USDA Natural Resources Conservation Service

Ecological site R077CY022TX
Deep Hardland 16-21" PZ

Last updated: 9/11/2023
Accessed: 05/14/2024

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.

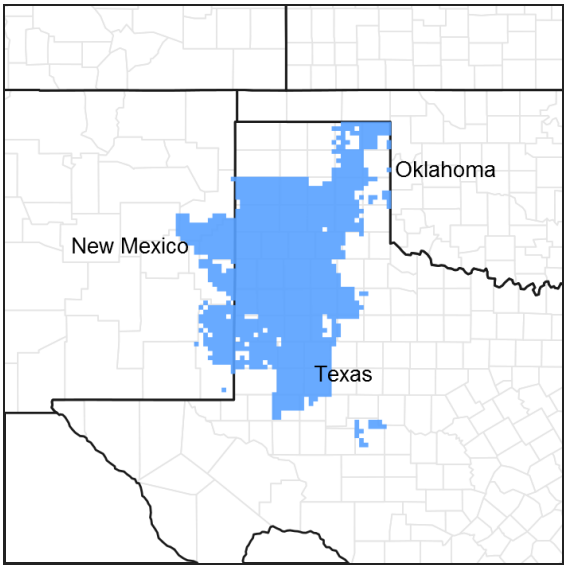


Figure 1. Mapped extent

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): 077C–Southern High Plains, Southern Part

MLRA 77C is characterized by nearly level to very gently sloping plains with numerous playa depressions, moderately sloping breaks along drainageways, and a steep escarpment along the eastern margin. From southwest to northeast, soils grade from coarse-textured to fine-textured. Soils are generally very deep and occur in a thermic soil temperature regime and ustic soil moisture regime bordering on aridic. Current land use is dominantly cropland.

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 very deep, very gently sloping clay loam soils on uplands. Although the soils are very deep and well drained, the nature of the clay soils can cause the site to be particularly sensitive to dry conditions. The reference vegetation consists of shortgrasses with some midgrasses and few forbs. Abusive grazing practices may lead to the suppression of palatable species and a shift in the plant community. Without periodic fire or alternative brush management, woody species may encroach on the site.

Associated sites

R077CY027TX	**Playa 16-21" PZ** Generally adjacent and downslope of the Deep Hardland site. The very deep soils are clayey in texture. Water is ponded for various lengths of time. Midgrasses and forbs dominate, but some sites are dominated by shortgrasses. Less productive than the Deep Hardland site.
R077CY028TX	**Limy Upland 16-21" PZ** Mainly adjacent and upslope of the Deep Hardland site. The soils are loamy in texture and highly calcareous. Shortgrasses dominate, but has a good mixture of midgrasses on the site. Less productive than the Deep Hardland site.
R077CY037TX	**Very Shallow 16-21" PZ** These sites are associated with changes in slope, scattered areas may occur as gravelly outcrops or small knolls and ledges. The soil is highly calcareous and shallow to a petrocalcic horizon surface textures are loams or gravelly loams. The plant community consist of sparse stands of midgrasses with some shortgrasses. The shallow nature of the soils limits production.

Similar sites

R077EY051TX	**Clay Loam 16-24" PZ** This site has very deep loam or clay loam soils on uplands. The reference vegetation consists of short grasses and midgrasses with scattered forbs and few shrubs.
R077DY038TX	**Clay Loam 12-17" PZ** This site has very deep to clay loam or loamy soils like the Deep Hardland site. Mean annual precipitation is lower (14 to 16 inches). This site is less productive than the Deep Hardland site. Slopes are nearly level to gently sloping with a plant community dominated by shortgrasses with some midgrasses.
R077AY001TX	**Deep Hardland 16-22" PZ** This site has very deep to moderately deep loam and clay loam soils on uplands. The reference vegetation consists of shortgrasses with some midgrasses and forbs. Woody species such as cactus and yucca may be present in small amounts.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Gutierrezia sarothrae* (2) *Cylindropuntia*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua dactyloides*

Physiographic features

This site occurs on the large nearly level to moderately sloping upland plateau formed in moderately alkaline windblown loess deposits of the Blackwater Draw Formation of Pleistocene age. A few ancient drainage ways dissect this plateau and relatively shallow closed depressions are scattered throughout the area. The elevation ranges from 2,600 feet to 4,600 feet above sea level. Slopes range from 0 to 5 percent. The site is extensively used for cultivated cropland, as well as rangeland.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Playa slope (3) Plateau > Depression
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	792–1,402 m

Slope	0–5%
Water table depth	203 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate is semi-arid dry steppe. Summers are hot with winters being generally mild with numerous cold fronts that drop temperatures into the single digits for 24 to 48 hours. Temperature extremes are the rule rather than the exception. Humidity is generally low and evaporation high. Wind speeds are highest in the spring and are generally southwesterly. Canadian and Pacific cold fronts come through the region in fall, winter and spring with predictability and temperature changes can be rapid. Most of the precipitation comes in the form of rain and during the period from May through October. Snowfall averages around 15 inches but may be as little as 8 inches or as much as 36 inches. Rainfall in the growing season often comes as intense showers of relatively short duration. Long-term droughts occur on the average of once every 20 years and may last as long as five to six years (during these drought years moisture during the growing season is from 50 to 60 percent of the mean.) Based on long-term records, approximately 60 percent of years are below the mean rainfall and approximately 40 percent are above the mean. May, June and July are the main growth months for perennial warm-season grasses. Forbs make their growth somewhat earlier.

Table 3. Representative climatic features

Frost-free period (characteristic range)	152-190 days
Freeze-free period (characteristic range)	188-206 days
Precipitation total (characteristic range)	483-559 mm
Frost-free period (actual range)	148-200 days
Freeze-free period (actual range)	184-212 days
Precipitation total (actual range)	457-584 mm
Frost-free period (average)	172 days
Freeze-free period (average)	197 days
Precipitation total (average)	508 mm

Climate stations used

- (1) CAMERON [USC00291332], Grady, NM
- (2) PANHANDLE [USC00416785], Panhandle, TX
- (3) SILVERTON [USC00418323], Silverton, TX
- (4) BIG SPRING [USW00023041], Big Spring, TX
- (5) PORTALES [USC00297008], Portales, NM
- (6) DENVER CITY [USC00412408], Denver City, TX
- (7) CROSBYTON [USC00412121], Crosbyton, TX

Influencing water features

Water features are not an influencing feature on this site.

Wetland description

N/A

Soil features

This site consists of very deep, well drained, moderately permeable soils that formed in loamy eolian deposits. These sites have well developed soils on old stable landforms and are moderately alkaline throughout. The surface

layer is dark colored loam or clay loam with clay loam subsurface layers. The available water holding capacity is moderate to high. and the fertility of these soils is high. Some sites are moderately deep to a restrictive petrocalcic horizon that occurs between 20 and 40 inches and has moderate permeability above a very slowly permeable layer. These sites are subject to wind erosion if suitable cover is not present.

Major Soil Taxonomic Units correlated to this site include: Acuff loam and sandy clay loam, Estacado loam and clay loam, Friona loam and sandy clay loam, Lazbuddie clay, Lockney clay, Lofton clay loam, Olton loam and clay loam, Pantex silty clay loam, Pullman clay loam, Stegall loam and clay loam, and Zita loam and clay loam.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam (4) Sandy clay loam
Family particle size	(1) Fine-loamy (2) Fine
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	51–203 cm
Soil depth	51–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–21.59 cm
Calcium carbonate equivalent (0-101.6cm)	0–40%
Electrical conductivity (0-101.6cm)	0–3 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.8
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The reference plant community for this site is a Shortgrass/Blue grama Dominant Community (1.1). A few midgrasses can be found in small depressions along with a small number of moisture dependent forbs. Very little woody plants are found. A few cholla cactus (*Cylindropuntia imbricata*), prickly pear (Opuntia spp.), or occasional yucca (Yucca spp.) will be present, usually only 1 to 2% of the total plant community. Blue grama (*Bouteloua gracilis*) dominates with a lesser amount of buffalograss (*Bouteloua dactyloides*) present. Western wheatgrass (*Pascopyrum smithii*) and vine mesquite (*Panicum obtusum*) may occur in low places that catch and hold more moisture. The major perennial forbs are scarlet globemallow (*Sphaeralcea coccinea*), chocolate daisy (*Berlandiera lyrata*), slimleaf scurfpea (*Pediomelum linearifolium*), prairie coneflower (*Ratibida columnifera*), and baby white aster (*Chaetopappa ericoides*). Annual forbs are more abundant in years of above average spring rainfall. As a rule, forbs contribute around 5 to 8 % of the total production. This site is not highly diverse as the clayey soils along with relatively low rainfall limit the range of species adapted to the site. Drought tolerant species prevail. Bison historically grazed the site and the plants are palatable to cattle. The highly palatable forage and level terrain make

this a choice grazing site even though production is only moderate. Pronghorns prefer this site, especially in spring when forbs are more abundant.

Fire plays a major role in maintaining the reference community. In general, woody plants are suppressed and grasses are perpetuated. Fire also influences grazing patterns. Animals are attracted to the regrowth of herbage in burned areas. Forbs become more profuse for a time following fire and attracted animals such as pronghorns that prefer forbs to grass. Fire in combination with a favorable growing season will generally tend to sustain the perennial shortgrass community. In contrast, fire in combination with drought can be a transitional pathway that can result in some plant community changes. Grasses that thrive on disturbance include sand dropseed (*Sporobolus cryptandrus*) and silver bluestem (*Bothriochloa laguroides*). Perennial forbs and shrubs may increase for a period of time. Fire can cause adverse effects to the perennial grass community under high fuel loads and summer heat conditions. Generally, this site does not produce the amounts of fine fuel needed to generate the amount of heat needed to kill woody vegetation. An exception to this may be plains prickly pear. The good palatability of the forage on this site makes it unnecessary to consider burning for improving forage quality. Prescribed fire is not often applicable as a management tool.

The reference community for this site also developed under a grazing ecology. Large herbivores grazed the grasslands and moved on seeking fresh forage. On the high plains plateau, the frequency of grazing was greatly influenced by availability of water. There are historical accounts of Spanish conquistadors encountering buffalo as the parties crossed the plains. Large amounts of water were needed to support the huge bison herds. During dry times the herds most likely grazed the edge of the plains near the breaks leading to the creeks and rivers. When grazing did occur it was probably severe. Recovery periods were likely long with the animals not returning to the same spot for a year or even more.

This is a preferred site for domestic livestock and overgrazing can easily occur. When continued overgrazing occurs over a long period of time, blue grama will develop a low vigor, stunted appearance. This is a response to constant grazing pressure. With continued heavy grazing pressure brings about a new plant community, the Degraded Shortgrass Community (1.2). The soil becomes more compacted, rainfall infiltration is reduced, and water runoff increases. Western wheatgrass, the only cool-season grass present, decreases under grazing pressure. Long-term abuse coupled with drought will often leave the turf open in places. Increasing species such as broom snakeweed (*Gutierrezia sarothrae*) can gain a foothold. Careful grazing management and control of invading/increaser competition can restore this site to the reference condition.

If long-term heavy grazing continues, a threshold will be crossed to a Broom snakeweed/Annual Forb Dominant Community (2.1). In this degraded state, blue grama loses its bunchgrass characteristics and assumes a sod bound appearance because of grazing pressure. The shortgrass species are so resistant to grazing that it is uncommon for them to be killed out, but they can be weakened dramatically. Weedy and/or halfshrub species such as broom snakeweed may increase and dominate this site along with perennial threeawn (*Aristida purpurea*) and annuals. In the eastern portions of MLRA 77C, mesquite (*Prosopis glandulosa*) is a common invader. In the western portions of MLRA 77C, cholla (Opuntia imbricata) and other cacti species may invade and possibly dominate the site. 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 the Shrub/Forb State (2.1) to the Grassland State will require prescribed grazing with rest periods during the growing season. Re-seeding bare areas with adapted native species, and chemical and/or mechanical brush management and some form of pest management will be necessary. Prescribed grazing along with the control of invading competition will usually restore this site within a few years provided judicious grazing management is applied. This site is perhaps one of the most resilient sites in MLRA 77C.

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.

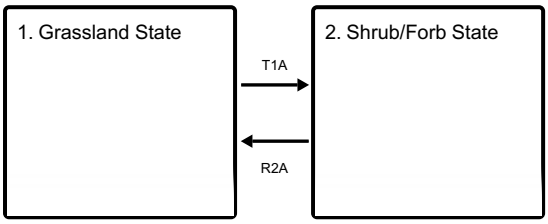
STATE AND TRANSITIONAL PATHWAYS: (DIAGRAM)

Narrative:
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.

State and transition model

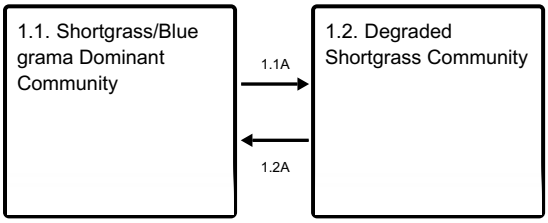
Ecosystem states



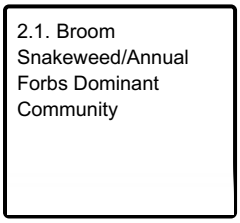
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Grassland State

The reference plant community for this site is a Shortgrass/Blue grama Dominant Community (1.1). A few midgrasses can be found in small depressions along with a small number of moisture dependent forbs. Very little woody plants are found. A few cholla cactus, prickly pear, or occasional yucca will be present, usually only 1 to 2% of the total plant community. Blue grama dominates with a lesser amount of buffalograss present. Western wheatgrass and vine mesquite may occur in low places that catch and hold more moisture. The major perennial forbs are scarlet globemallow, chocolate daisy, slimleaf scurfpea, prairie coneflower, and baby white aster. Annual forbs are more abundant in years of above average spring rainfall. As a rule, forbs contribute around 5 to 8 % of the total production. This site is not highly diverse as the clayey soils along with relatively low rainfall limit the range of species adapted to the site. With continued heavy grazing pressure brings about a new plant community, the Degraded Shortgrass Community (1.2). The soil becomes more compacted, rainfall infiltration is reduced, and water runoff increases. Western wheatgrass, the only cool-season grass present, decreases under grazing pressure.

Long-term abuse coupled with drought will often leave the turf open in places. Increasing species such as broom snakeweed can gain a foothold.

Dominant plant species

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

Community 1.1
Shortgrass/Blue grama Dominant Community

Figure 8. 1. 1 Shortgrass/Blue grama Dominant Community

The interpretive or "reference" plant community for this site is a shortgrass dominated community with blue grama being the dominant grass with lesser amounts of buffalograss (average of 60 – 70 percent blue grama and 15 – 25 percent buffalograss). There are a few other species of shortgrasses present making up from 5 to 10 percent of total production. Western wheatgrass and vine mesquite are often present in depressions and on slopes above playa lakes. There are approximately 5 percent forbs and almost no woody shrubs or trees present.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1065	1653	2242
Forb	56	101	146
Shrub/Vine	45	56	67
Microbiotic Crusts	17	22	28
Tree	–	–	–
Total	**1183**	**1832**	**2483**

Figure 10. Plant community growth curve (percent production by month). TX1019, Shortgrass Dominant Community. Growth is predominately shortgrasses from April through October with a peak growth from May to July..

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

Community 1.2
Degraded Shortgrass Community

Figure 11. 1.2 Degraded Shortgrass Community

As retrogression occurs, the plant community is composed of low vigor blue grama and buffalograss with an increase in broom snakeweed and annual forbs. Blue grama and buffalograss will still dominate the site but total production will be reduced. Some Deep Hardland Sites in the western portion of MLRA 77C may see cholla and other cacti species increasing on the site, while sites in the eastern portion of MLRA 77C may see mesquite invasion to the point of domination. Nutrient cycling, the water cycle, watershed protection and biological functions have been reduced. The transition back to the reference community is possible with proper grazing management for several years. Chemical and/or mechanical brush management may be needed to reduce the increased canopy of invasive/increasing plants.

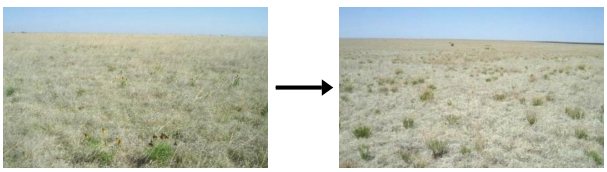
Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	813	1121
Forb	112	202	291
Shrub/Vine	112	168	224
Microbiotic Crusts	6	11	22
Tree	–	–	–
Total	**734**	**1194**	**1658**

Figure 13. Plant community growth curve (percent production by month). TX1020, Shortgrass/BroomSnakeweed/Annual Forbs Community. Growth is predominately low vigor shortgrasses from April to October with peak growth from May to July. There are also encroaching shrubs and annual forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	20	25	17	8	15	4	1	1

Pathway 1.1A
Community 1.1 to 1.2

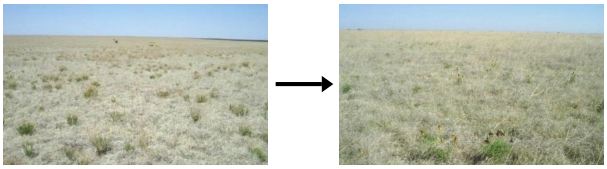


Shortgrass/Blue grama Dominant Community

Degraded Shortgrass Community

With heavy continuous grazing and brush invasion of broom snakeweed, cholla, and pricklypear, the Shortgrass/Blue grama Dominant Community shifts to the Degraded Shortgrass Community.

Pathway 1.2A
Community 1.2 to 1.1



Degraded Shortgrass Community

Shortgrass/Blue grama Dominant Community

With the implementation of various conservation practices such as Prescribed Grazing, the Degraded Shortgrass Community can revert back to the Shortgrass/Blue grama Dominant Community.

Conservation practices

Prescribed Grazing

State 2
Shrub/Forb State

If long-term heavy grazing continues, a threshold will be crossed from a Grassland State (1) to a Shrub/Forb State (2). In this degraded state, blue grama loses its bunchgrass characteristics and assumes a sod bound appearance. The shortgrass species are so resistant to grazing that it is uncommon for them to be killed out, but they can be weakened dramatically. Weedy and/or halfshrub species such as broom snakeweed may increase and dominate this site along with perennial three-awn and annuals. In the eastern portions of MLRA 77C, mesquite is a common invader. In the western portions of MLRA 77C, cholla and other cacti species may invade and possibly dominate the site.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- threeawn (*Aristida*), grass

Community 2.1
Broom Snakeweed/Annual Forbs Dominant Community

Figure 14. 2.1 Broom Snakeweed/Annual Forb Dominant Communit

Figure 15. 2.1 Cholla

Figure 16. 2.1 Mesquite

In this phase of retrogression a threshold has been crossed. Broom snakeweed and annuals dominate the site with large and numerous amounts of bare ground scattered throughout the site. Blue grama and buffalograss are in low vigor and the blue grama has lost its bunchgrass characteristics and has now assumed a sod bound appearance. Three-awns are encroaching the site. Some Deep Hardland sites in the eastern and far southwestern portion of MLRA 77C may see mesquite dominating the site. Some Deep Hardland sites in the western portion of MLRA 77C may see cholla and other cacti species dominating. Production of grass is low, and the community integrity has been compromised. Ecological processes are not functioning as needed. Runoff is increased and infiltration is low. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration back to the reference state 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 along with some form of pest management.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	280	420	560
Grass/Grasslike	336	448	560
Forb	157	247	336
Microbiotic Crusts	22	39	56
Tree	–	–	–
Total	**795**	**1154**	**1512**

Figure 18. Plant community growth curve (percent production by month). TX1021, Broom Snakeweed/Annual Forb Dominant Community. Growth is predominately shrubs and forbs from April to October with a peak growth from April to June..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	18	23	16	5	5	8	15	3	0

Transition T1A
State 1 to 2

Due to heavy continuous grazing pressure and brush invasion of broom snakeweed, cholla, and pricklypear, the Grassland State will transition to the Shrub/Forb State.

Restoration pathway R2A
State 2 to 1

With the application of several conservation practices such as Brush Management, Pest Management, and Prescribed Grazing, the Grassland State can be restored from the Shrub/Forb State.

Conservation practices

Brush Management
Prescribed Grazing
Integrated Pest Management (IPM)

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Shortgrass/Midgrass**			673–1569	
	blue grama	BOGR2	*Bouteloua gracilis*	560–1121	–
	buffalograss	BODA2	*Bouteloua dactyloides*	157–448	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	67–135	–
2	**Midgrasses**			90–168	
	vine mesquite	PAOB	*Panicum obtusum*	56–112	–
	western wheatgrass	PASM	*Pascopyrum smithii*	56–112	–
3	**Mid/Shortgrasses**			45–90	
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	22–56	–
	black grama	BOER4	*Bouteloua eriopoda*	22–56	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	22–56	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	22–56	–
	Arizona cottontop	DICA8	*Digitaria californica*	22–56	–
	sand muhly	MUAR2	*Muhlenbergia arenicola*	22–56	–
	James' galleta	PLJA	*Pleuraphis jamesii*	22–56	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	22–56	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–56	–
4	**Shortgrasses**			45–90	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	22–56	–
	gummy lovegrass	ERCU	*Eragrostis curtipedicellata*	22–56	–
Forb					

5	**Forbs**			56–146	
	Forb, annual	2FA	*Forb, annual*	0–56	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	22–56	–
	sagebrush	ARTEM	*Artemisia*	22–56	–
	lyreleaf greeneyes	BELY	*Berlandiera lyrata*	22–56	–
	rose heath	CHER2	*Chaetopappa ericoides*	22–56	–
	prairie clover	DALEA	*Dalea*	0–56	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	22–56	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	22–56	–
	dotted blazing star	LIPU	*Liatris punctata*	22–56	–
	evening primrose	OENOT	*Oenothera*	22–56	–
	Fendler's penstemon	PEFE	*Penstemon fendleri*	22–56	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	22–56	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	22–56	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	22–56	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–56	–
	stemmy four-nerve daisy	TESC2	*Tetraneuris scaposa*	22–56	–
	stiff greenthread	THFI	*Thelesperma filifolium*	22–56	–
Shrub/Vine					
6	**Shrubs**			45–67	
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	22–45	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	22–45	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	22–45	–
	yucca	YUCCA	*Yucca*	22–45	–

Animal community

Native animals that occupy this site include scaled quail, pronghorn antelope, coyote, jackrabbit, swift fox, Texas horned lizard, prairie dogs and various small mammals and grassland birds. It is an open grassland site; therefore, species that require cover will not be resident. For specific guidance on wildlife, Wildlife Habitat Appraisal Guides are available through NRCS for several species. Prairie dogs were a part of the natural ecosystem and their towns were extensive in the plains. Before settlement, prairie dogs were able to expand into new territory at will. There were also more natural predators present, such as the black-footed ferret. The towns could spread out and the burrows were likely well spaced. Today prairie dogs often occupy a relatively small tract of range and over populate through lack of space and predators. Sever abuse of the plant community occurs. Once severe abuse by prairie dogs takes place, the site may never regain the structure and composition of the reference state.

Hydrological functions

This site has very little slope, so runoff is slow. Runoff from the site often supplies nearby playa lakes, and this water eventually flows into the few major draws and streams in the area. With good vegetative cover, runoff contains low sediment. Infiltration is moderately slow and evaporation relatively high. If vegetative cover is poor, very little water gets into the soil.

Recreational uses

This site is well suited for many recreational uses such as hunting, camping, hiking, bird watching, 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 Clipping Data summaries over a 20 year period

Other references

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, Ed M Vavra, W Laycock, R Pieper, pp13-68, Denver, CO: society for Range Management
2. Gould F. 1978. Common Texas Grasses: an illustrated guide. College Station, TX: Texas A & M Press.
3. Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
4. Heischmidt RK, Stuth, Eds. 1991 Grazing Management: an ecological perspective. Portland OR: Timberline Press
5. Scifres CJ, Hamilton WT. 1993. Prescribed burning for brushland management: the South Texas example. College Station, TX: Texas A & M Press.
6. Natural Resources Conservation Service - Range Site Descriptions
7. USDA-Natural Resources Conservation Service - Soil Surveys & Website soil database

The following individuals assisted with the development of this site description:
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Approval

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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.
The following individuals assisted with the development of this site description:
Clint Rollins –Rangeland Management Specialist- NRCS; Amarillo, Texas
Justin Clary – Rangeland Management Specialist – NRCS; Temple, Texas

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):** 0-10%, small pockets of non-connected areas.

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 erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface 0 to 9 inches thick; brown loam to clay loam; moderate medium and fine granular structure; slightly hard; friable; many roots; non-calcareous; neutral pH.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High canopy basal cover and density with small interspaces should make rainfall impact minimal. This site has moderately permeable soils, runoff is slow to moderate, available water holding capacity is high and wind erosion is low to moderate.

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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 shortgrasses >>

    Sub-dominant:

    Other: Warm-season midgrasses > cool-season grasses = forbs > shrubs/vines

    Additional:

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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.

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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):** 1,300 to 1,700 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:** Pricklypear, yucca western honey mesquite, and cholla. Broom snakeweed can become invasive.

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.