

Ecological site R077DY040TX

High Lime

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.

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, sandy loam soils on dune-like topography. The reference plant community consists of midgrasses and shortgrasses with traces of forbs and shrubs. Plants adapted to high lime soil conditions dominate the site. abusive grazing practices can alter the vegetative composition and result in a shift in the plant community.

Associated sites

R077DY046TX	Sandy 12-17" PZ Sandy sites often occur as an upland site downslope to the east of the High Lime sites. Tallgrasses dominate a good mixture of midgrasses are on this site. Production is higher on the Sandy site than on the High Lime site.
R077DY041TX	Lakebed 12-17" PZ Occurs adjacent to on the south/southwest side of the High Lime sites. Shortgrasses dominate but some midgrasses and many forbs can be found on the site. Production is higher on the Lakebed site than on the High Lime site.
R077DY042TX	Limy Upland 12-17" PZ Limy upland sites typically occur as an upland site surrounding the lakebed and High Lime sites. Midgrasses dominate but a good mixture of Shortgrasses are found on this site. Production is higher on the Limy Upland site than on the High Lime site.

Similar sites

R077DY042TX	Limy Upland 12-17" PZ Limy 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. Limy upland sites are preferred sites where as High Lime sites are not.
R077CY026TX	High Lime 16-21" PZ The Limy Upland site in MLRA 77C is similar to the High Lime site in MLRA 77D in the respect they both have calcareous loamy soils. The MLRA 77C site has higher Mean Annual Precipitation (16 - 21 inches). They both have similar vegetative communities with production lower on the MLRA 77D High Lime site.
R077EY057TX	Limy Upland 16-24" PZ Limy Upland site in MLRA 77E is similar to the MLRA 77D High Lime site in the respect they both have calcareous loamy soils with High Lime sites having a much higher lime content. They both have similar vegetative communities with production much lower on the MLRA 77D High Lime site. The MLRA 77E Limy Upland site has higher Mean Annual Precipitation (16 - 24 inches). Limy upland sites are preferred sites where as High Lime sites are not.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Atriplex canescens</i>
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Bouteloua curtipendula</i>

Physiographic features

The High Lime ecological site consists of very deep, very gently to gently sloping calcareous loamy soils with light colored surfaces and moderately permeable fine sandy loam to sandy clay loam subsoils. Slopes dominantly range from 1 to 5 percent. Due to the slope these sites typically generate runoff and these sites are susceptible to both wind and water erosion if adequate vegetative cover is not present. The site is used almost entirely as a rangeland.

Landform: Convex, linear, and curvilinear dunes on the leeward (eastern) margin of playa or salt lake basins to nearly level to very gently sloping terraces.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Playa dune
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None

Elevation	760 – 1,550 m
Slope	0 – 10 %
Water table depth	200 cm
Aspect	W, NW, 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 rainfall events occur in the spring and summer months, annual production will be favorable, even while the remainder of the year is not favorable. Most of the annual precipitation occurs as a result from mid to late summer thunderstorms. 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)	150-190 days
Freeze-free period (characteristic range)	180-190 days
Precipitation total (characteristic range)	380-430 mm
Frost-free period (actual range)	150-200 days
Freeze-free period (actual range)	170-210 days
Precipitation total (actual range)	380-430 mm
Frost-free period (average)	170 days
Freeze-free period (average)	190 days

Precipitation total (average)	410 mm
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- (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 do not influence this site.

Wetland description

None.

Soil features

These soils are calcareous (limy) throughout and the water holding capacity is moderate. The calcium carbonate content may limit the plant community to tolerant plant species. Plant roots will easily penetrate the soil if not severely compacted. Fertility is low and these soils have a moderate permeability rate. They yield water to plants readily. If vegetative cover is poor and runoff is excessive, significant wind and water erosion can occur.

Major Soil Taxonomic Units correlated to this site include: Krade fine sandy loam and Tornero soils.

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
Family particle size	(1) Coarse-loamy (2) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

This site is not generally a preferred site for grazing by livestock or wildlife due to lower palatability of the plants that are influenced by the limy nature of the soil. The high lime content limits the plant community to lime-tolerant plant species. The High Lime site is considered a minor component of MLRA 77D. This site usually occurs on the east and northeast side of ancient salt lakes and basins as flats and low rolling hills and ridges. This site is a product of the prevailing south/southwest winds removing soil particles from the bottoms of dry lakes and large basins during extended drought periods. Thus, the deposition of the sediment occurred on the east and northeast sides of the lakes and basins over time creating the high lime site.

The Reference Plant Community is the Midgrass/Shortgrass Community (1.1). It is a mixture of midgrass and shortgrass species. On the slopes and ridges, alkali sacaton (*Sporobolus airoides*), black grama (*Bouteloua eriopoda*), blue grama (*Bouteloua gracilis*), and sideoats grama (*Bouteloua curtipendula*) were the dominant grass species. The more common grasses in the low lying areas were vine mesquite (*Panicum obtusum*), cane bluestem (*Bothriochloa barbinodis*), plains bristlegrass (*Setaria macrostachya*), with lesser amounts of inland saltgrass (*Distichlis spicata*), sand dropseed (*Sporobolus cryptandrus*), slim tridens (*Tridens muticus*), tobosagrass (*Pleuraphis mutica*), and perennial threeawn (*Aristida purpurea*). Grasses make up approximately 95% of the total annual production. Only traces of forbs can be found on the site, typical associated forbs included plains blackfoot (*Melampodium leucanthum*), curlycup gumweed (*Grindelia squarrosa*), dotted gayfeather (*Liatris punctata*), Texas croton (*Croton texensis*), along with a few other annual and perennial forbs. Fourwing saltbush (*Atriplex canescens*) is the primary woody species on the High Lime sites making up 40% bare soil) with a dramatic increase in annuals filling the voids. The short and midgrass species that do remain will be in low vigor. 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 grass species, and chemical brush and pest management. Full recovery and maintenance of the reference state requires continued proper grazing management as well as occasional 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 limy 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.

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	Midgrasses			168-336	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	168-336	–
2	Short/Midgrasses			297-588	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	127-252	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	85-168	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	85-168	–
3	Midgrasses			213-426	
	vine mesquite	PAOB	<i>Panicum obtusum</i>	85-170	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	85-170	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	43-85	–
4	Short/Midgrasses			179-359	
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	36-72	–
	saltgrass	DISP	<i>Distichlis spicata</i>	36-72	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	36-72	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	36-72	–
	slim tridens	TRMU	<i>Tridens muticus</i>	36-72	–
Forb					
5	Forbs			0-17	
	Texas croton	CRTE4	<i>Croton texensis</i>	0-17	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0-17	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0-17	–
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0-17	–
	grassland blazingstar	MEST3	<i>Mentzelia strictissima</i>	0-17	–
	evening primrose	OENOT	<i>Oenothera</i>	0-17	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0-17	–
	stiff greenthread	THFI	<i>Thelesperma filifolium</i>	0-17	–
Shrub/Vine					
6	Shrubs/Vines			39-67	

	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	39-67	–
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

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

Native animals that utilize this site include scaled quail, pronghorn antelope, coyote, jackrabbits, Texas horned lizard, prairie dogs, and various small mammals and grassland birds. This site is typically an open grassland area with very little woody cover surrounding ancient lakebeds and large basins. Therefore, species that require cover will not be resident wildlife.

Hydrological functions

The soils consists of gently sloping areas with deep, well drained, moderately rapid permeable upland soils occurring on the eastern and northeastern side of ancient lakes and basins. Runoff from the site contributes to the lakes and basins with water supply. With good cover, runoff contains low sediment. If cover is poor, very little water gets into the soil, increased sediment loads in the runoff.

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

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

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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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. Justin Clary, RMS, NRCS, Temple, Texas Mark Moseley, RMS, NRCS, Boerne, Texas Kelly Attebury, RSS, NRCS, Lubbock, 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.

Author(s)/participant(s)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
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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% bare ground.

5. Number of gullies and erosion associated with gullies: 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): 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 resistance to surface erosion; primarily by wind erosion.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Calcareous (limy)
loamy 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 moderately
permeable soils; runoff is slow to medium; and available water holding capacity is moderate to low.

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/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 1,750 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 become invasive.
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17. **Perennial plant reproductive capability:** All plants species should be capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory or intense wildfires.
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