USDA Natural Resources Conservation Service

Ecological site R077DY048TX
Shallow 12-17" PZ

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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.

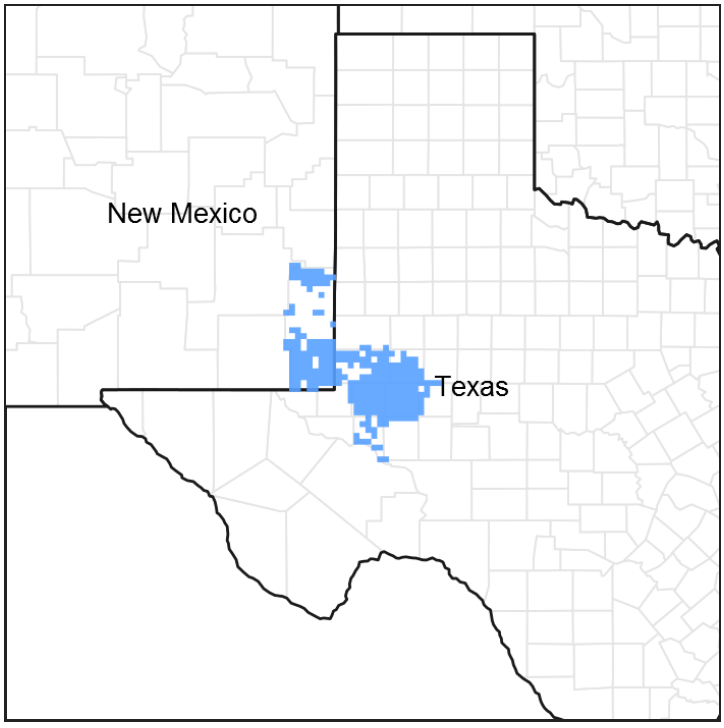


Figure 1. Mapped extent

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): 077D–Southern High Plains, Southwestern Part

This MLRA 77D is characterized by nearly level to gently undulating plains with scattered playa depressions. Soil temperature regime is thermic and soil moisture regime is aridic

bordering on ustic. Sandy and loamy soils are generally well drained and range from shallow to deep and medium- to coarse-textured. Native vegetation is short- to midgrasses and sandy sites support tallgrasses with sand shin oak and mesquite. Current land use is mainly rangeland, although irrigated cropland is expanding.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296

Ecological site concept

This site occurs on shallow, calcareous soils on uplands. The reference vegetation consists of primarily shortgrasses with midgrasses, few forbs, and very few shrubs. Abusive grazing practices can lead to a shift in the plant community. Removal of fire from the ecosystem can lead to an increase in woody plant cover.

Associated sites

R077DY042TX	**Limy Upland 12-17" PZ** Shallow sites can be found adjacent to Limy Upland sites, MLRA 77D. The Limy Upland sites occur as gently undulating soils that occur on broad upland plains. Midgrasses dominate but there is a good mixture shortgrasses on this site. Production is higher on the Limy Upland sites.
R077DY047TX	**Sandy Loam 12-17" PZ** Sandy loam sites, MLRA 77D, occur adjacent to Shallow sites as deeper soils on nearly level plains. Midgrasses dominate but some tallgrasses and shortgrasses can occur on this site. Production is higher on the Sandy Loam sites.
R077DY049TX	**Very Shallow 12-17" PZ** Very Shallow sites, MLRA 77D, occur adjacent to Shallow sites as shallower soils on nearly level plains. Shortgrasses dominate but a good mixture of midgrasses occur on this site. Production is often lower on the Very Shallow sites.

Similar sites

R077CY037TX	**Very Shallow 16-21" PZ** Very Shallow sites, MLRA 77C, have similar forage plant communities with higher production potential due to higher annual precipitation (16 to 21 inches).
R077EY068TX	**Very Shallow 16-24" PZ** Very Shallow sites, MLRA 77E, have similar forage plant communities with higher production potential due to higher annual precipitation (16 to 24 inches).

R077DY047TX	**Sandy Loam 12-17" PZ** Sandy loam sites, MLRA 77D, have similar forage plant communities with higher production potential.

Table 1. Dominant plant species

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

Physiographic features

Soils correlated in the MLRA 77D Shallow ecological site are shallow to a petrocalcic horizon. They were formed in moderately fine textured eolian sediments of the Blackwater Draw Formation of Pleistocene age. These soils are typically on gently sloping plains, narrow ridges, and side slopes along draws. Slope ranges from 0 to 15 percent.

The landforms for the Shallow site include Plains and Ridges.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Ridge
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	457–1,615 m
Slope	0–15%
Water table depth	203 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Continental Steppe climate is prevalent in MLRA 77D. This climate type is typical of interiors of continents and is characterized by large variations in the magnitude of ranges in daily temperature extremes, low relative humidity, and irregularly spaced rainfall of moderate amounts. This climate regime is also known for being semi-arid with mild winters.

Droughts occur with monotonous frequency although there will be years having excessive precipitation resulting in large accumulations of water that little benefit is obtained from the

rainfall events. If good rains occur in the spring and summer months, annual production will be favorable even if the remainder of the year is not favorable. Most of the annual precipitation occurs as a result from spring and early summer thunderstorms. Due to the fact that the area is mainly flat, local flooding may occur but only of short duration. There is very little precipitation and infrequent snowfall amounts in the winter.

During the late winter and early spring months, dust storms occur very frequently. The flat plains of the area contribute very little resistance to the strong winds. Dust in many of these storms remains in the air for several days after the storms have passed.

Daytime temperatures are warm in the summer but there is a large diurnal range and most nights are comfortable. In summers, the normal daily maximum temperatures are in the low to mid 90s and the normal minimum temperatures are in the upper 60s and low 70s. Even though the temperatures may be high, the low humidity and high evaporation rates create a cooling effect during the nighttime hours. Fall months exhibit extremely variable weather. Winters are mild and are characterized by frequent cold fronts accompanied by strong, gusty, northerly winds. Most of the cold fronts are dry as they pass through the area.

Table 3. Representative climatic features

Frost-free period (characteristic range)	154-191 days
Freeze-free period (characteristic range)	181-194 days
Precipitation total (characteristic range)	381-432 mm
Frost-free period (actual range)	147-195 days
Freeze-free period (actual range)	171-213 days
Precipitation total (actual range)	381-432 mm
Frost-free period (average)	167 days
Freeze-free period (average)	190 days
Precipitation total (average)	406 mm

Climate stations used

- (1) MELROSE [USC00295617], Melrose, NM
- (2) ELIDA [USC00292854], Elida, NM
- (3) CROSSROADS 2 [USC00292207], Crossroads, NM
- (4) TATUM [USC00298713], Tatum, NM
- (5) CAPROCK [USC00291445], Caprock, NM
- (6) HOBBS 13W [USC00294030], Lovington, NM
- (7) ANDREWS [USC00410248], Andrews, TX
- (8) ODESSA SCHLEMEYER FLD [USW00003031], Odessa, TX

- (9) K-BAR RCH [USC00414710], Odessa, TX

Influencing water features

Water features are not an influencing factor in this site.

Wetland description

None.

Soil features

The soils of this site are very shallow to shallow well drained, calcareous, gravelly soils. Permeability is moderate and runoff is low to medium. Parent material is a thin mantle of medium to moderately coarse textured eolian sediments over an indurated layer.

Major Soil Taxonomic Units correlated to this site include: Blakeney soils, Conger soils, Slaughter soils and Tonuco soils.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Clay loam (2) Gravelly loam (3) Loam (4) Fine sandy loam (5) Loamy fine sand
Family particle size	(1) Clayey (2) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to rapid
Depth to restrictive layer	25–51 cm
Soil depth	25–51 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-50.8cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-50.8cm)	0–60%
Electrical conductivity (0-50.8cm)	0–2 mmhos/cm

Sodium adsorption ratio (0-50.8cm)	0–2
Soil reaction (1:1 water) (0-50.8cm)	7.4–8.4
Subsurface fragment volume <=3" (0-50.8cm)	0–40%
Subsurface fragment volume >3" (0-50.8cm)	0–3%

Ecological dynamics

The Reference Plant Community of the Shallow Ecological Site was a Shortgrass/Midgrass Community (1.1). Few if any tallgrass species could be found. Grass species accounted for 90 percent of the total site production. A wide variety of forbs are produced on this site with scattered woody shrubs equally accounting for 10 percent of the total annual production. This site occurs on gently to moderately sloping upland areas. Slopes typically range from 1 to 5 percent. The soils of the site vary from shallow fine sandy loams to loams with a depth of 12 to 20 inches over indurated caliche. The soils have good plant-soil-moisture relationships, but moisture-holding capacity is moderate, often limiting productivity.

The dominant shortgrass species is black grama (*Bouteloua eriopoda*), with lesser amounts of buffalograss (*Bouteloua dactyloides*) and Wright threeawn (Aristida wrightii). Trace amounts of Hall’s panicum (*Panicum hallii*), blue grama (*Bouteloua gracilis*) and hairy grama (*Bouteloua hirsuta*) can be found on the site. The dominant midgrass species is sideoats grama (*Bouteloua curtipendula*) and plains bristlegrass (*Setaria macrostachya*), with lesser amounts of cane bluestem (*Bothriochloa barbinodis*), Arizona cottontop (*Digitaria californica*), sand dropseed (*Sporobolus cryptandrus*), slim tridens (*Tridens muticus*), tobosagrass (*Pleuraphis mutica*), vine mesquite (*Panicum obtusum*), and Reverchon bristlegrass (*Setaria reverchonii*). A good variety of forbs exist but the amount varies greatly from year to year depending on moisture. The more commonly found forbs are trailing ratany (*Krameria lanceolata*), orange zexmania (Zexmania hispida), bush sunflower (*Simsia calva*), dotted gayfeather (*Liatris punctata*), white prairie clover (*Dalea albiflora*), gaura spp. (Gaura spp.), plains blackfoot (Melampodium leucanthus), tansy aster (*Machaeranthera tanacetifolia*), Texas croton (*Croton texensis*), Texas sleepy daisy (*Xanthisma texanum*), western ragweed (Ambrosia psilstachya), Oenothera spp. (Oenothera spp.), yellow spiny daisy (Haplpappus spinulosus), and desert holly (*Atriplex hymenelytra*). The major shrubs are catclaw acacia (*Acacia greggii*), vine ephedra (*Ephedra antisyphilitica*), lotebush (*Ziziphus obtusifolia*), pricklypear spp. (Opuntia spp.), javalina bush (*Condalia ericoides*), and winterfat (*Krascheninnikovia lanata*).

Fire plays a role in the ecology of this site as well as most other high plains sites. The general role of fire was to sustain the natural grassland and suppress shrubby species. Fire helps to keep a balance between the grasses, forbs and shrubs. However, in the shortgrass region, fire was probably secondary to climate in shaping the reference vegetative state. A drier climate (<20 inches annual precipitation) creates a situation where the subsoil is dry more often than it is wet. Plant roots grow in response to moisture and this dryer climate favors short grasses with fibrous root systems or short rhizomatous grasses. Annual forbs are stimulated by fire and diversity is generally increased. Heavy grazing after a fire can have a negative effect if conditions are dry and remain so for an extended period.

Periodic overgrazing and trampling by migrating herds of bison and elk as well as resident herds of pronghorn antelope occurred during drought periods. Bison moved about in large herds over the region somewhat regulated by water sources and fire frequency.

However, long rest periods followed once the large herds of bison moved out of the area, allowing the resilient grassland to re-establish and maintain its structure.

Variations in climatic factors, especially the amount and timing of precipitation, greatly influence 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 fluctuations of greater than 50% to occur from one year to another. These types of climatic variation are part of the overall environment in which the reference state developed. However, it needs to be pointed out that long-term drought (4 to 6 years of rainfall 50 percent below the mean) can act in concert 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 and need long periods of time to fully recover. Extremely dry summers followed by wet winters can favor cool-season annual grasses at the expense of perennial warm-season species. A well-adapted, healthy community could better withstand such rigors of drought. However, even they experience damage that would result in some departure from the former stable state. Usually, the departure would be temporary.

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 were confined to these areas continually. Not understanding the limits of rangeland productivity, European settlers overstocked the area with domesticated livestock almost universally. As overgrazing occurred on this site, there was a reduction of the less grazing resistant midgrass species, a decline in mulch and organic matter, and consequently a reduction in intensity and frequency of fires. The shift in plant cover to less palatable shortgrass species and the decline in soil cover, favors woody plant encroachment.

With abusive grazing, no fire, no brush management and/or pest management this site will transition to the Shortgrass/Shrub/Annuals Community (1.2). 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. The tendency of this site is to become a shortgrass dominant site if long term grazing abuse occurs. This will lead to a decline in the vigor of sideoats grama and other palatable midgrass species. Croton species and western ragweed will increase and hairy tridens (*Erioneuron pilosum*), annual broomweed (Guitierrezia dracunculoides), broom snakeweed (*Gutierrezia sarothrae*), mesquite (*Prosopis glandulosa*) and numerous annuals will invade the site. The production of vegetation has shifted from mostly herbaceous vegetation to increasing amounts of woody shrubs. Herbaceous vegetation is still the largest production in this state. Nutrient cycling, the water cycle, watershed protection and biological functions have changed somewhat. This state can transition back to reference with good management practices such as prescribed grazing, brush management and pest management. Prescribed burning could be used if the fuel load and conditions allow.

If long-term, heavy grazing continues with no fire or any form of brush and pest management, a major threshold will be crossed to the Shrub/Shortgrass Community (2.1). In this state, mesquite, broom snakeweed and pricklypear will dominate the site. The typical shortgrass species will be perennial three-awns, hairy tridens and other invading low quality short grasses. Bare areas will increase with annuals filling the voids.

The loss of herbaceous cover and increased bare soil encourages accelerated erosion. Nutrient cycling, the water cycle, watershed protection and biological functions have been severely reduced.

The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Prescribed grazing with rest periods during the growing season, re-seeding with adapted native grass species, chemical and/or mechanical brush management, and some form of pest management will be required to return this state back to the reference state. With the reduced amounts of grass fuel, prescribed burning is usually not an option in this state.

In the early 1930’s Lehman lovegrass (*Eragrostis lehmanniana*), a grass of African origin, was introduced in the southern high plains as a drought tolerant, easy to establish introduced grass species. This grass species was used in many grass mixtures and pasture plantings in an attempt to re-seed poor condition rangeland following mechanical brush management and to return old cropland fields to a perennial vegetative state for livestock grazing purposes. This grass is both invasive and persistent; published evidence indicates that variables such as elevation, summer precipitation, winter temperatures, and soils impact its abundance and distribution. Shallow upland sites in a weakened state near established areas of Lehman lovegrass may become invaded by this grass. Presently, several thousand acres of loam, clay loam and sandy loam sites have been invaded to the point that Lehman lovegrass is the dominant grass species with few if any native species remaining. The resulting plant community is a Lehman Lovegrass/Shrub Dominant Community (3.1). Once this lovegrass has become well established, returning the site to reference would be expensive and generally not very successful or practical. Prescribed

burning for seedbed preparation purposes may be necessary to remove excessive amounts of plant biomass. Moderate to heavy mechanical brush management, heavy seedbed preparation and re-seeding to a native grass mixture would be required. The application of herbicides can be effective to reduce competition from this lovegrass species, but there is only a narrow time of treatment opportunity. Since this grass species has become naturalized much like K.R. bluestem has in Central Texas, it is unlikely that it will disappear through any natural processes such as competition from native species.

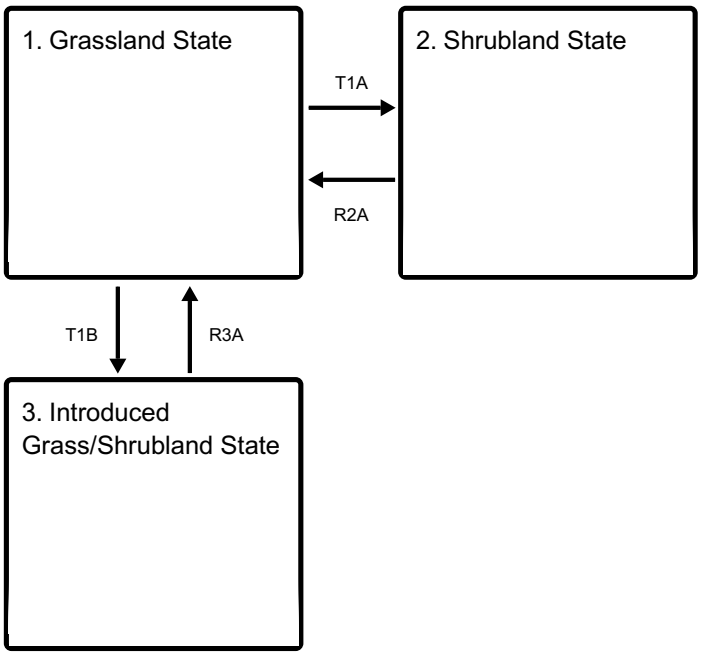
NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

STATE AND TRANSITIONAL PATHWAYS: (DIAGRAM)

Narrative:
The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Ecosystem states



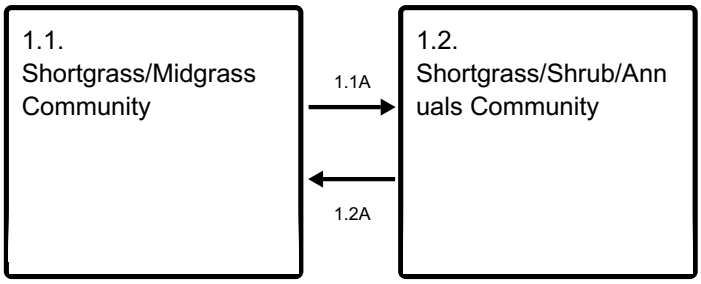
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T1B - Absence of disturbance, natural regeneration over time and introduction of non-natives, coupled with excessive grazing pressure

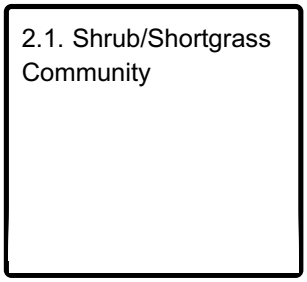
R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

R3A - Adequate rest from defoliation and removal of woody canopy and non-native species, followed by reintroduction of historic disturbance regimes

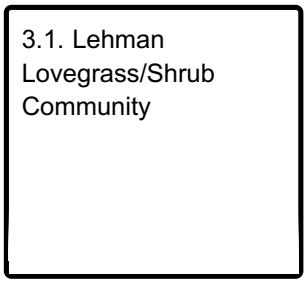
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The Reference Plant Community of the Shallow Ecological Site is a Shortgrass/Midgrass Community (1.1). Few if any tallgrass species can be found. Grass species account for 90 percent of the total site production. A wide variety of forbs are produced on this site with scattered woody shrubs equally accounting for 10 percent of the total annual production. The dominant shortgrass species was black grama, with lesser amounts of buffalograss and Wright threeawn. With continuous heavy grazing, no fire, no brush management and/or pest management this site will transition to the Shortgrass/Shrub/Annuals Community (1.2). 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. The tendency of this site is to become a shortgrass dominant site if long-term grazing abuse occurs. This will lead to a decline in the vigor of sideoats grama and other palatable midgrass species.

Dominant plant species

- black grama (*Bouteloua eriopoda*), grass

- buffalograss (*Bouteloua dactyloides*), grass

Community 1.1
Shortgrass/Midgrass Community

Figure 8. 1.1 Shortgrass/Midgrass Community

The Reference Plant Community of the Shallow Ecological Site is a Shortgrass/Midgrass Community (1.1). Grass species account for 90 percent of the total site production with black grama dominating and a strong midgrass component. A wide variety of forbs are produced on this site with scattered woody shrubs equally accounting for 10 percent of the total annual production. This site occurs on gently to moderately sloping upland areas. Slopes typically range from 1 to 5 percent. The shallow soils of the site vary from fine sandy loams to loams. The soils have good plant-soil-moisture relationships, but moisture-holding capacity is moderate, often limiting productivity. Most energy and nutrient cycling was contained in the narrow grass/soil interface and evapo-transpiration was minimal. Maintenance of this plant community requires continued proper grazing management as well as occasional brush and pest management.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	1009	1513
Forb	28	56	84
Shrub/Vine	28	56	84
Tree	–	–	–
Microbiotic Crusts	–	–	–
Total	**560**	**1121**	**1681**

Figure 10. Plant community growth curve (percent production by month). TX1251, Warm-season bunchgrasses w/ forbs & shrubs. Warm-season bunchgrasses with forbs and shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	12	16	15	20	18	9	1	0

Community 1.2
Shortgrass/Shrub/Annuals Community

Figure 11. 1.2 Shortgrass/Shrub/Annuals Community

With continuous heavy grazing, no fire, no brush management and/or pest management this site will transition to the Shortgrass/Shrub/Annuals Community (1.2). 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. The tendency of this site is to become a shortgrass dominant site if long term grazing abuse occurs. This will lead to a decline in the vigor of sideoats grama and other palatable midgrass species. Croton species and western ragweed will increase and hairy tridens, annual broomweed, broom snakeweed, mesquite and numerous annuals will invade/increase on the site. The production of vegetation has shifted from mostly herbaceous vegetation to increasing amounts of woody shrubs. Herbaceous vegetation is still the largest production in this state. Nutrient cycling, the water cycle, watershed protection and biological functions have changed somewhat. This state can transition back to the reference community with good management practices such as prescribed grazing, brush management and pest management. Prescribed burning could be used if the fuel load and conditions allow.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	673	1009
Shrub/Vine	224	336	448
Forb	67	90	112
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**627**	**1099**	**1569**

Figure 13. Plant community growth curve (percent production by month). TX1252, Shortgrass Dominant/Invading Shrub Community. Warm-season shortgrasses with increasing shrubs and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	12	16	15	20	18	9	1	0

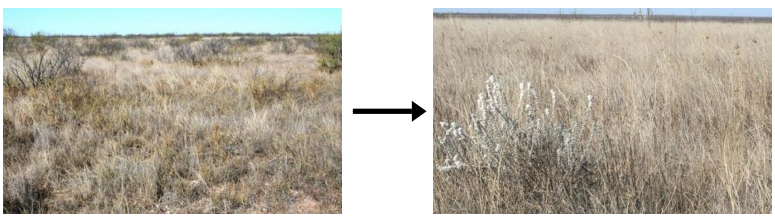
Pathway 1.1A
Community 1.1 to 1.2

Shortgrass/Midgrass Community

Shortgrass/Shrub/Annuals Community

With continuous heavy grazing, no fire, no brush management and/or pest management this site will shift to the Shortgrass/Shrub/Annuals Community (1.2). 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.

Pathway 1.2A
Community 1.2 to 1.1



Shortgrass/Shrub/Annuals Community

Shortgrass/Midgrass Community

This state can transition back to near reference conditions with good management

practices such as prescribed grazing, brush management and pest management. Prescribed burning could be used if the fuel load and conditions allow.

Conservation practices

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

State 2
Shrubland State

If long-term, heavy grazing continues with no fire or any form of brush and pest management, a major threshold will be crossed from the Grassland State (1.0) to the Shrubland State (2.0). In this state, mesquite, broom snakeweed and pricklypear will dominate the site. The typical shortgrass species will be perennial three-awns, hairy tridens and other invading low quality short grasses. Bare areas will increase with annuals filling the voids.

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- pricklypear (*Opuntia*), shrub
- threeawn (*Aristida*), grass

Community 2.1
Shrub/Shortgrass Community

Figure 14. 2.1 Shrub/Shortgrass Community

If long-term, heavy grazing continues with no fire or any form of brush and pest management, a major threshold will be crossed to the Shrub/Shortgrass Community (2.1). In this state, mesquite, broom snakeweed and pricklypear will dominate the site. The typical shortgrass species will be perennial threeawns, hairy tridens and other invading low quality short grasses. Bare areas will increase with annuals filling the voids. The loss of herbaceous cover and increased bare soil encourages accelerated erosion. Nutrient cycling, the water cycle, watershed protection and biological functions have been severely reduced. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Prescribed grazing with rest periods during the growing season, re-seeding with adapted native grass species, chemical and/or mechanical brush management, and some form of pest management will be required to return this state back to the reference state. With the reduced amounts of grass fuel, prescribed burning is usually not an option in this state.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	448	560	673
Grass/Grasslike	168	336	504
Forb	67	90	112
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**683**	**986**	**1289**

Figure 16. Plant community growth curve (percent production by month). TX1254, Shrub/Shortgrass/Annuals Community. Spring and fall growth of shortgrasses, annuals, and shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	4	6	10	16	15	20	15	12	1	0

State 3
Introduced Grass/Shrubland State

Lehman lovegrass is the dominant grass species with few if any native species remaining. The resulting plant community is a Lehman Lovegrass/Shrub Dominant Community (3.1). Once this lovegrass has become well established, returning the site to the reference state(1)would be expensive and generally not very successful or practical.

Dominant plant species

- Lehmann lovegrass (*Eragrostis lehmanniana*), grass

Community 3.1
Lehman Lovegrass/Shrub Community

Figure 17. 3.1 Lehman Lovegrass/Shrub Community

Several thousand acres of loam, clay loam and sandy loam sites in the southern high plains that are in a degraded state have been invaded by Lehman lovegrass to the point that it is the dominant grass species with few if any native species remaining. The resulting plant community is a Lehman Lovegrass/Shrub Dominant Community (3.1). Once this lovegrass has become well established, returning the site to the reference state(1) would be expensive and generally not very successful or practical. Prescribed burning for seedbed preparation purposes may be necessary to remove excessive amounts of plant biomass. Moderate to heavy mechanical brush management, heavy seedbed preparation and re-seeding to a native grass mixture would be required. The application of herbicides can be effective to reduce competition from this lovegrass species, but there is only a narrow time of treatment opportunity. It is unlikely that Lehman loverass will disappear through any natural processes such as competition from native species.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	2354	3363
Shrub/Vine	336	616	897
Forb	6	11	17
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**1687**	**2981**	**4277**

Figure 19. Plant community growth curve (percent production by month). TX1255, Lehman Lovegrass/Shrub Dominant Community. Lehman lovegrass with shrub dominance..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	8	16	18	12	15	18	6	1	0

Transition T1A
State 1 to 2

If long-term, heavy grazing continues with no fire or any form of brush and pest management, a major threshold will be crossed from the Shortgrass/Shrubs/Annuals Community (1.2) to the Shrub/Shortgrass Community (2.1). In this state, mesquite, broom snakeweed and pricklypear will dominate the site.

Transition T1B
State 1 to 3

If long-term, heavy grazing continues with no fire or any form of brush and pest management, along with encroachment of introduced grasses such as Lehman lovegrass, a major threshold will be crossed from the Shortgrass/Shrubs/Annuals Community (1.2) to the Lehman lovegrass/ Shrubs Community. Dominant species include Lehman lovegrass and mesquite.

Restoration pathway R2A
State 2 to 1

The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Prescribed grazing with rest periods during the growing season, re-seeding with adapted native grass species, chemical and/or mechanical brush management, and some form of pest management will be required to return this state back to the reference state(1). With the reduced amounts of grass fuel, prescribed burning is usually not an option in this state.

Conservation practices

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

Restoration pathway R3A
State 3 to 1

Returning the site to the reference state would be expensive and generally not very successful or practical. Prescribed burning for seedbed preparation purposes may be

necessary to remove excessive amounts of plant biomass. Moderate to heavy mechanical brush management, heavy seedbed preparation and re-seeding to a native grass mixture would be required.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Shortgrass**			140–420	
	black grama	BOER4	*Bouteloua eriopoda*	140–420	–
2	**Midgrass**			112–336	
	sideoats grama	BOCU	*Bouteloua curtipendula*	112–336	–
3	**Midgrasses**			196–588	
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	56–168	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	28–84	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	28–84	–
	Arizona cottontop	DICA8	*Digitaria californica*	28–84	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	28–84	–
	vine mesquite	PAOB	*Panicum obtusum*	0–1	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–1	–
4	**Shortgrasses**			56–168	
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	28–84	–
	buffalograss	BODA2	*Bouteloua dactyloides*	28–84	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–6	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–6	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–6	–

	Hall's panicgrass	PAHA	*Panicum hallii*	0–0	
Forb					
5	**Forbs**			28–84	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	2–6	–
	desertholly	ATHY	*Atriplex hymenelytra*	2–6	–
	Texas croton	CRTE4	*Croton texensis*	2–6	–
	whiteflower prairie clover	DAAL	*Dalea albiflora*	2–6	–
	beeblossom	GAURA	*Gaura*	2–6	–
	trailing krameria	KRLA	*Krameria lanceolata*	2–6	–
	dotted blazing star	LIPU	*Liatris punctata*	2–6	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	2–6	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	2–6	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	2–6	–
	evening primrose	OENOT	*Oenothera*	2–6	–
	awnless bushsunflower	SICA7	*Simsia calva*	2–6	–
	Texas sleepydaisy	XATE	*Xanthisma texanum*	2–6	–
Shrub/Vine					
6	**Shrubs**			28–84	
	bigtooth maple	ACGRG	*Acer grandidentatum var. grandidentatum*	4–13	–
	catclaw acacia	ACGRG3	*Acacia greggii var. greggii*	4–13	–
	javelina bush	COER5	*Condalia ericoides*	4–13	–
	clapweed	EPAN	*Ephedra antisyphilitica*	4–13	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	4–13	–
	pricklypear	OPUNT	*Opuntia*	4–13	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	4–13	–

Animal community

This site is inhabited by dove, quail, deer and pronghorn. Limited populations of pronghorn antelope frequent the site. The limited amount of woody plants does not provide good cover and food sources for deer.

Hydrological functions

These shallow soils have moderate to moderately low runoff potential due to slopes which range from 1 to 5 percent. These soils are fertile and absorb water at a moderate rate. Moisture storage is limited by the 12 to 20 inch depth to indurated caliche.

Recreational uses

This site has very little value from an aesthetic standpoint. The site is occupied almost exclusively by native short and midgrass species with few woody shrubs. Recreational activities could include bird hunting, camping, hiking, bird watching, photography, and horseback riding.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

NRCS FOTG – Section II of the FOTG Range Site Descriptions and numerous historical accounts of vegetative conditions at the time of early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations for support documentation.

Inventory Data References (documents):
NRCS FOTG – Section II - Range Site Descriptions
NRCS Clipping Data summaries over a 20 year period

Other references

Reviewers and Technical Contributors:
Mark Moseley, RMS, NRCS, Boerne, Texas
Justin Clary, RMS, NRCS, Temple, Texas
Kelly Attebury, RSS, NRCS, Lubbock, Texas

Other references: (List other references used in the description or correlation of this site.)

J.R. Bell, USDA-NRCS Rangeland Management Specialist (retired)
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Sosebee, Ronald E. Timing – The Key to Herbicidal Control of Broom Snakeweed.
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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.

Mark Moseley, RMS, NRCS, Boerne, Texas
Justin Clary, RMS, NRCS, Temple, 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:** Slight to moderate.

2. **Presence of water flow patterns:** Slight to moderate.

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

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

5. **Number of gullies and erosion associated with gullies:** Slight to moderate.

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):** Slight to moderate.

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

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Shallow clays and clay loam surfaces; weak fine granular surface; hard; friable; few fine roots; calcareous; moderately alkaline; moderate permeability; well drained; good plant-soil moisture; moderate SOM.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low vegetative cover and percent slopes makes this site susceptible to erosion. This site is a very slowly permeable soil, runoff is medium to high depending on slopes and available water holding capacity is moderate to high.

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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 midgrasses > Warm-season shortgrasses>>

    Sub-dominant:

    Other: 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):** 500 to 1500 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:** Mesquite, pricklypear, and broom snakeweed can become invasive.

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