USDA Natural Resources Conservation Service

Ecological site R077DY042TX
Limy Upland 12-17" PZ

Last updated: 9/11/2023
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 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

These sites occur on calcareous, moderately deep and deep loamy soils on uplands. The reference vegetation consists of midgrasses and shortgrasses with few forbs and very few shrubs. Abusive grazing practices can alter the species composition and result in a shift in the plant community. Also, removal of fire may result in an increase in woody species.

Associated sites

R077DY047TX	**Sandy Loam 12-17" PZ** Limy Upland sites are generally associated with Sandy Loam sites MLRA 77D. The Limy Upland sites will occur as gently undulating soils that occur on broad upland plains. The associated Sandy Loam sites occur as nearly level upland sites. Production is often higher on the Limy Upland sites
R077DY040TX	**High Lime 12-17" PZ** Limy Upland sites can be associated with High Lime sites MLRA 77D. The Limy Upland sites will occur downslope from the High Lime sites on gently undulating plains. The associated High Lime sites occur as dunes on the leeward side of playas. Production is often higher on the Limy Upland sites.
R077DY038TX	**Clay Loam 12-17" PZ** Limy Upland sites can be associated with Clay Loam sites MLRA 77D. The Limy Upland sites will occur as gently undulating soils that occur on broad upland plains. The associated Clay Loam sites occur as nearly level upland sites. Production is often higher on the Clay Loam sites

Similar sites

R077EY057TX	**Limy Upland 16-24" PZ** Limy Upland sites (MLRA 77E) have similar forage plant communities with higher production potential due to lower calcium and lime content and higher mean annual precipitation (16 - 24inches). The higher calcium and lime content of the Limy Upland sites allows for higher amounts of sideoats grama and yucca plants.
R077DY038TX	**Clay Loam 12-17" PZ** Clay loam sites MLRA 77D have similar forage plant communities with slightly higher production potential. The higher calcium and lime content of the Limy Upland sites allows for higher amounts of sideoats grama and yucca plants.
R077CY028TX	**Limy Upland 16-21" PZ** Limy Upland sites (MLRA 77C) have similar forage plant communities with higher production potential due to lower calcium and lime content and higher mean annual precipitation (16 - 21inches). The higher calcium and lime content of the Limy Upland sites allows for higher amounts of sideoats grama and yucca plants.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Gutierrezia sarothrae* (2) *Yucca glauca*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bothriochloa barbinodis*

Physiographic features

They are on nearly level to gently undulating upland plain. The regolith consists of loamy, calcareous sediments. Slope ranges from 0 to 5 percent. Elevation ranges from 2,500 to 4,800 feet.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Interdune (3) Plateau > Playa slope (4) Plateau > Basin floor
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	762–1,463 m

Slope	0–5%
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) CAPROCK [USC00291445], Caprock, NM
- (5) TATUM [USC00298713], Tatum, 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 moderately deep to deep well drained that are moderately permeable. They are upland soils formed in loamy calcareous materials. They are on nearly level to gently undulating uplands, plain, playa slope, interdune, and basin floor. Runoff is negligible on slopes less than one percent and low from 0 to 5 percent.

Major Soil Taxonomic Units correlated to this site include: Chavaro loam, Lea soils and Ratliff soils.

Parent Material Kind: Loamy, calcareous eolian sediments
Parent Material Origin: Blackwater Draw of Pleistocene age

Table 4. Representative soil features

Parent material	(1) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Fine sandy loam (2) Sandy clay loam (3) Loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	51–203 cm
Soil depth	51–203 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	1–40%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (0-101.6cm)	0–8%
Subsurface fragment volume >3" (0-101.6cm)	0%

Ecological dynamics

The Midgrass/Shortgrass Community (1.1) is the Reference Plant Community. This plant community is almost exclusively (>95 percent) warm-season midgrass and shortgrass species. Few perennial forbs are present accounting for less than (<5 percent) of the total site production. Only a trace of woody shrubs will be found. Trees are seldom found on this upland site. Approximate total annual production on this site ranges from 1,200 lbs. in low

rainfall years to 2,200 pounds per acre during high rainfall years. Productivity is moderate with most of the production coming from blue grama (*Bouteloua gracilis*), black grama (*Bouteloua eriopoda*), sideoats grama (*Bouteloua curtipendula*), cane bluestem (*Bothriochloa barbinodis*), plains bristlegrass (*Setaria leucopila*), Arizona cottontop (*Digitaria californica*), vine mesquite (*Panicum obtusum*), sand dropseed (*Sporobolus cryptandrus*), slim tridens (*Tridens muticus*) and buffalograss (*Bouteloua dactyloides*). Lesser amounts of hairy grama (*Bouteloua hirsuta*), perennial threeawn (Aristida wrightii), fall witchgrass (*Digitaria cognata*) and sand muhly (*Muhlenbergia arenicola*) could be found on the site. The few commonly found forbs were croton spp. (Croton spp.), dotted gayfeather (*Liatris punctata*), scarlet globemallow (*Sphaeralcea coccinea*), baby white aster (*Chaetopappa ericoides*), silverleaf nightshade (*Solanum elaeagnifolium*), yellow spiny daisy (Haplopappus spinulosus), woolly plantain (*Plantago patagonica*), tansy aster (*Machaeranthera tanacetifolia*), western ragweed (*Ambrosia psilostachya*), and annual forbs. The primary woody species that did occur on this site in trace amounts were yucca (*Yucca glauca*), broom snakeweed (*Gutierrezia sarothrae*), catclaw mimosa (*Mimosa aculeaticarpa*), plains pricklypear (Opuntia imbricata), lotebush (*Ziziphus obtusifolia*), vine ephedra (*Ephedra antisyphilitica*), and fourwing saltbush (*Atriplex canescens*).

The site consists of nearly level to gently undulating soils that occur on broad upland plains. Yucca has a tendency to increase on limy upland sites that have had regular spring and early summer deferment for many years with good yucca seed production. Yucca blooms are very palatable to deer, pronghorn and cattle.

Fire played 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 helped to keep a balance between the grasses, forbs and shrubs. However, in the shortgrass region, fire was probably secondary to climate in promoting 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. Yucca is a major increaser on this site and natural fire no doubt kept yucca suppressed significantly. 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 the reference community structure and composition.

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 percent to occur from one year to another. These types of climatic variation are part of the overall environment in which the reference community 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 theses areas continually.

With continuous heavy grazing, no fire, no brush management and/or pest management this site will transition from the reference community to the Midgrass/Shortgrass/Shrub 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 desirable midgrass species. Low vigor blue grama, buffalograss, threeawns, and hooded windmillgrass will dominate the site. Yucca will increase on the site if the grass cover is weakened and the yucca plants make seed for several years. With the weakened grass cover, broom snakeweed will often gain a major foothold 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 reference with good management practices such as prescribed grazing, chemical brush 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 threshold will be crossed to the Shortgrass/Shrub/Annuals Community (2.1). In this state, typical vegetation will be perennial threeawns and low vigor, sodbound blue grama and buffalograss. Low quality short grasses such as burrograss (*Scleropogon brevifolius*), hairy tridens (*Erioneuron pilosum*), gummy lovegrass (*Eragrostis curtipedicellata*), and tumble windmillgrass (*Chloris verticillata*) will become the dominant grass species as the more desirable grasses are removed. Bare areas will increase with annuals filling the voids. The loss of herbaceous cover and increased bare ground encourages accelerated erosion. Broom snakeweed and yucca will increase dramatically with mesquite invading and establishing on many of the limy upland sites. Nutrient cycling, the water cycle, watershed protection and biological functions have been severely reduced.

At this point, 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. 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 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. Limy 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 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 Dominant Community (3.1). Once this lovegrass has become well established, 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. 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.

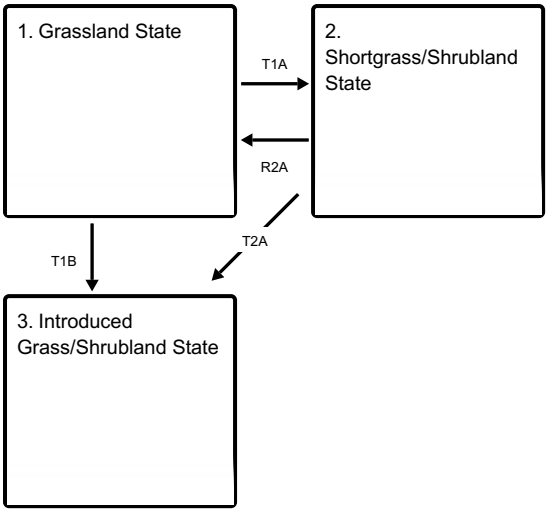
NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

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



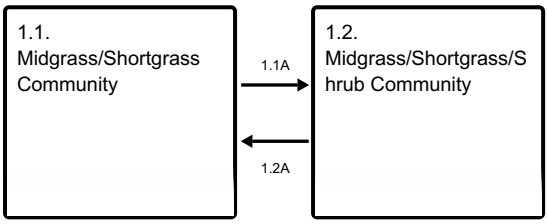
T1A - Absence of disturbance and natural regeneration over time, coupled with excessive grazing pressure and drought conditions

T1B - Absence of disturbance, excessive grazing pressure, and introduction of non-native species

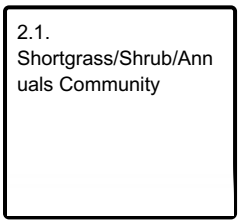
R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

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

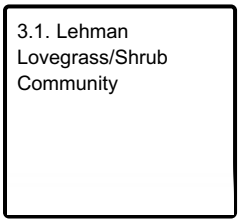
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The interpretive or "reference" plant community for this site is the Midgrass/Shortgrass Community (1.1). This site is dominated by a good mixture of midgrasses and shortgrasses (>95 percent). Sideoats grama is the dominant midgrass with blue grama and black grama the dominant shortgrass species. There are very few perennial forbs which make up (<5 percent) of the total plant community. Only traces of woody plants could be found with yucca anc broom snakeweed the primary woody species. The Midgrass/Shortgrass/Shrub Community (1.2) occurs when long-term grazing abuse continues and revolves into a shortgrass dominant site. This will lead to a decline in the vigor of sideoats grama and other desirable midgrass species. Low vigor three-awns, blue grama, buffalograss, and hooded windmillgrass will dominate the site. Yucca will increase and broom snakeweed will often gain a major foothold on

the site.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- cane bluestem (*Bothriochloa barbinodis*), grass

Community 1.1
Midgrass/Shortgrass Community

Figure 8. 1.1 Midgrass/Shortgrass Community

The interpretive or "reference" plant community for this site is the Midgrass/Shortgrass Community (1.1). This site is dominated by a good mixture of midgrasses and shortgrasses (>95%). Sideoats grama is the dominant midgrass with blue grama and black grama the dominant shortgrass species. There is very few perennial forbs making up (<5%) of the total plant community. Only traces of woody plants could be found with yucca and broom snakeweed the primary woody species. Generally these plants are lightly scattered across the site. The plant community's ecological processes were in balance with the environment. 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	1278	1810	2343
Forb	67	95	123
Shrub/Vine	–	–	1
Tree	–	–	–
Microbiotic Crusts	–	–	–
Total	**1345**	**1905**	**2467**

Figure 10. Plant community growth curve (percent production by month). TX1256, Midgrass/Shortgrass Community. Warm season mid/shortgrass species, few forbs and <5% shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	20	25	17	8	15	4	1	1

Community 1.2
Midgrass/Shortgrass/Shrub Community

Figure 11. 1.2 Midgrass/Shortgrass/Shrub Community

With continuous heavy grazing, no fire, no brush management and/or pest management this site will shift to the Midgrass/Shortgrass/Shrub Community (1.2). 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 desirable midgrass species. Low vigor threeawns, blue grama, buffalograss, and hooded windmillgrass will dominate the site. Yucca will increase and broom snakeweed will often gain a major foothold 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. The percent bare ground is increasing with annuals filling the voids. This plant community has not crossed a threshold at this point and can shift back to the reference community(1.1) with good management practices such as prescribed grazing, chemical brush 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	1009	1345	1681
Shrub/Vine	168	224	280
Forb	90	112	135
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**1267**	**1681**	**2096**

Figure 13. Plant community growth curve (percent production by month). TX1263, Midgrass/Shortgrass/Shrub Community. Low vigor warm season midgrass/shortgrass species with increasing shrubs and annuals..

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

Pathway 1.1A
Community 1.1 to 1.2

Midgrass/Shortgrass Community

Midgrass/Shortgrass/Shrub Community

Heavy Continuous Grazing, No Fire, No Brush Management, No Pest Management would lead the shift from the Midgrass/Shortgrass Community to the Midgrass/Shortgrass/Shrub Community.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Shortgrass/Shrub Community

Midgrass/Shortgrass Community

With the implementation of conservation practices such as Prescribed Grazing, Prescribed Burning, Brush Management, and Pest Management, the Midgrass/Shortgrass/Shrub Community can be converted back to the Midgrass/Shortgrass Community.

Conservation practices

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

State 2
Shortgrass/Shrubland State

In this Shortgrass/Shrubland State, the typical vegetation will be threeawn with small colonies of low vigor, sodbound blue grama and buffalograss. Low quality shortgrasses will become the dominant grass species as the more desirable grasses are removed. Bare areas will increase with annuals filling the voids. The loss of herbaceous cover and increased bare ground encourages accelerated erosion. Broom snakeweed and yucca will increase dramatically with mesquite invading and establishing on many of the limy upland sites.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Community 2.1
Shortgrass/Shrub/Annuals Community

Figure 14. 2.1 Shortgrass/Shrub/Annuals 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 Shortgrass/Shrub/Annuals Community (2.1). In this state, the typical vegetation will be threeawn with small colonies of low vigor, sodbound blue grama and buffalograss. Invading low quality short grasses will

become the dominant grass species as the more desirable grasses are removed. Bare areas will increase with annuals filling the voids. The loss of herbaceous cover and increased bare ground encourages accelerated erosion. Broom snakeweed and yucca will increase dramatically with mesquite invading and establishing on many of the limy upland sites. Nutrient cycling, the water cycle, watershed protection and biological functions have been severely reduced. This 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. 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)
Grass/Grasslike	448	616	785
Shrub/Vine	336	448	560
Forb	45	62	78
Microbiotic Crusts	–	–	–
Tree	–	–	–
Total	**829**	**1126**	**1423**

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

This Introduced Grass/Shrubland State has been invaded by Lehman lovegrass to the point that it is the dominant grass species with few if any native species remaining. Once this lovegrass has become well established, returning the site to the reference state 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 MLRA 77D 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 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 lovegrass 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

With Heavy Continuous Grazing, No Fires, Long-term Droughts, no Brush Management, and no Pest Management, the Grassland State can be converted into a Shortgrass/Shrubland State.

Transition T1B
State 1 to 3

With Heavy Continuous Grazing, Invasion of Introduced Grass Species, No Fires, No Brush Management, and No Pest Management, the Grassland State can be converted into the Introduced Grass/Shrubland State.

Restoration pathway R2A
State 2 to 1

This 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 and integrated used adapted native grass species, chemical and/or mechanical brush management, and some form of pest management may be needed. With the reduced amounts of grass fuel, prescribed burning is usually not an option in this state.

Conservation practices

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

Transition T2A
State 2 to 3

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	**Midgrasses**			404–740	
	sideoats grama	BOCU	*Bouteloua curtipendula*	135–247	–
	Arizona cottontop	DICA8	*Digitaria californica*	67–123	–
	vine mesquite	PAOB	*Panicum obtusum*	67–123	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	67–123	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	67–123	–
2	**Shortgrasses**			605–1110	
	blue grama	BOGR2	*Bouteloua gracilis*	336–616	–
	black grama	BOER4	*Bouteloua eriopoda*	202–370	–
	buffalograss	BODA2	*Bouteloua dactyloides*	67–123	–
3	**Midgrasses**			135–247	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	67–123	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	67–123	–
4	**Shortgrasses**			135–247	
	hooded windmill grass	CHCU2	*Chloris cucullata*	67–123	–
	fall witchgrass	DICO6	*Digitaria cognata*	22–39	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	22–39	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	22–39	–
Forb					
5	**Forbs**			67–123	
	Forb, annual	2FA	*Forb, annual*	6–11	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	6–11	–
	rose heath	CHER2	*Chaetopappa ericoides*	6–11	–
	croton	CROTO	*Croton*	6–11	–
	beeblossom	GAURA	*Gaura*	6–11	–
	dotted blazing star	LIPU	*Liatris punctata*	6–11	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	6–11	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	6–11	–
	woolly plantain	PLPA2	*Plantago patagonica*	6–11	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	6–11	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	6–11	–
Shrub/Vine					
6	**Shrubs/Vines**			0–1	

0	**Shrubs/Vines**			0–1	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–1	–
	clapweed	EPAN	*Ephedra antisyphilitica*	0–1	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–1	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–1	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	–
	yucca	YUCCA	*Yucca*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–

Animal community

This site is inhabited primarily by dove and quail. Limited populations of pronghorn antelope also occur on this site. The limited amount of woody plants and forbs does not provide good cover and food sources for deer.

Hydrological functions

The gentle slopes and moderate permeability of these deep soils minimize problems from water erosion when a good grass cover is maintained. The hydrology of the site is functioning at its peak. However, if the soils are left exposed as the result of heavy overgrazing, the problem of water erosion becomes moderate.

Recreational uses

This site has very little value from an aesthetic standpoint. The reference state is occupied almost exclusively by native range grasses. 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

J.R. Bell, USDA-NRCS Rangeland Management Specialist (retired)
Natural Resources Conservation Service - Range Site Descriptions
USDA-Natural Resources Conservation Service - Soil Surveys & Website soil database
Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press

Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
Texas A&M Exp. Station, College Station, Texas
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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.

J.R. Bell, USDA-NRCS Rangeland Management Specialist (retired)
Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press
Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
Texas A&M Exp. Station, College Station, Texas
Texas Tech University – Natural Resources Management Department

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)	Clint Rollins, RMS, NRCS, Amarillo, Texas
Contact for lead author	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
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.

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

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

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

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

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

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):** Moderate resistance to surface erosion.

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

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

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

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

    Dominant: Warm-season shortgrasses >

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

    Other: Warm-season tallgrasses = Forbs = Shrubs/Vines = Trees

    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):** 1,400 to 1,900 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:** Yucca, catclaw acacia, cholla, and pricklypear can become invasive.

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