USDA Natural Resources Conservation Service

Ecological site R081AY566TX
Limestone Hill 14-19 PZ

Last updated: 9/19/2023
Accessed: 05/04/2024

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): 081A–Edwards Plateau, Western Part

This area is entirely in Texas. It makes up about 16,550 square miles (42,885 square kilometers). The cities of San Angelo and Fort Stockton and the towns of Big Lake, McCamey, Ozona, and Sheffield are in this MLRA. Interstate 20 crosses the northern part of the area, and Interstate 10 crosses the middle of the area. The eastern part of Amistad National Recreation Area is in this MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 81A

Ecological site concept

The Limestone Hills are comprised of shallow soils with lithic contact. The sites are filled with gravels, cobbles, and flagstones and occur on undulating hills with less than 20 percent slopes.

Associated sites

R081AY290TX	**Clay Flat 14-19 PZ** The Clay Flat ecological site has deeper soils and is more productive.
R081AY303TX	**Loamy 14-19 PZ** The Loamy ecological site has deeper soils and is more productive.
R081AY291TX	**Clay Loam 14-19 PZ** The Clay Loam ecological site has deeper soils lower in the landscape.

Similar sites

R081AY309TX	**Low Stony Hill 14-19 PZ** The Low Stony Hill ecological site is shallow to limestone bedrock with gravels, cobbles, and stones.
R081AY311TX	**Shallow 14-19 PZ** The Shallow ecological site is shallow to limestone bedrock with fewer fragments.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Acacia greggii*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bouteloua eriopoda*

Physiographic features

The sites are on uplands that occur on gently sloping to steep, generally convex ridges or mesas. Slopes range from 1 to 15 percent. Elevation of the site ranges from 900 to 5,080 feet above mean sea level. In most locations, no runoff is received from other sites. The abundant herbaceous ground cover prevents, or at least moderates, erosion damage, while the problem is compounded as cover diminishes. Although annual production is comparatively low, the site supports a diverse plant community and will recover from abuse relatively quickly under good management.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Ridge (2) Plateau > Mesa
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	274–1,548 m
Slope	1–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid and is characterized by hot summers and dry, relatively mild winters. The average relative humidity in mid-afternoon ranges from 25 to 50 percent. Humidity is higher at night, and the average at dawn is around 70 to 80 percent. The sun shines 80 percent of the time during the summer and 60 percent in winter. The prevailing wind is from the south-southwest. Approximately two-thirds of annual rainfall occurs during the May to October period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The climate is one of extremes, which exert much more influence on plant communities than averages. Timing and amount of rainfall are critical. High temperatures and dry westerly winds have a tremendously negative impact on precipitation effectiveness, as well as length of time since the last rain. Records since the mid-1900's, as well as geological and archaeological findings, indicate wet and dry cycles going back many thousands of years and lasting for various lengths of time with enormous influence on the flora and fauna of the area.

Table 3. Representative climatic features

Frost-free period (characteristic range)	210-270 days
Freeze-free period (characteristic range)	240-300 days
Precipitation total (characteristic range)	381-483 mm
Frost-free period (actual range)	210-270 days
Freeze-free period (actual range)	240-300 days
Precipitation total (actual range)	381-584 mm
Frost-free period (average)	225 days
Freeze-free period (average)	255 days
Precipitation total (average)	457 mm

Climate stations used

- (1) BAKERSFIELD [USC00410482], Iraan, TX
- (2) BIG LAKE 2 [USC00410779], Big Lake, TX
- (3) COPE RCH [USC00411974], Big Lake, TX
- (4) GARDEN CITY [USC00413445], Garden City, TX
- (5) MCCAMEY [USC00415707], Mc Camey, TX
- (6) PAINT ROCK [USC00416747], Paint Rock, TX
- (7) PANDALE 1 N [USC00416780], Comstock, TX
- (8) PANDALE 11 NE [USC00416781], Comstock, TX
- (9) SANDERSON [USC00418022], Dryden, TX
- (10) SHEFFIELD [USC00418252], Sheffield, TX

Influencing water features

This is an upland site and is not influenced by water from a wetland or a stream.

Wetland description

N/A

Soil features

The site consists of very shallow or shallow, well drained, moderately permeable soils. They are composed of grayish-brown to dark grayish-brown very gravelly loams, very cobbly clay loams, and very cobbly silt loams formed in residuum from limestone and lying over limestone bedrock, usually unfractured. Available water capacity is very low. Shrink-swell potential is low. In the profile there are no saline horizons, and there are no sodic horizons. Soils associated with this site include: Ector, Langtry, Lozier, and Noelke.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone
Surface texture	(1) Very gravelly loam (2) Very cobbly silt loam (3) Very cobbly clay loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	10–51 cm
Soil depth	10–51 cm

Surface fragment cover <=3"	20–50%
Surface fragment cover >3"	5–30%
Available water capacity (0-50.8cm)	0.76–3.05 cm
Calcium carbonate equivalent (0-50.8cm)	40–80%
Electrical conductivity (0-50.8cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-50.8cm)	0
Soil reaction (1:1 water) (0-50.8cm)	7.4–8.4
Subsurface fragment volume <=3" (10.2-50.8cm)	15–40%
Subsurface fragment volume >3" (10.2-50.8cm)	5–40%

Ecological dynamics

The Limestone Hill site was is a mid and short grassland with scattered small shrubs and numerous perennial forbs. Mid-size bunchgrasses, shortgrasses, and perennial forbs probably covered most of the surface. This plant community was greatly influenced by grazing, climate (including periodic extended periods of drought) and, to a lesser degree, fire.

Extensive herds of pronghorns, large towns of black tailed prairie dogs, as well as smaller populations of elk, white-tailed deer, and desert mule deer were present and had an impact on the plant community. Bison, a migratory herd animal, would come into an area, graze on the move, and not come back for many months or even years. This long deferment period allowed the plants to recover from the heavy grazing. Bison grazing on this site was probably intermittent, occurring during wetter periods. Very few bison were reported in the area after 1830. There were no recorded sightings after 1860. Fire has an influence on plant community structure and was probably a factor in maintaining the original savannah vegetation. Mesquite were present on the site, but not at the level seen today. Periodic fires may have helped keep mesquite as a scattered savannah and other woody species a small part of the composition. Grazing patterns by native herbivores and prairie dog activities were probably more significant factors in maintaining a well-balanced plant community.

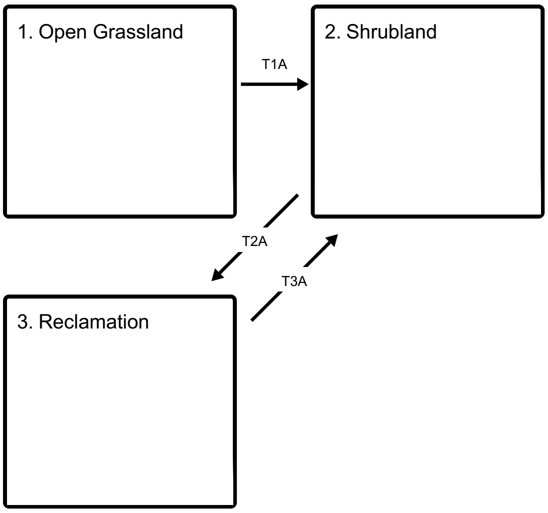
Reference community plants developed ways to withstand periods of drought. The midgrasses and forbs shaded the ground, reduced soil temperature, improved infiltration of what little moisture might fall and maintained soil moisture longer. Their roots reached deeper into the soil, utilizing deep soil moisture no longer available to short-rooted plants. In extreme cases many species could go virtually dormant, preserving the energy stored in underground roots, crowns and stems until wetter weather arrived. Their seeds could stay viable in the soil for long periods, sprouting when conditions improved.

While grazing is a natural component of this ecosystem, overstocking and thus overgrazing by domesticated animals has had a tremendous impact on the site. Early settlers, accustomed to farming and ranching in more temperate zones of the eastern United States or even Europe, misjudged the capacity of the site for sustainable production and expected more of the site than it could deliver. Moreover, there was a gap of time between the extirpation of bison and the introduction of domestic livestock which resulted in an accumulation of plant material. This may have given the illusion of higher production than was actually being produced. Overgrazing and fire suppression disrupted ecological processes that took hundreds or thousands of years to develop. Instead of grazing and moving on, domestic livestock were present on the site most of the time, particularly after the practice of fencing arrived. Another influence on grazing patterns was the advent of wells and windmills. They opened up large areas that were previously unused by livestock due to lack of natural surface water. The more palatable plants were selected repeatedly and eventually began to disappear from the ecosystem to be replaced by lower successional, less palatable species. As overgrazing continued, overall production of grasses and forbs declined, more bare ground appeared, soil erosion increased, and woody and succulent increasers began to multiply. The elimination of fire due to the lack of fine fuel or by human interference assisted the rapid encroachment of mesquite and other woody increasers and a concurrent reduction of usable forage.

Extremes in climate exerted tremendous influence on the site long before European man arrived. Geologic formations, archeological findings, and rainfall records since the mid-1900’s show wide variations in precipitation with cycles of long, dry periods going back thousands of years with corresponding variations in kind and amount of flora and fauna species. Although the limestone hill site has shallow soils with low moisture holding capacity, it can make good use of small rainfall events. The mineral content and reaction of the soils enable the site to produce diverse, highly nutritious forage. Loss of cover and soil robs the site the site of this capability and promotes rapid water shed, erosion and crusting. Pedestalling, terracetes, and water flow patterns are range health indicators that will be present if the site begins to deteriorate.

State and transition model

Ecosystem states

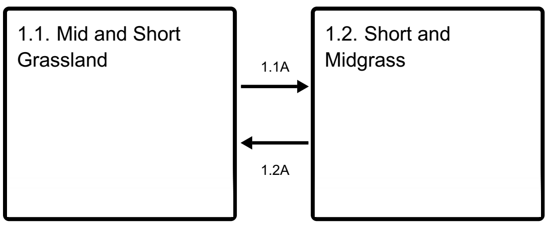


T1A - Absence of disturbance with natural regeneration overtime. Maybe be coupled with prolonged excessive grazing.

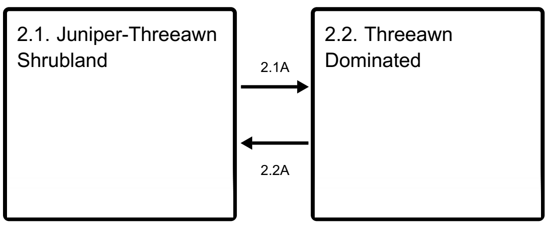
T2A - Removal of woody canopy followed by rangeland seeding

T3A - Absence of disturbance with natural regeneration overtime. Maybe be coupled with prolonged excessive grazing.

State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities

3.1. Reclaimed Grassland

State 1
Open Grassland

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- black grama (*Bouteloua eriopoda*), grass

Community 1.1
Mid and Short Grassland

The reference plant community for this site is a grassland composed of mid and shortgrasses with scattered shrubs that evolved under the influence of grazing, periodic fire, and fluctuations between wet and dry periods that often last for years at a time. Fire effects are limited to areas with a dominance of midgrasses and annual rainfall over 15 inches, generally increasing from west to east. The overstory shades less than five percent of the site and consists of occasional shrubs such as catclaw acacia (*Acacia greggii*), Roemer's acacia (*Acacia roemeriana*), Texas kidneywood (*Eysenhardtia texana*), ephedra (Ephedra spp.), and skeletonleaf goldeneye (*Viguiera stenoloba*). Midgrasses such as sideoats grama (*Bouteloua curtipendula*), black grama (*Bouteloua eriopoda*), cane bluestem (Bothriochloa barbinoides), green sprangletop (*Leptochloa dubia*), and plains bristlegrass (*Setaria leucopila*) along with shortgrasses such as buffalograss (*Bouteloua dactyloides*), Hall's panicum (*Panicum hallii*), and burrograss (*Scleropogon brevifolius*) dominate the site. Other important grasses include Arizona cottontop (*Digitaria californica*), vine mesquite (*Panicum obtusum*), three-flower melic (*Melica nitens*), Texas wintergrass (*Nassella leucotricha*), sand dropseed (*Sporobolus cryptandrus*), slim tridens (Hilaria muticus), rough tridens (Hilaria muticus var. elongates), and three-awns (Aristida spp.). Perennial forbs such as awnless bushsunflower (*Simsia calva*), orange zexmenia (Wedelia hispida), low menodora (*Menodora heterophylla*), Mexican sagewort (*Artemisia ludoviciana*), and Indianmallow (Abutilon spp.) are a small but important component of the plant community. In wet years, annual forbs produce significant herbaceous vegetation. The site has few trees due to the shallow nature of the soils and impermeable, non-fractured underlying material. Plants are vigorous and reproduction is rapid during wet weather. Bare ground is less than 25 percent. Interspaces between plants are slightly covered with litter. Soil erosion is little to none and infiltration is slow to moderate. Runoff occurs during heavier rainfall but is slowed down and dispersed by vegetative ground cover. Concentrated water flow patterns are rare. Recurrent periodic fire, climatic patterns, and grazing by herbivores were natural processes that maintained this reference plant community. Interruption of the ecological processes of a site brings about change. The reference plant community included large populations of important grasses and smaller but highly important numbers of perennial forbs. Extended drought, continued overuse and elimination of fire result in their decline or disappearance from large portions of the site. The more dominant, desirable grasses decrease as do palatable perennial forbs. Less palatable or productive midgrasses such as perennial three-awn (*Aristida purpurea*), sand dropseed, slim tridens, and hairy grama (*Bouteloua hirsuta*); shortgrasses like buffalograss, red grama (*Bouteloua trifida*), and burrograss; and less desirable forbs such as croton (Croton spp.), globemallow (Sphaearalcea spp.), verbena (Verbena spp.), and annuals begin to increase, filling in for the declining species. Small juniper (Juniperus spp.), mesquite, agarito (Mahonia trifoliata), and prickly pear (Opuntia spp.) begin to appear. More bare ground is evident. If the process is not halted or reversed, the community shifts toward the Short and Midgrass Community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	712	953	1194
Forb	90	112	140
Shrub/Vine	39	56	67
Tree	–	–	–
Total	**841**	**1121**	**1401**

Figure 9. Plant community growth curve (percent production by month). TX3251, Mid&Shortgrasses Grassland Community. Warm season mid and shortgrasses with shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	6	10	20	10	15	20	10	1	1

Community 1.2
Short and Midgrass

This community represents a significant vegetational shift. Due to overstocking, elimination of fire, lack of brush management, and possibly changes in weather patterns, the population of juniper and other woody species has increased. Vigor and reproduction of the historically dominant grass species have declined and they are being replaced by threeawns, buffalograss, burrograss, hairy grama, slim tridens, Hall's panicum, and other shortgrasses. Less palatable annual and perennial forbs have also increased. Ground cover by litter has decreased. Up to 50 percent of the ground is bare. Soil organic matter is low. Infiltration has dropped off and runoff is rapid. Signs of erosion are evident. The loss of topsoil and soil organic matter makes it very hard for these abused areas to return to the reference plant community within a reasonable period of time.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	616	785	897
Forb	112	168	224
Shrub/Vine	90	112	168
Tree	28	56	112
Total	**846**	**1121**	**1401**

Figure 11. Plant community growth curve (percent production by month). TX3260, Short&Midgrass Community. Short and midgrass dominated community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	6	10	20	10	15	20	10	1	1

Pathway 1.1A
Community 1.1 to 1.2

With heavy abusive grazing, no brush management, brush invasion, and no fires, the Mid and Short Grassland Community will transition to the Short and Midgrass Community.

Pathway 1.2A
Community 1.2 to 1.1

With the institution of sound management practices, this trend can usually be reversed and a measure of productivity restored. Understanding the effects of climate, fire, and grazing on the ecology of the site combined with the use of sound grazing management, individual plant treatment, fine fuel accumulation and prescribed burning where practical are keys to any attempt to return to the reference plant community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Shrubland

Dominant plant species

- juniper (*Juniperus*), tree
- catclaw acacia (*Acacia greggii*), shrub

Community 2.1
Juniper-Threeawn Shrubland

The Juniper-Threeawn Shrubland Community is the result of an extreme shift of site characteristics from the original midgrass grassland. Juniper, catclaw acacia, cenizo, and other woody increasers dominate the slopes. Mesquite, prickly pear, and other woody/succulent invaders/increasers are established on benches and plateau tops. Stands of sotol, ocotillo, and lechuguilla may be present, particularly in the southwest ranges of the site. Canopy cover ranges from 20 percent upward. Their strong competition for water, sunlight, and nutrients has severely limited or eliminated shortgrass populations, let alone the original midgrass community. Various threeawns, hairy tridens, red grama, Texas grama, burrograss, and annuals dominate the grass plant population of this site. The forb component consists predominantly of annuals or unpalatable perennials. Up to 80 percent of the ground can be bare of grasses and forbs. Often most of the original, fertile topsoil has eroded away. Bare soil has crusted and is relatively impermeable. Very little rainfall infiltrates and runoff is rapid. This community very likely cannot be restored to the reference plant community. Decades of transition from a Midgrass Grassland Community have negatively impacted soil properties, species diversity, site integrity, and hydrological features. It can, however, be improved through mechanical and chemical brush management and implementation of sound grazing management. Before beginning the management program, the land manager should decide the relative value of livestock and wildlife to the ranch and plan brush management goals and objectives accordingly.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	336	448
Shrub/Vine	280	336	448
Tree	196	224	336
Forb	112	224	336
Total	**812**	**1120**	**1568**

Figure 13. Plant community growth curve (percent production by month). TX3261, Juniper-Threeawn Shrubland Community. Juniper and Threeawn dominated Shrubland community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	5	8	10	15	15	10	5	15	10	2	2

Community 2.2
Threeawn Dominated

This site is the result of a brush control program applied to the Juniper-Threeawn Shrubland Community. The grass and forb components are initially the same as in that community. Removal of brush competition for water and nutrients can be performed by increasing ground disturbance and pitting while removing brush. This would allow the forage production to be increased and improvement of rangeland health due to increased management and periodic mechanical or chemical individual plant treatment of unwanted brush seedlings. In the absence of prescribed grazing and brush control maintenance, this plant community will eventually revert back to the Juniper-Threeawn Shrubland community, sometimes in as little as 5 years. Due to the arid nature of the site, range seeding has about a 10 percent chance of being successful on the average. However, during periods of above average rainfall the potential for reseeding disturbed areas with native grasses and forbs, and prescribed grazing is much greater.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	673	897
Forb	90	168	224
Shrub/Vine	39	56	67
Tree	–	–	–
Total	**465**	**897**	**1188**

Figure 15. Plant community growth curve (percent production by month). TX3262, Threeawn Dominated Grassland Community. Threeawn dominated grassland community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	6	10	20	10	15	20	10	1	1

Pathway 2.1A
Community 2.1 to 2.2

With a brush management conservation practice, the Juniper-Threeawn Shrubland Community is converted to the Threeawn Dominated Community.

Conservation practices

Brush Management

Pathway 2.2A
Community 2.2 to 2.1

If woody species are allowed to grow unabated, the community will eventually transition back to the Juniper-Threeawn Shrubland Community. Proper grazing and brush management are needed to prevent this transition.

State 3
Reclamation

Community 3.1
Reclaimed Grassland

This community is the product of efforts to reclaim the Juniper-Threeawn Shrubland community or the Threeawn Dominated Grassland community. Through brush management, reseeding of native species during periods of above average rainfall, and prudent grazing management, a land manager can possibly manipulate this site successfully towards a reference community appearance. But, the plant community will never be able to mirror the original site, mainly because of the loss of topsoil. However, utilizing native species as the reseeding source will greatly benefit wildlife species that occur on the site. This open grassland community may also be comprised of seeded non-native species, which may occur as a monoculture community. This type of community may contain less cover or food for wildlife, often practically devoid of native grasses and forbs. The site’s capacity to produce forage must be determined over time under careful management. Maintenance through prescribed grazing and individual plant treatment can preserve the site's sustained production indefinitely within the constraints of extended weather cycles. Without these measures, the site will experience renewed encroachment of juniper and other increasers and invaders.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	673	785	897
Forb	56	112	168
Shrub/Vine	45	56	67
Tree	11	28	56
Total	**785**	**981**	**1188**

Figure 17. Plant community growth curve (percent production by month). TX3253, Reclaimed Grassland Community. Reclaimed Grassland Community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	6	10	20	10	15	20	10	1	1

Transition T1A
State 1 to 2

If proper management is not planned and implemented, the site will continue to degrade and shift toward a Shrubland State. By implementing conservation measures such as prescribed grazing, chemical/mechanical brush management, and prescribed burning where sufficient fine fuel can be accumulated, the land manager can reverse the retrogression and shift the trend back toward the reference plant community.

Transition T2A
State 2 to 3

With prescribed grazing, brush management, IPT, and prescribed burning, the Shrubland State can be transitioned to a Reclamation State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Transition T3A
State 3 to 2

With heavy abusive grazing, no brush management, brush invasion, and no fires, the Reclamation State is reverted back to the Shrubland State.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			297–488	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	297–488	–

	cane bluestem	BOBA3	*Bothriochloa barbinodis*	297–488	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	297–488	–
	black grama	BOER4	*Bouteloua eriopoda*	297–488	–
2	**Midgrasses**			213–347	
	Arizona cottontop	DICA8	*Digitaria californica*	213–347	–
	green sprangletop	LEDU	*Leptochloa dubia*	213–347	–
	vine mesquite	PAOB	*Panicum obtusum*	213–347	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	213–347	–
3	**Midgrasses**			84–140	
	threeawn	ARIST	*Aristida*	84–140	–
	muhly	MUHLE	*Muhlenbergia*	84–140	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	84–140	–
	slim tridens	TRMU	*Tridens muticus*	84–140	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	84–140	–
4	**Shortgrasses**			39–67	
	buffalograss	BODA2	*Bouteloua dactyloides*	39–67	–
	Hall's panicgrass	PAHA	*Panicum hallii*	39–67	–
5	**Shortgrasses**			34–67	
	hairy grama	BOHI2	*Bouteloua hirsuta*	34–67	–
	red grama	BOTR2	*Bouteloua trifida*	34–67	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	34–67	–
	burrograss	SCBR2	*Scleropogon brevifolius*	34–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	34–67	–
6	**Cool Season grasses**			34–62	
	southwestern needlegrass	ACEM4	*Achnatherum eminens*	34–62	–
	threeflower melicgrass	MENI	*Melica nitens*	34–62	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	34–62	–
7	**Annual grasses**			11–22	
	Grass, annual	2GA	*Grass, annual*	11–22	–
Forb					
8	**Forbs**			90–135	
	Forb, annual	2FA	*Forb, annual*	90–135	–
	Indian mallow	ABUTI	*Abutilon*	90–135	–
	dozedaisy	APHAN3	*Aphanostephus*	90–135	–
	low silverbush	ARHU5	*Argythamnia humilis*	90–135	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	90–135	–
	croton	CROTO	*Croton*	90–135	–
	prairie clover	DALEA	*Dalea*	90–135	–
	false pennyroyal	HEDEO	*Hedeoma*	90–135	–
	Gregg's tube tongue	JUPI5	*Justicia pilosella*	90–135	–
	trailing krameria	KRLA	*Krameria lanceolata*	90–135	–
	low menodora	MEHE2	*Menodora heterophylla*	90–135	–
	skullcap	SCUTE	*Scutellaria*	90–135	–

	awnless bushsunflower	SICA7	*Simsia calva*	90–135	–
	globemallow	SPHAE	*Sphaeralcea*	90–135	–
	vervain	VERBE	*Verbena*	90–135	–
	creepingoxeye	WEDEL	*Wedelia*	90–135	–
Shrub/Vine					
9	**Shrubs/Vine**			39–73	
	guajillo	ACBE	*Acacia berlandieri*	39–73	–
	catclaw acacia	ACGR	*Acacia greggii*	39–73	–
	roundflower catclaw	ACRO	*Acacia roemeriana*	39–73	–
	javelina bush	COER5	*Condalia ericoides*	39–73	–
	snakewood	CONDA	*Condalia*	39–73	–
	Texan hogplum	COTE6	*Colubrina texensis*	39–73	–
	featherplume	DAFO	*Dalea formosa*	39–73	–
	sotol	DASYL	*Dasylirion*	39–73	–
	jointfir	EPHED	*Ephedra*	39–73	–
	Texas kidneywood	EYTE	*Eysenhardtia texana*	39–73	–
	Texas swampprivet	FOAN	*Forestiera angustifolia*	39–73	–
	stretchberry	FOPU2	*Forestiera pubescens*	39–73	–
	littleleaf ratany	KRER	*Krameria erecta*	39–73	–
	Texas barometer bush	LEFR3	*Leucophyllum frutescens*	39–73	–
	algerita	MATR3	*Mahonia trifoliolata*	39–73	–
	Texas sacahuista	NOTE	*Nolina texana*	39–73	–
	resinbush	VIST	*Viguiera stenoloba*	39–73	–

Animal community

This site is suitable to produce domestic livestock and to provide habitat for native wildlife. Cow-calf, stocker cattle, sheep, and goats can utilize this site. Carrying capacity has declined drastically over the past 100 years due to deterioration of the reference plant community. An assessment of vegetation is needed to determine the site’s current carrying capacity. Calculations used to determine livestock stocking rate should be based on forage production remaining after determining use by resident wildlife, then refined by frequent and careful observation of the plant community’s response to animal foraging.

A large diversity of wildlife is native to this site. In the historic plant community, migrating bison, grazing primarily during wetter periods, resident pronghorns and smaller populations of white-tailed deer, desert mule deer, quail, and prairie chickens were the more predominant species. With the subsequent transformation of the plant community, due primarily to the influence of man and climate change, the kind and proportion of wildlife species have been altered.

With the eradication of the screwworm fly, increase in woody vegetation and man-suppressed natural predation, deer numbers have increased and are often in excess of carrying capacity. Where deer numbers are excessive, overbrowsing and overuse of preferred forbs causes deterioration of the plant community. Progressive management of deer populations through hunting can keep populations in balance and provide an economically important ranching enterprise. Achieving a balance between brushy cover and more open plant communities on this and adjacent sites is important to deer management. Competition among deer, sheep, and goats must be a consideration in livestock and wildlife management to prevent damage to preferred vegetation.

Smaller mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunks, possum, and armadillo. Mammalian predators include coyote, red fox, gray fox, bobcat, and mountain lion. Wolves were common in earlier times, bears resided in some areas, and an occasional jaguar was encountered. Many species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, songbirds, and birds of prey. Major game birds that are economically important are bobwhite quail, scaled (blue) quail, and mourning dove. Quail prefer a combination of low shrubs, bunch grass (critical for nesting cover), bare ground, and low successional forbs. Turkeys visit the site to feed. The different species of songbirds vary in their habitat preferences. Habitat on this site that provides a large diversity of grasses, forbs, and shrubs will support a good variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits, and snakes in balance.

Hydrological functions

The site is well drained with low water holding capacity but is able to make good use of small rainfall events. It does not lend itself to aquifer recharge, especially with unfractured bedrock. The site is located at higher elevations with steeper slopes, so the potential for rapid runoff is high, particularly when in a denuded state during heavy rainfall. Erosion can be quite high on this site, and, as the erosion process continues, the hydrologic characteristics worsen.

When heavy grazing or prolonged drought occurs, the water cycle becomes impaired due to the loss or reduction of bunchgrass and ground cover. Infiltration is decreased and runoff is increased due to poor ground cover, rainfall splash, soil capping, low organic matter, and poor structure. With a combination of a sparse ground cover and intensive rainfall, this site can contribute to increased frequency and severity of flooding within a watershed. Soil erosion is accelerated; quality of surface runoff is poor, and sedimentation is increased. Organic matter is lost from the site with surface runoff and decrease of herbaceous recycling.

As the site becomes dominated by woody species, the water cycle is further altered. Interception of rainfall by tree and shrub canopies increases, thereby reducing the amount of rainfall reaching the surface. However, stem flow is greater due to the funneling effect of the canopy, which increases soil moisture at the base of the tree and infiltration under the canopy is increased due to the mulch effect of leaf litter. Increased transpiration, especially by evergreen species such as live oak and juniper, accelerates depletion of soil moisture. As woody species increase, grass cover declines, which causes some of the same results as heavy grazing. Brush management combined with effective grazing management can help restore the natural hydrology of the site. Grass recovery, however, is slow.

Recreational uses

This site has the appeal of the wide-open spaces and a wide variety of plant and animal life. When winter and early spring moisture is available, colorful annual and perennial forbs will show well on this site. The area is also used for hunting, birding, and other eco-tourism related enterprises.

Inventory data references

Information provided here has been derived from limited NRCS clipping data, and from field observations of range trained personnel.

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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)	
Contact for lead author	
Date	05/04/2024
Approved by	Bryan Christensen
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

    Sub-dominant:

Other:

Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
