USDA Natural Resources
Conservation Service

Ecological site R077BY016TX
Limy Upland 12-17" PZ

Last updated: 9/11/2023
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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): 077B–Southern High Plains, Northwestern Part

MLRA 77B is characterized by nearly level to gently sloping plains with a minimal number of playa depressions and moderately sloping breaks along drainageways. Loamy and sandy soils are generally deep and occur in a mesic soil temperature regime and ustic soil moisture regime bordering on aridic. Current land use is dominantly rangeland with minor 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

These sites occur on moderately deep, calcareous, loamy soils on uplands. Reference vegetation consists of short and midgrasses with forbs and few shrubs. Abusive grazing practices can lead to a change in the plant community. In the absence of fire or other brush management, woody species may increase across the site.

Associated sites

R077BY014TX	**Deep Hardland 12-17" PZ** Generally adjacent and downslope of the Limy Upland site. This site has deep loamy to clayey soils like the Limy Upland site. The soils contain less calcium carbonate. Slopes are less steep (0 - 3 %) with a plant community dominated by shortgrasses, more productive.
R077BY725TX	**Draw 12-17" PZ** Generally adjacent and downslope of the Limy Upland site. Draw sites provide the drainage from the Limy Upland site to bottomland sites. The soils are sandy to loamy in texture. Midgrasses dominate, less productive.
R077BY026NM	**Gravelly Loam** Sometimes adjacent and upslope of the Limy Upland site. The site has deep gravelly loam soils. The soils contain less calcium carbonate. Slopes are steeper (0 to 9%). Production is lower.
R077BY722TX	**High Lime 12-17" PZ** Generally adjacent, downslope or upslope of the Limy Upland site. The soils are generally loamy to clayey in texture and very highly calcareous. Production is lower.

Similar sites

R077AY006TX	**Limy Upland 16-22" PZ** This site has deep to very deep loam soils like the Limy Upland site of MLRA 77B. Mean annual precipitation is higher (16 to 22 inches). Midgrasses dominate, generally more productive.
R077BY722TX	**High Lime 12-17" PZ** Generally adjacent, downslope or upslope of the Limy Upland site. The soils are generally loamy to clayey in texture and very highly calcareous. Production is lower.
R077EY055TX	**Hardland Slopes 16-24" PZ** Limy Upland sites are similar to Hardland Slopes in plant composition with the exception sideoats grama will be higher on the Limy Upland site due to the increased lime content. Hardland Slopes is downslope from Limy Upland site with higher slopes (1 to 12%).
R077EY057TX	**Limy Upland 16-24" PZ** This site has deep to very deep loam soils like the Limy Upland site of MLRA 77B. Mean annual temperature is slightly higher (59 to 63 degrees F). Mean annual precipitation is higher (16 to 24 inches). Midgrasses dominate, generally more productive.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Chrysothamnus viscidiflorus*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua curtipendula*

Physiographic features

The Limy Upland site occurs as nearly level to strongly sloping plains and adjacent to draws or escarpments. Due to the general nature of this site, runoff is both generated and received. This generally depends on the amount of vegetative cover and intensity of the precipitation event.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	2,460–5,900 ft
Slope	0–12%

Water table depth	80 in
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 the 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)	142-147 days
Freeze-free period (characteristic range)	168-170 days
Precipitation total (characteristic range)	17-18 in
Frost-free period (actual range)	140-148 days
Freeze-free period (actual range)	168-170 days
Precipitation total (actual range)	16-18 in
Frost-free period (average)	144 days
Freeze-free period (average)	169 days
Precipitation total (average)	17 in

Climate stations used

- (1) CLAYTON 1 N [USC00291883], Clayton, NM
- (2) DALHART MUNI AP [USW00093042], Hartley, TX
- (3) AMISTAD 5 SSW [USC00290377], Amistad, NM
- (4) ROSEBUD 7NW [USC00297585], Mosquero, NM
- (5) MCCARTY RCH [USC00295516], Nara Visa, NM

Influencing water features

Water features are not an influencing factor in this site.

Wetland description

None.

Soil features

These are deep, loamy soils that are part of the Blackwater Draw geologic formation and have disseminated secondary calcium carbonates present throughout the soil profile. Some have argillic subsurface horizons and all have calcic horizons. Subsurface carbonates are in the form of films, threads, concretions, masses, and nodules. They are moderate in fertility, have a low level of water storage capacity, moderate infiltration rate, and exhibit low to medium runoff depending on slope and vegetative cover.

Major Soil Taxonomic Units correlated to this site include: Texline loam.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Clay loam (2) Loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	80 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–6 in
Calcium carbonate equivalent (0-40in)	2–50%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.9–9
Subsurface fragment volume <=3" (0-40in)	0–18%
Subsurface fragment volume >3" (0-40in)	0%

Ecological dynamics

The soils, topographic location, climate, periodic droughts and fire influenced the stabilization of the reference plant community for this site. this plant community as found by early European settlers was a Shortgrass/Midgrass Community (1.1) with few tallgrasses. There was a good variety of perennial forbs with a few scattered woody shrubs. The calcareous soils influenced the species composition of the site. Productivity is moderate with most of the production coming from sideoats grama (*Bouteloua curtipendula*) and blue grama (*Bouteloua gracilis*). Other commonly found grasses were buffalograss (*Bouteloua dactyloides*), sand dropseed (*Sporobolus compositus*) and perennial threeawn (*Aristida purpurea*). Vine mesquite (*Panicum obtusum*) and western wheatgrass (*Pascopyrum smithii*) could be found in runoff concentration areas. The more free lime there is in the soil, the higher the sideoats grama and little bluestem (*Schizachyrium scoparium*) composition. Major forbs included dotted gayfeather (*Liatris punctata*), slimleaf scurfpea (Psoralea tenuiflora), Engelmann daisy (*Engelmannia peristenia*), lyreleaf greeneyes (*Berlandiera lyrata*), baby white aster (*Chaetopappa ericoides*), catclaw sensitivebriar (*Mimosa microphylla*), scarlet globemallow (*Sphaeralcea coccinea*), and plains zinnia (*Zinnia grandiflora*). The major woody shrub is plains yucca (*Yucca glauca*) and there were often small amounts of catclaw mimosa (*Mimosa aculeaticarpa* var. biuncifera), plains pricklypear (Opuntia polycantha), broom snakeweed (*Gutierrezia sarothrae*), and cholla (*Cylindropuntia imbricata*) present. Yucca acts as a strong increaser on this site and if the site is constantly rested in the spring when the yucca blooms make seed, the increase is hastened.

Natural fire played a major role in the ecology of this site as with most plains sites. The major effect of periodic fire was to suppress woody shrubs and promote a grassland community. With the absence of fire it is much easier for woody shrubs to proliferate and become dominant. Natural fires probably occurred every 10 to 15 years and perhaps more often throughout the plains region. This was often enough to hold most woody species in check and encourage grass dominance. Fire also promoted diversity of forb growth for a couple of years following the burn,

which drew the attention of wildlife species such as pronghorn and mule deer. The main obstacle to the use of fire in the present day is the liability situation and the unpredictability of precipitation. As precipitation falls below a mean of 18 inches, measuring the positive effects of fire becomes more difficult. Fire can be a valuable tool for managing vegetation when used by trained experts in a proper manner.

Large herbivores, mainly bison, roamed the prairie, grazed heavily, and then moved on allowing for long recovery periods. Healthy, productive grassland ecosystems were maintained under this type of natural grazing regime. The grazing of domestic livestock, mainly cattle, began in the 1870's. Early day ranchers saw a land of endless grass and over estimated the ability of the land to support large numbers of stock. As the land was fenced in the 1880's, stock began to be more confined leading to continuous grazing pressure on much of the range. Since that time, continuous grazing has been common and stocking rates have been for the most part excessive.

Hydrologically speaking, the site produces a considerable amount of runoff which finds its way to the numerous small and medium sized drainages. If plant cover is a healthy grassland community, the runoff is slowed and the water quality of runoff is acceptable. Poor cover with significant bare soil promotes runoff and siltation.

This becomes a vicious cycle with infiltration being limited by poor cover and poor moisture relationships limiting the growth of healthy plants. Deep rooted perennial grasses and forbs aid in an efficient water cycle.

This is not a particularly diverse site as far as habitat for wildlife is concerned. However, grassland birds, pronghorn and mule deer inhabit the site. Woody cover is not sufficient to provide cover for whitetail deer and turkey. Scaled quail are often found on the site as they need no more brush than a few yucca and cholla plants to provide their cover needs. In reference conditions, this site could support the native plains wildlife, while other sites with more woody vegetation supported different species. In planning with producers to meet wildlife habitat needs, the potential of each ecological site needs to be realized and included in the overall plan.

Although recent climatic warming trends and increased atmospheric carbon dioxide may be enhancing vegetative change, the major forces influencing the transition from the historic climax plant community are continuous heavy grazing and the decrease in the frequency and intensity of fire. As livestock and wildlife numbers increase and grazing use exceeds a plants ability to sustain defoliation, the more palatable and generally more productive species decline in stature, productivity and density.

If abusive grazing continues for long periods of time, ecologic retrogression occurs. As retrogression proceeds, this site will move towards the Shortgrass/Midgrass/Shrub Community (1.2) with an increase in woody and annual plants. The low vigor midgrasses will decrease and the shortgrass species such as blue grama, perennial threeawn and annuals will increase to the point of dominating the site. Shrubs such as yucca and possibly broom snakeweed will become a significant part of the plant community. Plant composition will be less diverse than the reference community. In this phase, ecological processes have changed somewhat, but the pathway back toward the reference community can be initiated through prescribed grazing, primarily deferment during the growing season for three to four years. Chemical pest and brush management will be necessary to reduce the shrub and annuals population. This can be accomplished by aerial application or individual plant treatment (IPT). In the Shortgrass/Midgrass/Shrub Community (1.2) the fine fuel load is still adequate for prescribed burning if climatic conditions allow.

If heavy continuous grazing continues, along with periodic droughts, retrogression will move towards a Shortgrass/Shrub Community (2.1). This phase will see deterioration of the perennial grass community, low vigor shortgrasses will dominate with minimal presence of midgrasses. Broom snakeweed and cactus may increase dramatically. Yucca can become the dominant plant on this site with no fire or brush management. Bare ground may exceed 40 percent with annuals filling the voids. The Shortgrass/Shrub Community (2.1) will have low production potential and the ecological processes are not functioning very well. Poor hydrological conditions prevail. Productivity and diversity of the plant community has generally suffered.

The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs; a major threshold has been crossed. Restoration of the Shortgrass/Shrub Community (2.1) to the Shortgrass/Midgrass State requires chemical brush and pest management, re-seeding and prescribed grazing. Due to the lack of fine fuel and poor continuity, prescribed burning is not an option.

If grazing abuse continues for many years, this site will become a Shrub/Shortgrass Community (2.2). Yucca will

become the dominant plant with a dramatic increase in broom snakeweed and cactus. Low vigor shortgrasses and perennial threeawn will occupy the interspaces. Bare ground can exceed 50 percent on some sites with annuals filling the voids. No presence of midgrasses remaining. Restoration of the Shrub/Shortgrass Community (2.2) requires extensive chemical brush and pest management, re-seeding and prescribed grazing for many years to restore this phase to near reference.

When given good management this site, as well as other sites, respond favorably and some measure of recovery can be expected fairly rapidly.

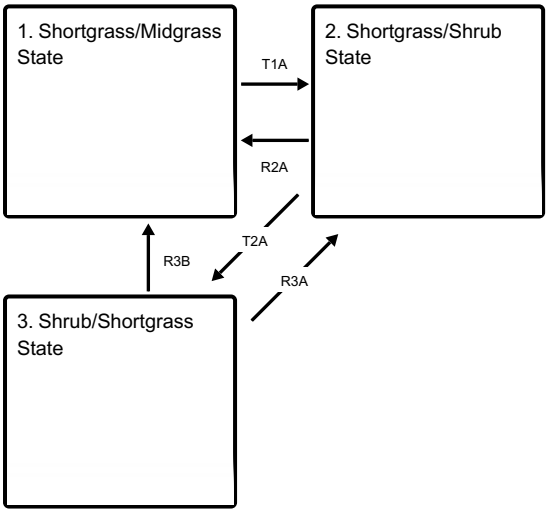
NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

STATE AND TRANSITIONAL PATHWAYS:
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. Changes in the structure and composition of the plant community may be due to management, to natural occurrences or both. At some point in time thresholds are crossed as indicated by the dashed lined box on the State and Transition Diagram. This suggest that once changes have progressed to a certain point, the plant 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 brush management to decrease the amount of woody/cacti 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 TRANSITIONAL PATHWAYS: (DIAGRAM)

State and transition model

Ecosystem states



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

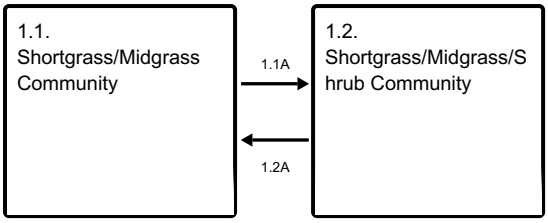
R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

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

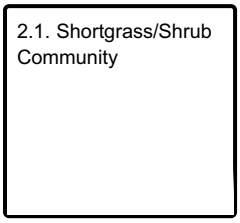
R3B - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

R3A - Adequate rest from defoliation and removal of woody canopy

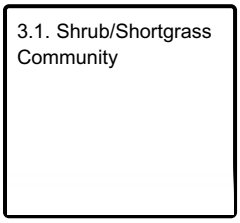
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Shortgrass/Midgrass State

The reference plant community for this site was a Shortgrass/Midgrass Community (1.1) with few tallgrasses. There was a good variety of perennial forbs with a few scattered woody shrubs consisted of yucca, catclaw mimosa, plains pricklypear, broom snakeweed, and cholla. The calcareous soils influenced the species composition of the site. Productivity is moderate with most of the production coming from sideoats grama and blue grama. Other commonly found grasses were buffalograss, sand dropseed and perennial threeawn. Vine mesquite and western wheatgrass could be found in runoff concentration areas. The more free lime there is in the soil, the higher the sideoats grama and little bluestem composition. If excessive grazing continues for long periods of time, ecologic retrogression occurs. As retrogression proceeds, this site will move towards the Shortgrass/Midgrass/Shrub Community (1.2) with an increase in woody and annual plants. The low vigor midgrasses will decrease and the shortgrass species such as blue grama, perennial threeawn and annuals will increase to the point of dominating the site. Shrubs such as yucca and possibly broom snakeweed will become a significant part of the plant community. Plant composition will be less diverse than the reference community.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- blue grama (*Bouteloua gracilis*), grass

Community 1.1
Shortgrass/Midgrass Community

Figure 8. 1.1 Shortgrass/Midgrass Community

The reference plant community for this site is dominated by shortgrass and midgrass species with a good diversity of forbs and only a few scattered shrubs. Blue grama and sideoats grama make up more than 70 percent of the total site production. The more free lime there is in the soil, the higher the sideoats grama and little bluestem composition. Other commonly found grasses include buffalograss, sand dropseed and perennial threeawn. Vine mesquite and western wheatgrass can be found in micro-lows that pond runoff water. This site will have very few, if any, tallgrasses present. Yucca is an indicator plant on this site and acts as a strong increaser if the site is constantly rested in the spring when the yucca blooms make seed, the increase is hastened. There are also a few scattered broom snakeweed. Hydrologically speaking, the site produces a considerable amount of runoff which finds its way to the numerous small and medium sized drainages. If plant cover is a healthy grassland community, the runoff is slowed and the water quality of runoff is acceptable. Poor cover with significant bare soil promotes runoff and siltation.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	900	1250	1600
Forb	45	75	105
Shrub/Vine	30	40	50
Microbiotic Crusts	10	15	20
Tree	0	0	0
Total	**985**	**1380**	**1775**

Figure 10. Plant community growth curve (percent production by month). TX0753, Shortgrass/Midgrass Community. Sideoats and blue grama are dominating the site alone 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
Shortgrass/Midgrass/Shrub Community

Figure 11. 1.2 Shortgrass/Midgrass Community

This plant community is dominated by shortgrass species with decreasing amounts of low vigor midgrasses. Perennial threeawn has made a considerable increase replacing the midgrass species. Woody shrubs such as yucca and broom snakeweed as well as annuals are increasing. The percent bare ground has begun to increase. Production is lower than that of community 1.1 and diversity less. Prescribed grazing in conjunction with chemical brush and pest management, either by aerial application or individual plant treatment (IPT) can return this site back to near reference condition.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	700	950	1200
Forb	80	115	150
Shrub/Vine	60	90	120
Microbiotic Crusts	10	15	20
Tree	0	0	0
Total	**850**	**1170**	**1490**

Figure 13. Plant community growth curve (percent production by month). TX0761, Shortgrass/Midgrass with annual forbs/shrubs. Warm-season shortgrasses dominant with lesser amounts of mid and tallgrasses. There is an increase of annual forbs and woody shrubs..

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

Shortgrass/Midgrass Community

Shortgrass/Midgrass/Shrub Community

With heavy continuous grazing pressure and no fire, the Shortgrass/Midgrass Community will shift to the Shortgrass/Midgrass/Shrub Community.

Pathway 1.2A
Community 1.2 to 1.1

Shortgrass/Midgrass/Shrub Community

Shortgrass/Midgrass Community

With conservation practices such as Prescribed Grazing, Prescribed Burning, and Brush Management or Individual Plant Treatments implemented, the Shortgrass/Midgrass/Shrub Community can shift back to the Shortgrass/Midgrass Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Shortgrass/Shrub State

The Shortgrass/Shrub State has experienced increasing shrubs, annuals and perennial three-awns. There are minimal midgrasses present in this community. The plant populations have low vigor, low production, and increase in bare ground.

Dominant plant species

- yucca (*Yucca*), shrub
- threeawn (*Aristida*), grass

Community 2.1
Shortgrass/Shrub Community

Figure 14. 2.1 Shortgrass/Shrub Community

This plant community is dominated by low vigor shortgrass species and perennial three-awn with only minimum amounts of low vigor midgrass species remaining. Woody shrubs such as yucca and broom snakeweed as well as annuals have made a dramatic increase. The percent bare ground has increased to >40 percent. A major threshold has been crossed and grazing management alone will not return this site back to near reference condition. Prescribed grazing along with chemical brush and pest management will be required with possibly some re-seeding to re-introduce some of the midgrass species. Prescribed burning is not an option once this site reaches this phase, limited fine fuel and poor continuity make burning ineffective.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	500	650	800
Shrub/Vine	280	340	400
Forb	50	85	120
Microbiotic Crusts	5	10	15
Tree	0	0	1
Total	**835**	**1085**	**1336**

Figure 16. Plant community growth curve (percent production by month). TX0760, Degraded Shortgrass/Annuals/Shrubs. Low vigor shortgrasses, increase annuals and woody shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	15	30	25	5	3	6	6	2	1

State 3
Shrub/Shortgrass State

This State has low vigor shortgrasses and no midgrasses remaining on the site. There is a low annual production potential with this plant community. The shrubs are dominating the site tremendously. There is also a high percentage (50+ percent) of bare ground.

Dominant plant species

- yucca (*Yucca*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub

Community 3.1
Shrub/Shortgrass Community

Figure 17. 3.1 Shrub/Shortgrass Community

In this phase, yucca dominates with high percentage of broom snakeweed. Low vigor blue grama has taken on a sodbound appearance with perennial three-awn production almost equal to the blue grama. The percent bare ground has exceeded 50 percent. Production is low and the site is not functioning well hydrologically. Runoff has increased and infiltration has declined. Plant residues are insufficient to protect the soil surface. Major economic and energy inputs are needed to return this site back to the reference community. Extensive chemical brush and pest management, re-seeding and several years of prescribed grazing will be necessary to reverse this degraded state.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	400	500
Grass/Grasslike	300	400	500
Forb	25	50	75
Microbiotic Crusts	0	5	5
Tree	0	1	1
Total	**625**	**856**	**1081**

Figure 19. Plant community growth curve (percent production by month). TX0755, Shrubs/Shortgrass Community. Shrub/Shortgrass community in low production with broom snakeweed dominating the site over shortgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	8	16	25	5	5	10	16	8	3

Transition T1A
State 1 to 2

The Shortgrass/Midgrass State will transition to the Shortgrass/Shrub State due to heavy continuous grazing, no fire, no brush management, brush invasion, and no pest management.

Restoration pathway R2A
State 2 to 1

With the implementation of various conservation practices such as Prescribed Grazing, Brush Management, Pest Management, and Range Planting, the Shortgrass/Shrub Community can be reverted back to the Shortgrass/Midgrass State.

Conservation practices

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

Transition T2A
State 2 to 3

Heavy continuous grazing, no brush management, no pest management, and no fires have lead to a transition from a Shortgrass/Shrub State to a Shrub/Shortgrass State.

Restoration pathway R3B
State 3 to 1

When Prescribed Grazing, Brush Management, Pest Management, and Range Planting conservation practices are implemented, the Shrub/Shortgrass Community can be restored to the Shortgrass/Midgrass State.

Conservation practices

Brush Management
Prescribed Grazing
Range Planting

Integrated Pest Management (IPM)

Restoration pathway R3A
State 3 to 2

With the implementation of various conservation practices such as Prescribed Grazing, Brush Management, Pest Management, and Range Planting, the Shrub/Shortgrass Community can be restored to the Shortgrass/Shrub Community.

Conservation practices

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

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Short/Midgrasses**			680–1200	
	blue grama	BOGR2	*Bouteloua gracilis*	300–550	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	300–550	–
	buffalograss	BODA2	*Bouteloua dactyloides*	80–100	–
2	**Midgrasses**			20–40	
	Canada wildrye	ELCA4	*Elymus canadensis*	20–40	–
	vine mesquite	PAOB	*Panicum obtusum*	20–40	–
	western wheatgrass	PASM	*Pascopyrum smithii*	20–40	–
3	**Short/Mid/Tallgrasses**			200–360	
	hairy grama	BOHI2	*Bouteloua hirsuta*	200–360	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	200–360	–
	James' galleta	PLJA	*Pleuraphis jamesii*	200–360	–
	little bluestem	SCSC	*Schizachyrium scoparium*	200–360	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	200–360	–
	purple threeawn	ARPU9	*Aristida purpurea*	100–200	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	100–200	–
	sand muhly	MUAR2	*Muhlenbergia arenicola*	100–200	–
	gummy lovegrass	ERCU	*Eragrostis curtipedicellata*	50–100	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	50–100	–
Forb					
4	**Forbs**			45–105	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	45–105	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	45–105	–
	lyreleaf greeneyes	BELY	*Berlandiera lyrata*	45–105	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	45–105	–

	yellow sundrops	CASE12	*Calylophus serrulatus*	45–105	
	purple prairie clover	DAPUP	*Dalea purpurea var. purpurea*	45–105	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	45–105	–
	tall woolly buckwheat	ERELE	*Eriogonum elatum var. elatum*	45–105	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	45–105	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	45–105	–
	stiffleaf false goldenaster	HEST3	*Heterotheca stenophylla*	45–105	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	45–105	–
	trailing krameria	KRLA	*Krameria lanceolata*	45–105	–
	dotted blazing star	LIPU	*Liatris punctata*	45–105	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	45–105	–
	Fendler's penstemon	PEFE	*Penstemon fendleri*	45–105	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	45–105	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	45–105	–
	stemmy four-nerve daisy	TESC2	*Tetraneuris scaposa*	45–105	–
	stiff greenthread	THFI	*Thelesperma filifolium*	45–105	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	45–105	–
Shrub/Vine					
5	**Shrubs/Vines**			30–50	
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	30–50	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	30–50	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	30–50	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	30–50	–
	soapweed yucca	YUGL	*Yucca glauca*	30–50	–

Animal community

Lack of cover limits the species that use this site as habitat. Usually, only species native to the plains grasslands will be seen. Plains grassland birds and mammals frequent the site. Scaled quail, coyotes, various raptors, song birds such as the meadow lark, Texas horned lizard, jackrabbit, and other species prefer open grassland. Prairie dog towns are occasionally found in the region.

Mule deer are sometimes observed browsing forbs and yucca blooms growing on the site. Pronghorn antelope favor this site and small bands are often seen.

Hydrological functions

This upland site contributes runoff to small and medium sized drainages. With good vegetative cover, infiltration is enhanced, runoff reduced and siltation minimized. Poor cover and lower ecological condition will contribute to an ineffective water cycle.

Recreational uses

Hunting, camping, hiking, horseback riding, photography.

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

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, 9/11/2023

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.

Reviewers:
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Mark Moseley, RMS, NRCS, San Antonio, Texas
Kelly Attebury, Soil Scientist, NRCS, Lubbock, Texas
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Rangeland health reference sheet

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

Author(s)/participant(s)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	09/04/2007
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** 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):** Moderately resistant to surface erosion.

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

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

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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: Warm-season midgrasses > Cool-season midgrasses >

    Other: Warm-season tallgrasses = 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):** 1,400 - 1,900 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, pricklypear, catclaw and cholla can be potentially invasive on the site.

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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, and intense wildfires.
