USDA Natural Resources Conservation Service

Ecological site R077AY006TX
Limy Upland 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

These sites occur on deep calcareous loam soils on uplands. Reference vegetation consists of midgrass and shortgrasses with few tallgrasses and forbs. Woody species have been suppressed historically through periodic fires. Without fire, the woody species may encroach across the site. Abusive grazing practices may lead to a decrease in the tallgrass and some midgrass species.

Associated sites

R077AY001TX	**Deep Hardland 16-22" PZ** Nearly level to gently sloping fine-textured soils on slightly higher positions that formed in calcareous loess. Dominated by short and mid-grass species with few woody species.
R077AY002TX	**Draw 16-22" PZ** Gently sloping loamy soils on lower positions that receive water run-on from adjacent sites. Due to increased water availability this site has higher production potential with tall and mid grasses.
R077AY004OK	**Parna Dune 16-22" PZ** Gently to moderately sloping silty and loamy soils formed in calcareous parna on higher adjacent dune positions and sideslopes. Dominated by mid- and shortgrass species with very few woody species.
R077AY005TX	**Playa 16-22" PZ** Nearly level clayey soils with high shrink-swell potential on lower closed depression playa positions that intermittently pond water. Vegetation is variable and includes hydrophytes.
R077AY013TX	**Very Shallow 16-22" PZ** Nearly level to moderately sloping soils with shallow soils formed over petrocalcic horizons on adjacent positions. Dominated by short and midgrasses with forbs. Limited production potential due to shallow soil depth over restrictive petrocalcic.

Similar sites

R077EY057TX	**Limy Upland 16-24" PZ** A similar site in MLRA 77E with soils formed in a slightly warmer thermic soil temperature regime.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Yucca glauca*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bouteloua gracilis*

Physiographic features

This site is classified as an upland and consists of linear to slightly convex plains and interfluves or as side slopes above playas or draws located on the High Plains north of the South Canadian River and south of the Cimarron River. Slopes range from 0 to 8 percent.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf (2) Dip
Landforms	(1) Plains > Plain (2) Plains > Playa rim (3) Plains > Interfluve
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	2,500–4,500 ft
Slope	0–8%
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	2,300–4,990 ft
Slope	0–8%

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

Influencing water features

Moderate rate of infiltration with good cover. Well drained soils with negligible to medium 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 inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

The soils of this site are deep to moderately deep well drained calcareous loams on gently sloping to sloping side slopes along draws and around playas, and on convex ridge tops. Slopes range from 1 to 8 percent. Surface textures are loams to clay loams with subsoils that contain significant amounts of calcium carbonate. Permeability is moderate, and available water holding capacity is moderate. These soils will support good stands of perennial grasses. The soil root zone is easily penetrated by plant roots. Because of slightly sloping to moderately sloping topography, runoff can be moderate and slight water erosion may occur, especially if cover is poor. Fertility is moderately high on the more gentle slopes where soil depth is greatest.

These are loamy textured soils that are deep to very deep, and calcareous to the surface. They have a layer with a high calcium carbonate equivalent within 40 inches of the soil surface. These soils are classified as Calcidic Argiustolls, and Aridic Calciustolls.

Representative soil components for this site include: Conlen, Kerrick, Oslo, and Sunray.

Table 5. Representative soil features

Parent material	(1) Calcareous loess
Surface texture	(1) Loam (2) Clay loam (3) Silt loam (4) Silty clay loam
Family particle size	(1) Fine-loamy (2) Coarse-loamy
Drainage class	Well drained
Permeability class	Moderate to slow
Soil depth	30–80 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3.5–7.9 in
Calcium carbonate equivalent (0-40in)	15–75%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1

Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (0-40in)	3–10%
Subsurface fragment volume >3" (0-40in)	0%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Soil depth	20–80 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3.1–8.3 in
Calcium carbonate equivalent (0-40in)	15–80%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–8
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (0-40in)	3–12%
Subsurface fragment volume >3" (0-40in)	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.

The reference plant community consists of a mixture of short and midgrasses with tallgrasses being few. Some perennial forbs are present with a few annual forbs and a few scattered woody shrubs. Productivity is moderate with most of the production coming from blue grama (*Bouteloua gracilis*) and sideoats grama (*Bouteloua curtipendula*). Other commonly found grasses are: hairy grama (*Bouteloua hirsuta*), sand dropseed (*Sporobolus compositus*) and perennial three-awn (*Aristida purpurea*). Vine mesquite (*Panicum obtusum*) and western wheatgrass (*Pascopyrum smithii*) grow in runoff concentration areas, and small pockets of sand bluestem (*Andropogon hallii*) or Indiangrass (*Sorghastrum nutans*) are sometimes found. Little bluestem (*Schizachyrium scoparium*) will occur in small amounts where the soil becomes more shallow. The more commonly found forbs are: dotted gayfeather (*Liatris punctata*), scarlet globemallow (*Sphaeralcea coccinea*), slimleaf scurfpea (*Psoralidium tenuiflorum*), lyreleaf greeneyes (*Berlandiera lyrata*), Engelmanndaisy (*Engelmannia peristenia*), baby white aster (*Chaetopappa ericoides*), half shrub sundrop (*Calylophus serrulatus*), trailing ratany (*Krameria lanceolata*) and annual forbs. The main woody species found are yucca (Yucca spp.) and broom snakeweed (Guterrezia sarothrae), with occasional catclaw mimosa (*Mimosa aculeaticarpa* var. biuncifera) and occasional juniper (Juniperus spp.) where seed sources are close. Shrubs and trees are few. The site occurs on slightly to moderately sloping areas on upland plains where slight geologic erosion may have occurred and the soils are somewhat “thinner” than those of the associated deep hardland site that occurs on more level terrain. The increase in calcium carbonate content throughout the soil profile is a major factor in the amount of sideoats grama growing on this site. This is the major difference between the closely associated Deep Hardland site that is dominated by blue grama instead of sideoats

grama. The forb component is more apparent in years of increased rainfall. Pronghorn antelope favor this site because of the variety of forbs present. Cryptogamic crusts are more common on this site than on the nearby hardland sites. The production of this site is quite close to that of the hardland sites. The two main indicator plants on limy upland sites are sideoats grama and yucca. Yucca has a tendency to increase on limy upland sites that have had regular spring and early summer deferment for many years because of the yucca seed production under these scenarios. Yucca blooms are extremely palatable to deer, pronghorn and cattle.

Fire played a role in the ecology of this site, as is true for practically all high plains sites. The general role of fire was to sustain grassland and keep shrubby species from becoming the dominant species. However, in the shortgrass region, fire was probably secondary to climate in shaping the reference community. A dryer climate (< 20 inches precipitation) means that the subsoil is dry more often than it is wet. Plant roots grow in response to moisture so naturally dryer climates favor shortgrasses with fibrous root systems or short rhizomatous grasses. Fire, no doubt, suppressed yucca, increased diversity and stimulated annual forbs. Heavy grazing after a fire can have a negative impact on the plant community if conditions are dry and remain dry for an extended period of time.

Grazing by large herbivores certainly played a major role in perpetuating the grasslands of the plains. Bison moved about in large herds over the region. Bison movement was somewhat defined by water availability and fire. Large areas of country were grazed closely; then the animals moved on to new grazing. Recovery time for the vegetation was sufficient for the grassland vegetation to complete a life cycle in most cases. Other large animals such as pronghorn antelope and elk also grazed the plains at will. When domestic livestock were brought to the plains in the 1870's, it was largely an open range situation. By 1890, however, most of the area had been fenced and livestock was confined within these fenced areas. With continuous pressure on the vegetation, the ranges began to decline in ecological diversity and productivity. Early day ranchers had little information on proper stocking rates, and in many cases, more animals were confined within areas that could not sustain them. Long-term grazing abuse, especially on Limy Upland sites, will lead to a decline in vigor of sideoats grama and other midgrass species. Blue grama will increase because it is more adapted to grazing pressure. With constant grazing pressure, the blue grama will become sod bound and loose its bunch grass appearance. Yucca will increase on the site if the grass cover is weakened and yucca is allowed to make seed for several years. Broom snakeweed is cyclic in nature and produces large quantities of seed that often germinate in the fall and winter under high moisture regimes (Sosebee, 1985). When densities of broom snakeweed become high enough on this site, it can digress from its cyclic nature and become both dominate and permanent. When sideoats grama and blue grama are perpetually in states of low vigor, bare areas open up and become vegetated with perennial three-awn, buffalograss and annuals forbs. There can be a shrub/half shrub dominant stage on the Limy Upland site. Dominant shrubs can be yucca, and in some cases broom snakeweed, providing a seed source for these species is available and the grass cover is opened up.

Variation in climatic factors, especially the amount and timing of precipitation, greatly influences the productivity of ecological sites and are largely responsible for the fluctuations in the amount of vegetative growth from one season to the next. It is not unusual for production fluctuations of greater than 50 percent to occur from one year to the next. These types of climatic variation are part of the overall environment in which the reference plant community developed. However, long-term drought (4 to 6 years of rainfall 50 percent below the mean) can act in conjunction with other forces to affect changes in plant communities. For instance, extended drought weakens plants and makes them more susceptible to the effects of overgrazing. Drought conditions coupled with fire can be damaging. Extremely dry summers followed by wet winters can favor cool-season annual grasses that thrive while perennial warm-season species suffer. A well adapted, healthy community such as the reference plant community could better withstand such rigors of drought. However, even reference communities experienced damage that would occur on occasion which results in some departure from a former stable state. Usually, the vegetation would recover in time and the reference community would be restored.

Most of the plant species that grow on the site are drought tolerant warm-season grasses. Warm season grasses have C4 metabolism and are best adapted to hotter, dryer situations. The small component of cool-season grasses (Canada wildrye and western wheatgrass), are C3 plants. The herbaceous species may be either C3 or C4 metabolism plants. Shrubs are C3. C3 plants tend to grow best in lower light intensity and cooler temperatures. For the site to function properly, plant community integrity is essential.

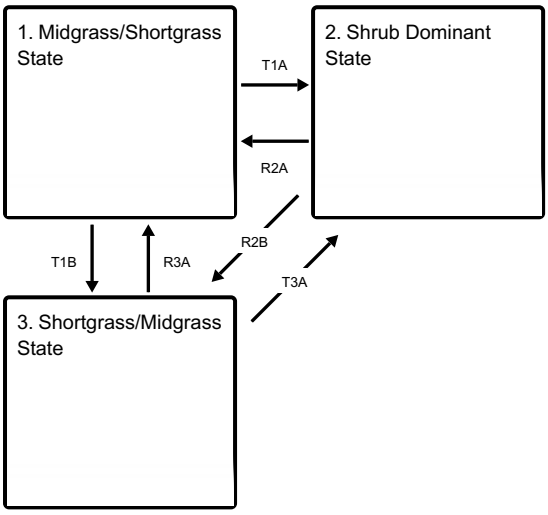
PLANT COMMUNITIES AND TRANSITIONAL PATHWAYS (Diagram):
The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of

circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

As a site changes in the structure and makeup of the plant community, the changes may be due to management, natural occurrences, or both. At some point in time, thresholds may be crossed. This means that once changes have progressed to a certain point, the balance of the community has been altered to the extent that a return to the former state is generally not possible, that is, not possible without some form of external energy being applied in order to make the community respond in some specific way. These changes in plant communities occur on all ecological sites. Some sites are more resistant to change than others. Also, some sites seem to be more resilient and able to heal more easily than other sites. Usually, changes in management practices alone, such as altering grazing methods, will not result in restoration of former vegetative states. Once a threshold has been crossed, an example of an energy input that might be necessary to effect change might be the implementation of chemical brush management and complete growing season rest to reduce the domination of woody shrubs and increase the production of perennial grasses and forbs. This might have to be done more than once and could take several years. Such a vegetative shift could not be accomplished by regulation of grazing alone. The amount of energy required to effect a change would depend on the present vegetative state and the desired state.

State and transition model

Ecosystem states



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

T1B - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

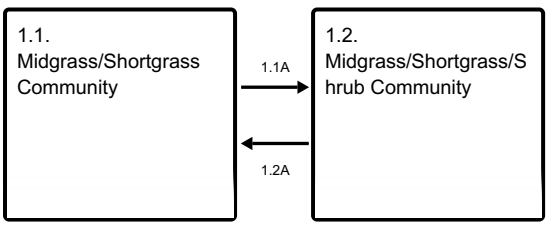
R2A - Reintroduction of historic disturbance regimes, may be coupled with rangeland seeding

R2B - Brush management and grazing management

R3A - Adequate rest from defoliation coupled with brush management

T3A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

State 1 submodel, plant communities



State 2 submodel, plant communities

2.1. Yucca/Shortgrass Community

State 3 submodel, plant communities

3.1. Shortgrass/ Midgrass Community - Low Vigor

State 1
Midgrass/Shortgrass State

The plant community consists of a mixture of short and midgrasses with tallgrasses being few. Some perennial forbs are present with a few annual forbs and a few scattered woody shrubs. Productivity is moderate with most of the production coming from blue and sideoats grama.

Dominant plant species

- soapweed yucca (*Yucca glauca*), shrub
- sideoats grama (*Bouteloua curtipendula*), grass
- blue grama (*Bouteloua gracilis*), grass

Community 1.1
Midgrass/Shortgrass Community

Figure 8. 1. Midgrass / Shortgrass Community

This plant community will be used as the representative plant community. The major grass species are sideoats grama and blue grama with some little bluestem. Lesser amounts of other shortgrasses and midgrasses occur. There are also a few perennial forbs present. The common woody plants observed are plains yucca and broom snakeweed. Production is very good in a Limy Upland site. The plant community is healthy and vigorous.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1000	1400	1675
Forb	50	100	160
Shrub/Vine	20	30	50
Total	**1070**	**1530**	**1885**

Figure 10. Plant community growth curve (percent production by month). TX0510, Short and midgrasses in good production.. Sideoats and blue grama are dominating the site along with few forbs and relatively few woody shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	3	5	8	23	25	12	5	10	5	3	1

Community 1.2
Midgrass/Shortgrass/Shrub Community

Figure 11. 2. Midgrass / Shortgrass/ Shrub Community

This plant community still falls within the boundaries considered to be reference state, although there is some woody shrub encroachment. Occasional periodic fires would probably limit the population of woody plants. The main grasses are still blue grama and sideoats grama. Broom snakeweed and yucca are beginning to increase. Some control of woody plants may become necessary in the future if the objective is to maintain the reference state. Since the threshold has not been crossed at this stage, this community would be considered to be within normal fluxes of the reference state although it is obvious that shrubs are increasing.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	900	1150	1350
Forb	75	120	160
Shrub/Vine	60	75	110
Total	**1035**	**1345**	**1620**

Figure 13. Plant community growth curve (percent production by month). TX0511, Midgrass/shortgrass with increasing shrubs. Midgrasses and shortgrasses with increasing amounts of woody species invading the site..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	9	23	24	12	7	10	5	2	1

Pathway 1.1A
Community 1.1 to 1.2

Midgrass/Shortgrass Community

Midgrass/Shortgrass/Shrub Community

With heavy continuous grazing pressure and no fire, the Midgrass/Shortgrass Community has changed into the Midgrass/Shortgrass/Shrub Community.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Shortgrass/Shrub Community

Midgrass/Shortgrass Community

With the implementation of prescribed grazing and prescribed burning conservation practices, the Midgrass/Shortgrass/Shrub Community can be reverted back to the Midgrass/Shortgrass Community 1.1.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shrub Dominant State

No presence of midgrasses remaining. Low production potential and yucca species are dominating the site. There is serious perennial three-awn encroachment. The site is moving towards a yucca/shortgrass community. Plant vigor is low, production is low, and the community is not functioning well hydrologically.

Dominant plant species

- soapweed yucca (*Yucca glauca*), shrub
- threeawn (*Aristida*), grass
- blue grama (*Bouteloua gracilis*), grass

Community 2.1
Yucca/Shortgrass Community

Figure 14. 3. Yucca/Shortgrass Community

This plant community has crossed a threshold since the site does not resemble the reference state. It is obvious that outside energy will have to be introduced to effect a change in vegetation. This Limy Upland site is now dominated by yucca, but still has shortgrasses and very few midgrasses present. There is serious perennial three-awn encroachment. The site is moving towards a yucca/shortgrass community. Plant vigor is low, production is low, and the community is not functioning well hydrologically. Runoff has increased; infiltration has declined. Plant residues are insufficient to protect the soil surface. Careful management can restore this community to a more productive state. Some midgrasses such as sideoats grama do remain, but they are in dire need of help and should be allowed to produce seed for several seasons. Prescribed grazing, brush management, prescribed burning after fuel buildup and time are all necessary to initiate the restoration process on this site.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	300	400	550
Shrub/Vine	300	400	475
Forb	25	50	70
Total	**625**	**850**	**1095**

Figure 16. Plant community growth curve (percent production by month). TX0512, Yucca/shortgrass Community. Shortgrasses with yucca dominating the site..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	5	15	30	20	5	5	8	5	2	1

State 3
Shortgrass/Midgrass State

Sideoats grama is in lower production. Dominant grass is blue grama. Perennial three-awn is beginning to encroach the site. Low vigor and low production potential.

Dominant plant species

- yucca (*Yucca*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass

Community 3.1
Shortgrass/ Midgrass Community - Low Vigor

Figure 17. 1. Shortgrass/ Midgrass Community - Low Vigor

This plant community has been subjected to abusive grazing for many years. There are a few midgrasses remaining in the plant community. The dominant grass is blue grama, but it is in a state of low vigor and has a sod bound appearance. Yucca has increased to the point of becoming very noticeable. It would be difficult to restore this site to a midgrass/shortgrass community due to a limited seed source of sideoats grama and other productive perennial grasses. Brush management of yucca will be necessary to restore balance to the community. The likely result of brush management and prescribed grazing will be a return to a midgrass/shortgrass community with improved vigor.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	600	850	1150
Forb	50	70	100
Shrub/Vine	25	45	50
Total	**675**	**965**	**1300**

Figure 19. Plant community growth curve (percent production by month). TX0513, Shortgrass/midgrass low production. Shortgrass and midgrasses that are low in production with increasing perennial threeawns..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	4	6	24	27	12	8	10	5	2	0

Transition T1A
State 1 to 2

With heavy continuous grazing and no fire over a twenty plus year period, the Midgrass/Shortgrass State has transitioned into the Shrub Dominant State.

Transition T1B
State 1 to 3

With heavy continuous grazing and no fire over a five year period, the Midgrass/Shortgrass State has transitioned into the Shortgrass/Midgrass State.

Restoration pathway R2A
State 2 to 1

With the implementation of various conservation practices such as prescribed grazing, prescribed burning, and brush management, the Shrub Dominant Community can be restored to the Midgrass/Shortgrass State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Restoration pathway R2B
State 2 to 3

With the implementation of various conservation practices such as prescribed grazing, prescribed burning, and brush management, the Shrub Dominant Community can be restored to the Shortgrass/Midgrass State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Restoration pathway R3A
State 3 to 1

With two to three years of prescribed grazing and the installation of brush management practices, the Shortgrass/Midgrass State can be reverted to the Midgrass/Shortgrass State.

Conservation practices

Brush Management
Prescribed Grazing

Transition T3A
State 3 to 2

With heavy continuous grazing, no brush management, or no fires, the Shortgrass/Midgrass Community has transitioned to the Shrub Dominant State.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
0	**Midgrasses**			900–1200	
1	**Warm-season grasses**			250–375	
	buffalograss	BODA2	*Bouteloua dactyloides*	0–95	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–95	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–95	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	0–95	–
	sand muhly	MUAR2	*Muhlenbergia arenicola*	0–95	–
	vine mesquite	PAOB	*Panicum obtusum*	0–95	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–95	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–95	–

	slim tridens	TRMU	*Tridens muticus*	0–95	–
2	**Cool-season grasses**			25–50	
	Canada wildrye	ELCA4	*Elymus canadensis*	0–50	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	–
3	**Tallgrasses**			25–50	
	sand bluestem	ANHA	*Andropogon hallii*	0–50	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–50	–
Forb					
4	**Forbs**			100–160	
	lyreleaf greeneyes	BELY	*Berlandiera lyrata*	0–40	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	0–40	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–40	–
	Texas croton	CRTE4	*Croton texensis*	0–40	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–40	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–40	–
	longleaf buckwheat	ERLO5	*Eriogonum longifolium*	0–40	–
	shaggy dwarf morning-glory	EVNU	*Evolvulus nuttallianus*	0–40	–
	oldplainsman	HYAR3	*Hymenopappus artemisiifolius*	0–40	–
	mountain laurel	KALA	*Kalmia latifolia*	0–40	–
	dotted blazing star	LIPU	*Liatris punctata*	0–40	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–40	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–40	–
	Fendler's penstemon	PEFE	*Penstemon fendleri*	0–40	–
	white milkwort	POAL4	*Polygala alba*	0–40	–
	James' holdback	POJA5	*Pomaria jamesii*	0–40	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–40	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–40	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–40	–
	stemmy four-nerve daisy	TESC2	*Tetraneuris scaposa*	0–40	–
	stiff greenthread	THFII	*Thelesperma filifolium var. intermedium*	0–40	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–40	–
Shrub/Vine					
5	**Shrubs**			35–50	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–15	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–15	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–15	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–15	–
	soapweed yucca	YUGL	*Yucca glauca*	0–15	–

Animal community

Lack of cover limits species that can use the site for habitat. Usually, only those species native to the plains grasslands will be seen. Plains grassland birds and mammals frequent this site. Scaled quail, coyotes, various raptors, song birds such as meadow lark, Texas horned lizard, jackrabbit, and other species that prefer an open

plains grassland habitat are found on this site. Prairie dogs towns are occasionally found in the region. Mule deer are sometimes observed browsing forbs growing on the site. Pronghorn antelope favor this site and small bands are often seen.

Hydrological functions

The water cycle, nutrient cycle and watershed protection capability of the site depends on good vegetative cover of deep rooted grasses and forbs. When production and vigor is adversely affected by poor grazing practices, infiltration is decreased and runoff can be as much as 70 %. When infiltration is reduced, the soil becomes artificially shallow and production potential is very limited. With less water getting into the soil, more opportunistic shallow rooted plants begin to abound. With good cover, runoff is cleaner and sedimentation is minimal. This site contributes runoff to draws and larger water courses located lower on the landscape. This site is a major contributor to the Canadian River watershed and other watersheds of the plains region.

Recreational uses

Hunting, Camping, Bird watching, Hiking, Horseback riding

Wood products

No woods products

Other products

Sometimes native plant species seed are collected for planting materials.

Other information

None.

Inventory data references

The information in this document is based on observation of range sites over many years, knowledge of where well managed rangelands were located, and from the review of data such as NRCS clipping studies (417’s), old range inventories (802’s), and from several sets of range site descriptions. Historical accounts have also been reviewed.

Soil Survey Reports for counties in MLRA 77A, NRCS Field Office Tech. Guide, Section II-E, Range Site Descriptions, Official Soil Series Descriptions, Ecological Checklist of Vascular Plants of Texas, Texas A&M Experiment Station, Gould’s Grasses of Texas. Historical accounts, especially The Texas Panhandle Frontier by Frederick W. Rathjen. Personal discussions with Dr. Ronald Sosebee, Professor, Dept. of Range, Wildlife and Fisheries, Texas Tech Univ., Lubbock, Tx. and Dr. Robert Wright, Professor, Biology Dept., West Texas A&M Univ., Canyon, Tx.

Other references

Sosebee, Ronald E., Timing - The Key to Herbicidal Control of Broom snakeweed, 1985, Contribution No. T-9-421, College of Agriculture Sciences, Texas Tech University.

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Approval

Bryan Christensen, 9/11/2023

Acknowledgments

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

Rangeland health reference sheet

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

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Contact for lead author	806-791-0581
Date	05/13/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-25%

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Loamy friable surface with medium SOM.

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

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: Warm-season midgrasses > Cool-season midgrasses >

    Other: Warm-season tallgrasses = Forbs = Shrubs

    Additional:

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

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,400 to 1,900 pounds per acre of total annual production.

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, pricklypear, cholla and catclaw.

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