1 |

## Community 1.2
## Average Vigor Shortgrass Community

The average vigor shortgrass community (1.2) is dominated by shortgrasses such as sodbound blue grama with increasing amounts of buffalograss. There is a low annual production potential.

## Community 1.3
## Low Vigor Shortgrass Community

The low vigor shortgrass community (1.3) is dominated by low production species such as blue grama and buffalograss. There is an invasion of other shortgrasses such as three-awn and silver bluestem. There is also an increase of annual forbs.

### Pathway 1.1A
### Community 1.1 to 1.3

Abusive grazing practices that include stocking above carrying capacity without adequate rest may push this community towards community 1.2 as the more palatable species are damaged.

### Pathway 1.2A
### Community 1.2 to 1.3

Abusive grazing practices that include stocking above carrying capacity without adequate rest may push this community towards community 1.2 as the more palatable species are damaged.

### Pathway 1.3A
### Community 1.3 to 1.1

Through adequate rest from grazing and favorable growing season precipitation, this community may be shifted back to community 1.1 under favorable rainfall.

### Pathway 1.3B
### Community 1.3 to 1.2

Through adequate rest from grazing and favorable growing season precipitation, this community may be shifted back to community phase 1.2.

## State 2
## Shortgrass/Shrubland State

This State is dominated by perennial three-awn and silver bluestem with low vigor blue grama and buffalograss. Numerous annuals also occur in this community stage. Production is lower than the historic climax community and diversity is less.

**Dominant plant species**

- threeawn (*Aristida*), grass
- silver bluestem (*Bothriochloa saccharoides*), grass

### Community 2.1
### Shortgrass with scattered shrubs Community

**Figure 11. 2.1 Shortgrass with scattered shrub Community**

This plant community is dominated by perennial three-awn and silver bluestem with low vigor blue grama and buffalograss. Numerous annuals also occurs in this community stage. Production is lower than the reference community and diversity is less. Higher percentage of bare ground.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 560 | 1009 | 1457 |
| Forb | 56 | 95 | 135 |
| Shrub/Vine | 56 | 95 | 135 |
| Tree | 11 | 20 | 28 |
| Microbiotic Crusts | – | – | – |
| **Total** | **683** | **1219** | **1755** |

**Figure 13. Plant community growth curve (percent production by month). TX1520, Shortgrass with scattered shrubs. Dominated by perennial threeawns and silver bluestem with low vigor blue grama and buffalograss..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 4 | 6 | 12 | 29 | 18 | 8 | 15 | 5 | 1 | 1 |

## State 3
## Degraded Shortgrass State

Low vigor shortgrass, high percentage of bare ground, unstable site conditions. Yucca and other woody species have invaded the site. Gully erosion has occurred due to the lack of ground cover. The bare ground has poor vegetative cover.

### Dominant plant species

- yucca (*Yucca*), shrub

## Community 3.1
## Degraded Shortgrass Community

**Figure 14. 3.1 Degraded Shortgrass Community**

Low vigor shortgrass, high percentage of bare ground, unstable site conditions. Yucca and other woody species have invaded the site. Gully erosion has occurred due to the lack of ground cover. The bare ground has poor vegetative cover.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 448 | 897 | 1345 |
| Shrub/Vine | 67 | 106 | 146 |
| Forb | 56 | 95 | 135 |
| Tree | 17 | 26 | 34 |
| Microbiotic Crusts | – | – | – |
| **Total** | **588** | **1124** | **1660** |

**Figure 16. Plant community growth curve (percent production by month). TX1521, Degraded Shortgrass, Increase Woody Species, Visible Erosion. Low vigor shortgrass, increase of woody species, and has bare ground..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 6 | 14 | 24 | 22 | 5 | 4 | 5 | 12 | 3 | 1 |

## Transition T1A
## State 1 to 2

With heavy continuous grazing, brush invasion, and no fires, the Shortgrass/Blue grama State will transition into the Shortgrass/Shrubland State.

## Restoration pathway R2A
## State 2 to 1

With the application of various conservation practices such as Prescribed Grazing, Prescribed Burning, Brush Management, and Pest Management, the Shortgrass/Shrubland State can be restored to the Shortgrass/Blue grama State.

**Conservation practices**

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

## Transition T2A
## State 2 to 3

With Heavy Continuous Grazing, Brush Invasion, and No Fires, the Shortgrass/Shrubland State will transition into the Degraded Shortgrass State.

## Restoration pathway R3B
## State 3 to 1

With Brush Management, Range Planting, Prescribed Grazing, and Pest Management conservation practices, the Degraded Shortgrass State can be restored to the Shortgrass/Blue grama State.

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Grazing |
| Range Planting |

| |
|---|
| Integrated Pest Management (IPM) |

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

With Brush Management, Prescribed Grazing, and Pest Management conservation practices, the Degraded Shortgrass State can be restored to the Shortgrass/Shrubland State.

**Conservation practices**

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

## Additional community tables

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

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Shortgrasses** | | | 661–1838 | |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 482–1345 | – |
| | buffalograss | BODA2 | *Bouteloua dactyloides* | 123–336 | – |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 56–157 | – |
| 2 | **Midgrasses** | | | 39–112 | |
| | vine mesquite | PAOB | *Panicum obtusum* | 20–56 | – |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 19–56 | – |
| 3 | **Mid/shortgrasses** | | | 34–90 | |
| | silver beardgrass | BOLAT | *Bothriochloa laguroides ssp. torreyana* | 0–22 | – |
| | tumble windmill grass | CHVE2 | *Chloris verticillata* | 0–22 | – |
| | Canada wildrye | ELCA4 | *Elymus canadensis* | 0–22 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 0–22 | – |
| | sand muhly | MUAR2 | *Muhlenbergia arenicola* | 0–22 | – |
| | James' galleta | PLJA | *Pleuraphis jamesii* | 0–22 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 0–22 | – |
| 4 | **Forbs** | | | 45–129 | |
| | Forb, annual | 2FA | *Forb, annual* | 0–34 | – |
| | Cuman ragweed | AMPS | *Ambrosia psilostachya* | 0–34 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 0–34 | – |
| | rose heath | CHER2 | *Chaetopappa ericoides* | 0–34 | – |
| | scarlet beeblossom | GACO5 | *Gaura coccinea* | 0–34 | – |
| | dotted blazing star | LIPU | *Liatris punctata* | 0–34 | – |
| | sensitive plant | MIMOS | *Mimosa* | 0–34 | – |
| | scarlet globemallow | SPCO | *Sphaeralcea coccinea* | 0–34 | – |
| | Rocky Mountain zinnia | ZIGR | *Zinnia grandiflora* | 0–34 | – |
| **Shrub/Vine** | | | | | |
| 5 | **Shrubs** | | | 34–101 | |
| | tree cholla | CYIMI | *Cylindropuntia imbricata var. imbricata* | 0–28 | – |
| | jointfir | EPHED | *Ephedra* | 0–28 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–28 | – |
| | yucca | YUCCA | *Yucca* | 0–28 | – |
| **Tree** | | | | | |
| 6 | **Trees** | | | 6–22 | |
| | hackberry | CELTI | *Celtis* | 0–11 | – |
| | Pinchot's juniper | JUPI | *Juniperus pinchotii* | 0–11 | – |

## Animal community

This site is used for the production of domestic livestock and to provide habitat for native wildlife. Cow-calf operations are the primary livestock enterprise although stocker cattle are also grazed. Sustainable stocking rates

have declined drastically over the past 100 years due to deterioration of the historic climax plant community.

Initial starting stocking rates will be determined with the landowner or decision maker. An assessment of current vegetation is needed to determine stocking rates. Calculations used to determine an initial starting stocking rate will be based on forage production.

This site is important to many wildlife species. Major species include bobwhite and scaled quail, muledeer, pronghorn antelope, coyote, swift fox, jackrabbit, mourning dove, hawks, owls, and badger. Being in an open grassland, this site is also home to a variety of small herbivores, birds and their associated predators. Water development is very important to these and other wildlife on this site. The value of this site for food and cover requirements for specific wildlife species changes when the vegetative transitions that occur from one plant community to another. Each plant community and each animal species must be considered individually.

## Hydrological functions

The water cycle on this site functions according to the existing plant community. The water cycle is most functional when the site is dominated by shortgrasses with a significant midgrass component. Good rainfall infiltration, high soil organic matter, good soil structure and good porosity are present with good grass cover. The quality of surface runoff will be high and erosion and sedimentation rates will be low.

When heavy grazing causes loss or reduction of forage production and ground cover, the water cycle becomes impaired. Infiltration is decreased and runoff is increased due to poor ground cover. Soil erosion is accelerated, the quality of surface runoff is poor and sedimentation is increased.

## Recreational uses

This site is used for hunting large and small game.

## 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.

Two documents used include the NRCS FOTG - Section II - Range Site Descriptions and the NRCS Range 417 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, 9/12/2023

## 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.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25-30% bare ground.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight.

7. **Amount of litter movement (describe size and distance expected to travel):** None to slight.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Very resistant to surface erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Clay loam; friable surface structure, loamy, high SOM.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density will make rainfall impact minimal. This site is a moderately permeable soil, runoff is medium and available water holding capacity is high.

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 shortgrasses >>

    Sub-dominant:

    Other: Warm-season midgrasses > Forbs > Shrubs/Vines > Trees

    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.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 800 - 2,250 pounds per acre.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Yucca, cholla, pricklypear, and juniper can be invasive.

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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.

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