USDA Natural Resources Conservation Service

Ecological site R077DY038TX
Clay Loam 12-17" PZ

Last updated: 9/11/2023
Accessed: 05/03/2024

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): 077D–Southern High Plains, Southwestern Part

This area 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 mid-grasses and sandy sites support tall-grasses 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 gently sloping loam and clay loam soils on uplands. The reference community consists of midgrasses and shortgrasses with few forbs and very few shrubs. Due to the clay loam soils, these sites can be quite susceptible to drought conditions. Abusive grazing may also alter the species composition of the site.

Associated sites

R077DY049TX	**Very Shallow 12-17" PZ** Very shallow sites may occur within or adjoining Clay Loam sites and occur on sloping plains, narrow ridges, side slopes along draws, side slopes around playas and ridges along the edge of mesas. Shortgrasses dominate but there is a good mixture of midgrasses on this site. Production is less than the Clay Loam site.
R077DY040TX	**High Lime 12-17" PZ** High Lime sites sometimes adjoin Clay Loam sites and occur on dunes associated with playas. Midgrasses dominate but there is a good mixture of shortgrasses on this site. Production is less than the Clay Loam site.
R077DY042TX	**Limy Upland 12-17" PZ** Clay Loam sites are often associated with Limy Upland sites on nearly level to gently sloping plains and the slopes of adjoining playas. Midgrasses dominate but there is a good mixture of shortgrasses on this site. Production is often slightly higher than the Clay Loam site.

Similar sites

R077CY022TX	**Deep Hardland 16-21" PZ** Similar to Clay Loam sites in physiographic features and similar plant communities. The Mean Annual Precipitation is higher (16 to 21 inches). The overall production of the Deep Hardland site in MLRA 77C is higher than that of the Clay Loam site in MLRA 77D.
R077DY042TX	**Limy Upland 12-17" PZ** Similar to Clay Loam sites in physiographic features and similar plant communities. The overall production on Limy Upland sites will be slightly higher than Clay Loam sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Mimosa aculeaticarpa var. biuncifera* (2) *Prosopis juliflora*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bouteloua gracilis*

Physiographic features

The Clay Loam ecological site is comprised of nearly level to gently sloping plains, commonly found adjacent to relict drainageways, and were formed in calcareous, loamy eolian sediments and are underlain by cemented or indurated petrocalcic layers. Runoff is very low to medium. Loamy soils and water movement is dependent on amount of vegetative cover and intensity of precipitation events.

Landform: broad, smooth, nearly level to very gently sloping plains near natural drainageways.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Drainageway
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	762–1,463 m
Slope	0–3%
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

These moderately deep soils are developed from calcareous, loamy eolian sediments and are underlain by cemented or indurated petrocalcic layers. Slopes dominantly range from 0 to 3 percent. They are moderate in fertility, have a low level of water storage capacity due to the limited about of soil material above the usually continuous cemented layer. These soils have a slow infiltration rate, depending on slope and vegetative cover. They yield water to plants readily and are subject to wind erosion without good cover. If cover is poor and runoff is excessive, significant water erosion can also occur. Plant roots easily penetrate these soils.

Major Soil Taxonomic Units correlated to this site include: Kenhill loam and Stegall loam.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Clay loam (3) Sandy clay loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	51–102 cm
Soil depth	51–102 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-86.4cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-86.4cm)	0–2%
Electrical conductivity (0-86.4cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-86.4cm)	0–2
Soil reaction (1:1 water) (0-86.4cm)	6.6–8.4
Subsurface fragment volume <=3" (0-86.4cm)	0–3%
Subsurface fragment volume >3" (0-86.4cm)	0%

Ecological dynamics

The Reference Plant Community for this ecological site is a Shortgrass/Midgrass Community (1.1) with less than 5 percent woody shrubs and only a limited variety of forbs. The heavy clay loam textured soils in a rainfall regime of less than 20 inches favor short and midgrasses. The dominant grasses are blue grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), sideoats grama (*Bouteloua curtipendula*), plains bristlegrass (*Setaria macrostachya*), and tobosa (*Pleuraphis mutica*). Lesser amounts of black grama (*Bouteloua eriopoda*), sand dropseed (*Sporobolus cryptandrus*) and perennial threeawn (Aristida sp.) are scattered throughout the site. Other grass species that can be found in and around small depressional areas include vine mesquite (*Panicum obtusum*), Arizona cottontop (*Digitaria californica*) and cane bluestem (*Bothriochloa barbinodis*). The few major forb species

present include gaura spp. (Guara spp.), croton spp. (Croton spp.), plains greenthread (*Thelesperma filifolium*), western ragweed (*Ambrosia psilostachya*) and wooly plantain (*Plantago patagonica*). Shrub/half-shrub species lightly scattered (<5 percent) throughout the site are broom snakeweed (*Gutierrezia sarothrae*), catclaw mimosa (*Mimosa aculeaticarpa* var. biuncifera), lotebush (*Ziziphus obtusifolia*), yucca (*Yucca glauca*), agarito (*Mahonia trifoliolata*), fourwing saltbush (*Atriplex canescens*) and wolfberry (*Lycium berlandieri*). Occasional shrubby mesquite (*Prosopis glandulosa*) may occur as well.

The production potential of the site is moderate and it is a preferred site for grazing of domestic livestock. The short grasses are palatable and nutritious and the site provides year round grazing. Generally speaking, the soils on this site are perhaps the most fertile of any in the MLRA. The most limiting soil factor is the tenacity with which soil water is held by the fine textured soil particles. The soils store maximum amounts of water but yield it to plants somewhat sparingly. In very dry periods, the soils can appear rather droughty. When good moisture occurs, the site produces well.

Pre-settlement influences included grazing or browsing by pronghorn antelope, deer and migratory bison, re-occurring droughts and frequent fires. In general, it is thought that wildfires occurred in this region every 8-15 years on the average. Since European settlement in the late 1800s, grazing pressure from domestic livestock and climatic factors has interacted with reduced fire frequency and intensity to give the competitive advantage to woody plant species. The interaction of these disturbances has changed the composition and structure of the dramatically on many sites. Mesquite has increased on virtually all of the clay loam sites over the past 100 to 150 years.

Fire played a role in the ecology of the site as is true for most of the plains grasslands. The main effect of fire on this site was to hold woody shrubs in check. The shorter grass species such as blue grama and buffalograss are considered fire neutral as far as their response to fire. Climate and soils are the most important and limiting factors affecting grass vegetation on the site. Fire stimulated forb growth if the timing was right and the fires of pre-settlement days were probably more severe due to more fuel being available which could have been more damaging to woody plants. Fire usually creates more diversity in this site for a year or two post-burn. Then the grasses tend to crowd out the forbs and diversity decreases. Forbs also need spring moisture which is perhaps the major factor in creating diversity in the plant community.

Since this site is much preferred as a grazing resource, it has a tendency to be abused perhaps more than some of the other associated sites. With abusive grazing practices, the vigorous blue grama and sideoats grama will become lower in vigor and secondary successional species such as black grama, buffalograss, sand dropseed, and tobosagrass will begin to increase. Broom snakeweed, prairie broomweed (*Amphiachyris dracunculoides*), western ragweed, crotons, and cool-season annuals will quickly increase if the principal species are in a weakened condition. The shift in plant cover to less palatable and generally shorter grasses and decline in soil and litter cover, favors woody plant encroachment. The hydrological functions have been reduced slightly at this point.

Mesquite, catclaw, yucca, and broom snakeweed are quick to increase on the site under continuous heavy grazing. The greatest contributor to the increase of mesquite is the domestic cow. The seed is consumed by animals after the seed pods ripen in late summer and when passed through the digestive system and excreted in the manure, the seed finds an excellent seedbed complete with moisture and nutrients. Some wildlife species rely heavily on mesquite beans and juniper berries for food and contribute to the spread of these species. It is possible for mesquite beans to lay dormant in the soil for many years and then germinate when ideal conditions occur. Grazing management probably has minimal effect on the proliferation of mesquite, but a good cover of perennial grasses likely minimizes the seed to soil contact the mesquite needs to establish.

Excessive grazing pressure combined with the lack of fire will result in a Shortgrass/Shrub Community (1.2). Grass vegetation still dominates annual herbage production, but the encroaching woody species production has increased. The more palatable grasses such as blue grama and sideoats grama will be in a low vigor state with perennial and annual forbs increasing. The percentage of bare soil will also increase at this point. This plant community may be returned to the reference community by prescribed grazing, chemical and/or mechanical brush management on an individual plant basis and possibly with prescribed burning if adequate fine fuel loads are present. Fuel loads are often the most limiting factor for the effective use of prescribed fire on this site. In general, the use of fire on shortgrass communities just does not result in the same positive effects that burning has in tall/midgrass communities. Woody plant suppression using safe approved herbicides is generally more practical, although prescribed fire may have a place in some circumstances.

When heavy grazing continues for extended periods on the Shortgrass/Shrub Community (1.2), and the lack of frequent and intense fires on the site, a transition from the Shortgrass/Shrubs Community into the Shrub/Shortgrass/Annuals Community (2.1) occurs. Droughts, which occur at approximately 20-year intervals in this region, magnify this situation. This plant community will generally be dominated by mesquite and broom snakeweed with lesser amounts of yucca, pricklypear and catclaw. During the transition the more grazing resistant plants such as tobosa, perennial threeawns, hooded windmillgrass, hairy grama, dropseeds and annuals will dominate the site. At this point, a threshold has been crossed and major, high cost and energy inputs will be required to return this site back to the reference community. Heavy mechanical brush management and chemical brush management along with other conservation practices such as range planting, and prescribed grazing will be necessary.

In the early 1930's Lehman lovegrass (*Eragrostis lehmanniana*), a grass of African origin, was introduced in MLRA 77D 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. Clay loam sites in a weakened state near established areas of Lehman lovegrass may become invaded by this grass. Presently, several thousand acres of clay loam, loam, and sandy sites have been invaded in MLRA 77D 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 Community (3.1). Once this lovegrass has become well established, returning the site to the reference community 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.

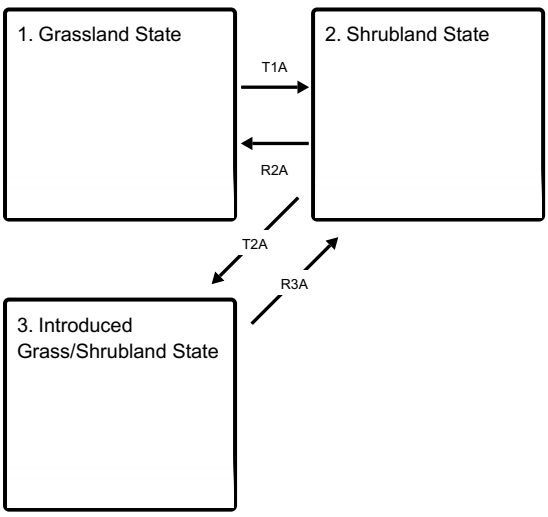
NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

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



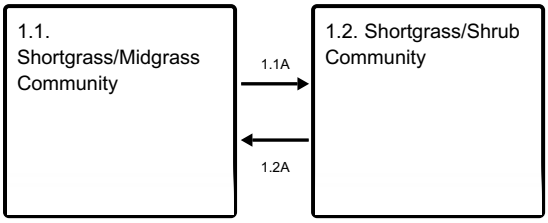
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

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

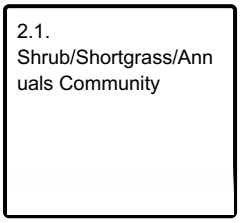
T2A - Absence of disturbance, excessive grazing pressure, and introduction of non-natives

R3A - Adequate rest from defoliation and removal of woody canopy, followed by rangeland seeding

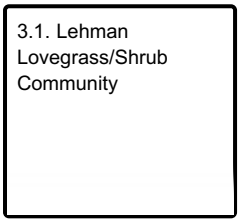
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The Shortgrass/Midgrass Community is the interpretive or "reference" plant community for the Clay Loam Ecological Site. The primary grass species are blue grama (>30 percent) and buffalograss (>20 percent) with lesser amounts of sideoats grama and sand dropseed. Forbs are minimal, less than 5 percent woody plants occur, primarily catclaw mimosa, lotebush, broom snakeweed and an occasional shrubby mesquite. The total production for this plant community ranges from 800 to 2,000 pounds per acre annually. If grazing pressure occurs for long periods combined with lack of fire, the reference plant community will transition to a Shortgrass/Shrubs Community (1.2). Blue grama and sideoats grama will reach a low vigor state with an increase in perennial and annual forbs. The percentage of bare soil will also increase at this point. Shrubby mesquite will increase to greater than 15 percent canopy. The herbaceous vegetation biomass is still the largest amount of the total site production at this phase, but woody plant production is increasing.

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 Shortgrass/Midgrass Community (1.1) is the interpretive or "reference" plant community for the Clay Loam Ecological Site. This site developed under a dry, sub-humid climate with hot dry summers. Natural wildfires kept woody plants at a minimum. The plant community's ecological processes were in balance with the environment. The primary grass species are blue grama (>30 percent) and buffalograss (>20 percent) with lesser amounts of sideoats grama and sand dropseed. Forbs are minimal, less than 5 percent woody plants occur, primarily catclaw mimosa, lotebush, broom snakeweed and an occasional shrubby mesquite. The total production ranges from 800 to 2,000 pounds per acre annually. If grazing pressure occurs for long periods combined with lack of fire, the reference community will transition to a Shortgrass/Shrubs Community (1.2). There will be a reduction in midgrass species and an increase in low vigor shortgrasses and shrubs. Grass production still dominates total annual herbage production but the encroaching woody species production has increased somewhat.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	841	1491	2074
Shrub/Vine	45	95	146
Forb	11	17	22
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**897**	**1603**	**2242**

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 Community

Figure 11. 1.2 : Shortgrass/Shrub Community

The Shortgrass/Shrub Community Phase (1.2) is the result of continuous grazing pressure over an extended period of time combined with periodic droughts. With the decline in grass plant biomass and litter, a corresponding reduction in the frequency and intensity of natural fires occurs, resulting in an increase in woody shrubs. Blue grama and sideoats grama will reach a low vigor state with an increase in perennial and annual forbs. The percentage of bare soil will also increase at this point. Shrubby mesquite will increase to greater than 15 percent canopy. The herbaceous vegetation biomass is still the largest amount of the total site production at this phase, but woody plant production is increasing. This plant community has not crossed a threshold at this point and can be managed back to the reference community. Nutrient cycling, the water cycle, watershed protection and biological functions have been reduced. The shift back to the reference community is possible with proper grazing management, growing season rest, brush and pest management. If heavy grazing pressure continues with no possibility of fire, combined with no brush and pest management, this phase of regression will transition into a shrubland state. The result will be a Shrub/Shortgrass/Annuals Community (2.1). If heavy grazing pressure continues with no possibility of fire, combined with no brush and pest management along with introduced grass invasion of Lehman lovegrass, the Grassland State will transition to the Introduced Grass/Shrubland State (3).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	673	1121	1569
Shrub/Vine	112	168	224
Forb	45	90	135
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**830**	**1379**	**1928**

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 Community

If grazing pressure occurs for long periods combined with lack of fire, the reference community(1.1) will transition to a Shortgrass/Shrubs Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Shortgrass/Shrub Community

Shortgrass/Midgrass Community

This plant community has not crossed a threshold at this point and can be managed back to the reference community. The shift back to the reference community is possible with proper grazing management, growing season rest, brush and pest management.

Conservation practices

Brush Management
Integrated Pest Management (IPM)
Prescribed Grazing

State 2
Shrubland State

In this degraded Shrubland state, typical vegetation will be less palatable shortgrass species; bare areas will open up with annuals filling the voids. Perennial threeawn will invade this site when the more desirable grasses are weakened and/or removed. Scrubby mesquite and broom snakeweed will increase dramatically to the point of domination. The loss of herbaceous cover and increased bare ground encourages accelerated erosion.

Dominant plant species

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

Community 2.1
Shrub/Shortgrass/Annuals Community

Figure 14. 2.1 Shrub/Shortgrass/Annuals Community

As retrogression continues from long-term heavy grazing and fire suppression compounded by drought conditions, a threshold will be crossed to a Shrub/Shortgrass/Annuals Community (2.1). In this degraded state, typical vegetation will be less palatable shortgrass species; bare areas will open up with annuals filling the voids. Perennial three-awn will invade this site when the more desirable grasses are weakened and/or removed. Scrubby mesquite and broom snakeweed will increase dramatically to the point of domination. The loss of herbaceous cover and increased bare ground encourages accelerated erosion. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration of this community (2.1) will require prescribed grazing with rest periods during the growing season, re-seeding bare areas with adapted native grass species, and heavy mechanical brush management and some form of pest management. With the reduced amounts of grass fuel, prescribed burning is not an option in this phase.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	448	785	1009
Grass/Grasslike	359	628	807
Forb	90	157	202
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**897**	**1570**	**2018**

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

Clay Loam sites in a weakened state near established areas of Lehman lovegrass may become invaded by this grass to the point that Lehman lovegrass is the dominant grass species in the community. Few if any native grass and forb species will remain. The resulting plant community is a Lehman Lovegrass/Shrub Community (3.1).

Dominant plant species

- Lehmann lovegrass (*Eragrostis lehmanniana*), grass

Community 3.1

Lehman Lovegrass/Shrub Community

Figure 17. 3.1 Lehman Lovegrass/Shrub Community

Clay Loam sites in a weakened state near established areas of Lehman lovegrass may become invaded by this grass to the point that Lehman lovegrass is the dominant grass species in the community. Few if any native grass and forb species will remain. The resulting plant community is a Lehman Lovegrass/Shrub Community (3.1). Once this lovegrass has become well established to the point of naturalization, returning the site to the reference state will be expensive and generally not very successful or practical. This lovegrass species does provide excellent soil erosion control from wind and water and produces a great deal of plant biomass which aids in improved hydrology of the site. Lehman lovegrass is very drought tolerant and does provide fair to good grazing forage for livestock. But, wildlife benefits are minimal with the reduction in native forbs, browse and cover. If the objective of the land manager is to restore this site to the reference state, 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 will 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.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1121	2242	3363
Shrub/Vine	448	785	1009
Forb	11	17	22
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**1580**	**3044**	**4394**

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 heavy grazing pressure continues with no possibility of fire, combined with no brush and pest management, this phase of regression will transition into a shrubland state. The result will be a Shrub/Shortgrass/Annuals Community (2.1).

Restoration pathway R2A
State 2 to 1

The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration of this community (2.1) to the Grassland State (1) will require prescribed grazing with rest periods during the growing season, re-seeding bare areas with adapted native grass species, and heavy mechanical brush management and some form of pest management. With the reduced amounts of grass fuel, prescribed burning is not an option in this phase.

Conservation practices

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

Transition T2A
State 2 to 3

If heavy grazing pressure continues with no possibility of fire, combined with no brush and pest management along with introduced grass invasion of Lehman lovegrass, the Grassland State will transition to the Introduced Grass/Shrubland State (3).

Restoration pathway R3A
State 3 to 2

Restoration of this site requires 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 will 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. Prescribed grazing and pest management are also required.

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	**Shortgrasses**			448–1121	
	blue grama	BOGR2	*Bouteloua gracilis*	269–673	–
	buffalograss	BODA2	*Bouteloua dactyloides*	179–448	–
2	**Mid/Shortgrasses**			269–673	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	45–112	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	45–112	–
	black grama	BOER4	*Bouteloua eriopoda*	45–112	–
	Arizona cottontop	DICA8	*Digitaria californica*	45–112	–
	vine mesquite	PAOB	*Panicum obtusum*	45–112	–
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	45–112	–
3	**Mid/Shortgrasses**			45–112	
	threeawn	ARIST	*Aristida*	22–56	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–56	–
4	**Shortgrasses**			78–168	
	tobosagrass	PLMU3	*Pleuraphis mutica*	78–168	–
Forb					
5	**Forbs**			11–22	
	Forb, annual	2FA	*Forb, annual*	0–6	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–6	–
	American star-thistle	CEAM2	*Centaurea americana*	0–6	–
	croton	CROTO	*Croton*	0–6	–
	beeblossom	GAURA	*Gaura*	0–6	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–6	–
	stiff greenthread	THFI	*Thelesperma filifolium*	0–6	–
Shrub/Vine					
6	**Shrubs/Vines**			45–146	
	fourwing saltbush	ATCA2	*Atriplex canescens*	6–22	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–22	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	6–22	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	6–22	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	6–22	–
	yucca	YUCCA	*Yucca*	6–22	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	6–22	–

Animal community

Woody plants provide cover for deer and quail. These wildlife species have both increased along with the brushy plants due to the cover that these plants provide. According to most wildlife biologists, both species prefer a lower successional plant community than was present in historic climax. More forbs are needed to meet these species food requirements and woody plants for browse are important for deer. It is often the objective of many land owners to strike a balance in plant community so that these wildlife species can exist along with domestic livestock. This can be accomplished by a carefully thought out grazing and brush management program. It must be realized that

managing at a lower successional level may meet some wildlife species requirements very well, but may not be nearly as productive for grazing purposes. Lower successional levels may not be as capable of satisfying functions such as nutrient cycling, hydrologic protection, plant community stability or soil protection. A proper balance can be achieved with careful planning that considers all resources.

Hydrological functions

Hydrologically, the site contributes runoff to the various draws, creeks, and streams that are common in the MLRA. If the perennial grass cover is maintained in good vigor, then maximum infiltration occurs and runoff is reduced. More water getting into the ground means a healthier, more productive plant community. If infiltration is minimal, then the effect is an artificially shallow soil with plant roots retreating to near the soil surface. More perennial grass cover means less runoff may result but the runoff that does occur is less laden with sediment. Overall watershed protection is enhanced by a healthy grassland community, as is nutrient cycling.

Recreational uses

Hunting, Camping, Hiking, Birdwatching, Photography, 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

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 (Ecological Checklist)
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Acknowledgments

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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
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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):** 25-30% bare ground.

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):** Slight to moderate water surface erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Loam to clay loam; friable surface; high SOM.

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

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season shortgrasses >>

    Sub-dominant: Warm-season midgrasses > Cool-season midgrasses >

    Other: Forbs > Shrubs/Vines

    Additional:

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.

14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 800 to 2,000 pounds per acre.

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, yucca and broom snakeweed can become invasive.

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