Ecological site R077BY722TX
High Lime
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.

MLRA notes

Major Land Resource Area (MLRA): 077B–Southern High Plains, Northwestern Part

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

Classification relationships

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

Ecological site concept

This site occurs on calcareous, loam and clay loam soils on uplands. Production is limited due to the calcium carbonate content as well as some locally salty areas. Reference vegetation consists of midgrasses, shortgrasses and forbs. Few shrubs occur in the reference plant community. Abusive grazing practices can lead to a change in the plant community. Also, without periodic fires or other brush management, woody species may increase.

Associated sites

R077BY021TX	**Sandy Loam 12-17" PZ** The Sandy Loam site is often adjacent to the High Lime site. The Sandy Loam is either found on similar landforms, downslope or upslope of the High Lime site. Dominated by midgrasses although some tallgrasses are found on this site. More production than the High Lime site.
R077BY016TX	**Limy Upland 12-17" PZ** The Limy Upland site is often adjacent to and in association with the High Lime site. The Limy Upland site is found on similar landforms, downslope or upslope. Dominated by shortgrasses, but a good mixture of midgrasses are found on this site. More production than the High Lime site.
R077BY014TX	**Deep Hardland 12-17" PZ** The Deep Hardland site is often adjacent to the High Lime site. The Deep Hardland site is either on similar landforms, downslope or upslope of the High Lime site. Dominated by shortgrasses, but a good mixture of midgrasses are found on this site. More production than the High Lime site.

R077BY725TX	**Draw 12-17" PZ** Ocassionally the High Lime site may be found along the side slopes of major draws. Dominated by midgrasses but some tallgrasses is found on this site. Production is much less than the Draw site.

Similar sites

R077AY006TX	**Limy Upland 16-22" PZ** Limey Upland is similar to High Lime sites in the respect they both have calcareous loamy soils with High Lime sites having a much higher lime content. They both are dominated by shortgrasses with production much lower on the High Lime sites. This Limey Upland site is also more productive because of it's higher annual precipitation (16 to 22 inches). Limey Upland sites are preferred sites whereas High Lime sites are not. This Limey Upland site is more productive
R077BY016TX	**Limy Upland 12-17" PZ** Limey Upland is similar to High Lime sites in the respect they both have calcareous loamy soils with High Lime sites having a much higher lime content. They both are dominated by midgrasses with production much lower on the High Lime sites. Limey Upland sites are preferred sites whereas High Lime sites are not.

Table 1. Dominant plant species

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

Physiographic features

The High Lime ecological site consists of deep, gently sloping to moderately sloping calcareous loamy to clayey soils with light colored surfaces and moderately permeable loam to clay subsoils. They are limey throughout, take water readily with high available plant water. The water holding capacity is moderate to low. These sites usually occur on the eastern side of ancient playa lakes, large basins and on the side slopes of some of the major draws. These sites formed in loamy to clayey, calcareous, moderately alkaline water and wind deposited sediments as low benches surrounding large enclosed basins or playas. The high lime content limits the plant community to tolerant plant species. The elevation ranges from 2,600 feet to 5,600 feet above sea level. Slopes range from 0 to 9 percent. The site is used almost entirely as a rangeland.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Playa dune (3) Plateau > Playa floor
Runoff class	Negligible to low
Flooding frequency	None

Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	790 – 1,710 m
Slope	0 – 10 %
Ponding depth	0 cm
Water table depth	0 – 200 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate is semi-arid dry steppe. Summers are hot with winters being generally mild with numerous cold fronts that drop temperatures into the single digits for 24 to 48 hours. Temperature extremes are the rule rather than the exception. Humidity is generally low and evaporation high. Wind speeds are highest in the spring and are generally southwesterly. Canadian and Pacific cold fronts come through the region in fall, winter and spring with predictability and temperature changes can be rapid. Most of the precipitation comes in the form of rain and during the period from May through October. Snowfall averages around 15 inches but may be as little as 8 inches or as much as 36 inches. Rainfall in the growing season often comes as intense showers of relatively short duration. Long-term droughts occur on the average of once every 20 years and may last as long as five to six years (during these drought years, moisture during the growing season is from 50 to 60 percent of the mean). Based on long-term records, approximately 60 percent of the years are below the mean rainfall and approximately 40 percent are above the mean. May, June and July are the main growth months for perennial warm-season grasses. Forbs make their growth somewhat earlier.

Table 3 Representative climatic features

Frost-free period (characteristic range)	140-150 days
Freeze-free period (characteristic range)	170-170 days
Precipitation total (characteristic range)	430-460 mm
Frost-free period (actual range)	140-150 days
Freeze-free period (actual range)	170-170 days
Precipitation total (actual range)	410-460 mm
Frost-free period (average)	140 days

Freeze-free period (average)	170 days
Precipitation total (average)	430 mm

- (1) CLAYTON 1 N [USC00291883], Clayton, NM
- (2) DALHART 6 SW [USC00412235], Hartley, TX
- (3) AMISTAD 5 SSW [USC00290377], Amistad, NM
- (4) ROSEBUD 7NW [USC00297585], Mosquero, NM
- (5) MCCARTY RCH [USC00295516], Nara Visa, NM

Influencing water features

Water features are intermittent ponding on playa floors. These are closed basins with no outlet. This site receives runoff from surrounding areas. Runoff collects and may pond for several days or months.

Wetland description

None.

Soil features

The soils formed in clayey to very fine sandy material that is quite uniformly high in calcium carbonate with local areas high in soluble salts as well. The regolith consists of fine textured, calcareous, moderately alkaline water-deposited sediments. Moderate to well drained. Permeability is very slow to moderate. Runoff is negligible on slopes less than 1 percent and very low to moderate on 1 to 3 percent slopes.

Major Soil Taxonomic Units correlated to this site include: Karde loam, Church clay loam and Spurlock soils.

Table 4. Representative soil features

Parent material	(1) Alluvium – igneous, metamorphic and sedimentary rock (2) Eolian deposits – igneous, metamorphic and sedimentary rock (3) Lacustrine deposits – igneous, metamorphic and sedimentary rock
Surface texture	(1) Fine sandy loam (2) Loam (3) Clay loam
Family particle size	(1) Fine (2) Fine-silty (3) Coarse-loamy
Drainage class	Somewhat poorly drained to well drained

Permeability class	Slow to rapid
Soil depth	200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	5.08 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 70 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10
Subsurface fragment volume <=3" (0-101.6cm)	0 – 20 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

The reference plant community as found by European settlers developed under the prevailing climate and conditions over time. This site is not generally a preferred site for grazing by livestock or wildlife due to lower palatability which is influenced by the limey nature of the soil. The high lime content limits the plant community to tolerant plant species. There are only minimal acres of the High Lime site in MLRA-77B of the Texas Panhandle and is considered a minor component of this MLRA. This site served as temporary watering sites for large numbers of bison and resident pronghorn antelope. It is generally located on the east side of these playas and large basins. Periodic droughts, fire and grazing by resident wildlife prevalent in the area as well as nomadic creatures such as bison did influence the

plant community. The resulting Shortgrass/Midgrass Community (1.1) is a mixture of short and midgrass species with a few tallgrass species present along with a small amount of forbs and woody plants. The dominant grasses were sideoats grama (Bouteloua curtipendula), blue grama (Bouteloua gracilis), little bluestem (Schizachyrium scoparium) and alkali sacaton (Sporobolus airoides). Typical associated forbs included plains blackfoot (Melampodium leucanthum), curlycup gumweed (Grindelia squarrosa) and dotted gayfeather (Liatris punctata) as well as numerous other annual and perennial forbs. Yucca (Yucca glauca), cholla cactus (Cylindropuntia imbricata) and fourwing saltbush (Atriplex canescens) were often present in lesser amounts.

The periodic overgrazing and trampling by migrating herds of bison and resident herds of pronghorn antelope probably occurred only during wet periods when the playas and basins had water. This provided ideal watering and loafing areas for large numbers of herbivores. As the playas dried up, the herds would move out of the area, until the next big rainfall event. The resulting long rest periods allowed the vegetation to re-establish and maintain the reference plant community structure.

Natural fire also played a part in the ecology of this site, as with all plains sites, in the nutrient cycle. The main effect of fire was to reduce old decadent plant cover from previous years, stimulated new shoots, and break down accumulated plant material. Fire may have also favored the perennials over the annual species.

The major forces driving transition from the reference plant community is continued overgrazing by livestock and the decrease in the frequency and intensity of fire. As livestock and wildlife numbers increase and grazing use exceeds a plants ability to sustain defoliation, the more palatable species decline in stature, productivity and density.

If abusive grazing continues, ecological retrogression occurs. As retrogression proceeds, this will bring about a new Shortgrass/Midgrass/Annuals Community (1.2) with decreased amounts of low vigor sideoats grama and blue grama. Less palatable species such as alkali sacaton will increase along with inland saltgrass (Distichlis spicata), dropseed species (Sporobolus spp.) and perennial threeawn species (Aristida spp.). The better quality perennial forbs will be replaced with less desirable annual and perennial forbs.

The Shortgrass/Midgrass/Annuals Community (1.2) is reversible to the reference community with proper grazing management and prescribed burning. The primary benefit from prescribed burning would be to reduce the excessive biomass of alkali sacaton and inland saltgrass and promote new sideoats grama and blue grama seedlings. In phase 1.2, woody shrub canopies have generally not increased to the point brush management is needed. There will be an increase in the percent bare ground scattered throughout the site.

If long-term heavy grazing continues, a threshold will be crossed to a Shrubs/Annuals Community (2.1). This site will develop bare areas (>30%) and an increase in annuals and broom snakeweed (Gutierrezia sarothrae) with pricklypear (Opuntia spp.) scattered throughout the site. Western ragweed (Ambrosia psilostachya) and sagewort (Artemesia spp.) may increase in some areas. The short and midgrass species that do remain will be in low vigor. In phase 2.1, the plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration will require prescribed grazing with rest periods during the growing season, re-seeding bare areas with adapted native species, chemical brush control and pest management. Full recovery and maintenance of the reference plant community requires continued proper grazing management as well as maintenance brush and pest management.

As mentioned earlier, this site is not preferred by livestock for grazing due to the low palatability of the forage, which is influenced by the limey nature of the soil. Therefore, if livestock are being forced to overgraze this undesirable site, then there is obviously a grazing management problem on the surrounding associated sites. Livestock generally will not frequent this site unless all other available forage in the pasture has been removed.

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

Changes in the structure and composition of the plant community may be due to management, natural occurrences or both. At some point in time thresholds are crossed as indicated by the dashed lined box on the State and Transition Diagram. This suggest that once changes have progressed to a certain point, the plant community has been altered to the extent that a return to the former state is not possible, that is, not possible unless some form of energy is applied to make it happen. These changes take place on all ecological sites, but some sites support communities that are more resistant to change than other sites. Also, some sites are more resilient, that is, they tend to be able to heal or restore themselves more easily. Usually, changes in management practices alone, such as grazing techniques, will not be sufficient to restore former plant communities. An example of energy input might be the implementation of chemical brush management to decrease the amount of woody/cacti shrubs and increase the amount of grasses and forbs. This shift in community balance could not be brought about with grazing alone. The amount of energy required to bring about a change in plant community balance may vary a great deal depending on the present state and upon the desired result.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrass**			269-359	
	alkali sacaton	SPAI	*Sporobolus airoides*	269-359	–
2	**Midgrass/Shortgrasses**			807-1076	
	sideoats grama	BOCU	*Bouteloua curtipendula*	404-538	–
	blue grama	BOGR2	*Bouteloua gracilis*	404-538	–
3	**Midgrasses**			135-179	
	vine mesquite	PAOB	*Panicum obtusum*	135-179	–
	western wheatgrass	PASM	*Pascopyrum smithii*	135-179	–
4	**Shortgrasses**			67-90	
	threeawn	ARIST	*Aristida*	67-90	–
	buffalograss	BODA2	*Bouteloua dactyloides*	67-90	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	67-90	–
	saltgrass	DISP	*Distichlis spicata*	67-90	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	67-90	–
	creeping muhly	MURE	*Muhlenbergia repens*	67-90	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	67-90	–
5	**Tallgrasses**			40-54	
	sand bluestem	ANHA	*Andropogon hallii*	40-54	–
	switchgrass	PAVI2	*Panicum virgatum*	40-54	–
	little bluestem	SCSC	*Schizachyrium scoparium*	40-54	–
6	**Cool-season Grasses**			27-36	
	Canada wildrye	ELCA4	*Elymus canadensis*	27-36	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	27-36	–
Forb					
7	**Forbs**			78-101	
	Forb, annual	2FA	*Forb, annual*	78-101	–
	rose heath	CHER2	*Chaetopappa ericoides*	78-101	–
	golden prairie clover	DAAU	*Dalea aurea*	78-101	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	78-101	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	78-101	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	78-101	–
	trailing krameria	KRLA	*Krameria lanceolata*	78-101	–
	dotted blazing star	LIPU	*Liatris punctata*	78-101	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	78-101	–
	blazingstar	MENTZ	*Mentzelia*	78-101	–
	evening primrose	OENOT	*Oenothera*	78-101	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	78-101	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	78-101	–
	stiff greenthread	THFI	*Thelesperma filifolium*	78-101	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	78-101	–
Shrub/Vine					
8	**Shrub**			78-101	
	fourwing saltbush	ATCA2	*Atriplex canescens*	78-101	–

	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	78-101	–
	hairspine pricklypear	OPPOP	*Opuntia polyacantha var. polyacantha*	78-101	–
	yucca	YUCCA	*Yucca*	78-101	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Native animals that occupy this site for at least a part of their habitat include scaled quail, pronghorn antelope, coyote, jackrabbit, swift fox, Texas horned lizard, prairie dogs and various small mammals and grassland birds. It is an open grassland site with very little woody cover, surrounding playas and large basins. Therefore, species that require cover will not be resident. For specific guidance on wildlife, Wildlife Habitat Appraisal Guides are available through NRCS for several species.

Hydrological functions

This site consists of deep, gently sloping to moderately sloping soils with moderately permeable loam to clay loam subsoils. Runoff from the site supplies the playa lakes and basins with water. With good cover, runoff contains low sediment. Infiltration is moderately slow and evaporation moderate. If cover is poor, very little water gets into the soil.

Recreational uses

Hunting, Camping, Hiking, Bird watching, 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

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, Ed M Vavra, W Laycock, R Pieper, pp13-68, Denver, CO: society for Range Management
2. Gould F. 1978. Common Texas Grasses: an illustrated guide. College Station, TX: Texas A & M Press.
3. Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
4. Heischmidt RK, Stuth, Eds. 1991 Grazing Management: an ecological perspective. Portland OR: Timberline Press
5. Scifres CJ, Hamilton WT. 1993. Prescribed burning for brushland management: the South Texas example. College Station, TX: Texas A & M Press.
6. Natural Resources Conservation Service - Range Site Descriptions
7. USDA-Natural Resources Conservation Service - Soil Surveys & Website soil database

The following individuals assisted with the development of this site description:

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Approval

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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. Clint Rollins, RMS, NRCS, Amarillo, Texas Mark Moseley, RMS, NRCS, San Antonio, Texas Kelly Attebury, Resource Soil Scientist, NRCS, Lubbock, Texas Justin Clary, RMS, NRCS, Temple, Texas

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.

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Date	09/04/2007
Approved by	
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):** 30-40%.

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

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):** Slight to moderate.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Calcareous loamy (limy) soils with low 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 large interspaces should make rainfall impact moderate. This site has moderate permeability, slow to medium runoff, and available water holding capacity is low to moderate.

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 midgrasses >

    Sub-dominant: Warm-season shortgrasses >

    Other: Cool-season midgrasses > Warm-season tallgrasses > forbs = shrubs

    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.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,400 to 1,750 pounds per acre.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Yucca, cholla and pricklypear can be potentially invasive on this site.

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