USDA Natural Resources
Conservation Service

Ecological site R077BY026NM
Gravelly Loam

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.

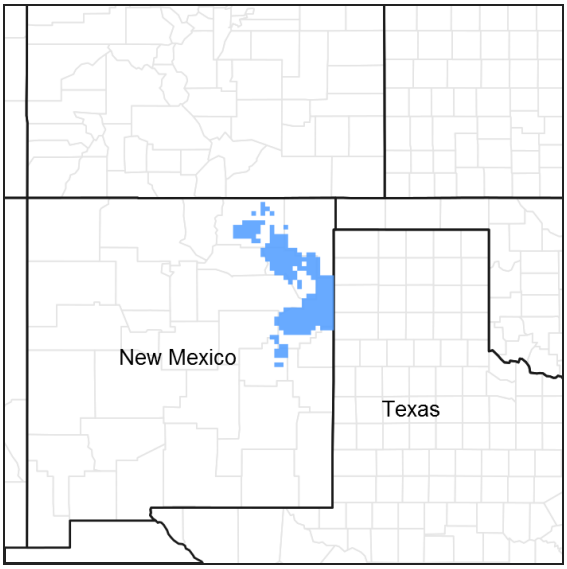

Figure 1. Mapped extent

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): 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.

Characteristic Soils Are:
Amarillo, Bascom, Clovis, Friona, Larimer
Mansker, Olton, Portales, Potter, Pullman,
Slaughter

Ecological site concept

The Gravelly Loam ecosite occurs over moderately deep and deep, well drained soils on uplands and alluvial fans. These soils may be loamy to sandy. The reference vegetation consists of midgrasses and shortgrasses with scattered forbs and shrubs. Abusive grazing practices can lead to a decline in the more palatable species and a shift in the plant community. Without fire or alternative brush management activities, woody species canopy may increase across the site. This site may have up to 35 percent surface gravel present.

Associated sites

R077BY016TX	**Limy Upland 12-17" PZ** Adjacent and slightly downslope from the Gravelly Loam site. The soils are loam to clay loam in surface texture. Shortgrasses dominate but a good mixture of midgrasses are found on this site. Production is higher than on the Gravelly Loam site.
R077BY021TX	**Sandy Loam 12-17" PZ** Adjacent and slightly downslope from the Gravelly Loam site. The soils are sandy loam in surface texture. Midgrasses dominate but some tallgrasses can be found on this site. Production is less than on the Gravelly Loam site.
R077BY658TX	**Sandy 12-17" PZ** Adjacent and slightly downslope from the Gravelly Loam site. The soils are loamy sand in surface texture. Tallgrasses dominate but some midgrasses can be found on this site. Production is less than on the Gravelly Loam site.

Similar sites

R077BY009NM	**Gravelly** Similar to the Gravelly Loam site is the Gravelly site. The soils are loamy to sandy in surface texture. Midgrasses dominate but there is a good mixture of shorgrasses on this site. Production is higher than the Gravelly Loam site.
R077EY053TX	**Gravelly 16-24" PZ** Similar to the Gravelly Loam site is the Gravelly site in MLRA 77E. Slopes are greater, up to 25%. Mean annual temperature is greater (59 to 63 degrees F). Mean annual precipitation is greater (16 to 24 inches). Production is higher than the Gravelly site in MLRA 77B.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Yucca madrensis*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua dactyloides*

Physiographic features

This site is on nearly level to undulating plains. Elevation ranges from approximately 3,800 to 5,000 feet above sea level. Slopes range from 0 to 9 percent.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain (2) Plateau > Alluvial fan
Runoff class	Very low to low
Flooding frequency	None
Ponding frequency	None
Elevation	3,800–5,000 ft
Slope	0–9%

Water table depth	80 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate of this area can be classified as “semi-arid continental”.
Annual average precipitation ranges from 15 to 19 inches. Seventy percent of the moisture usually falls during the six-month period May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thunderstorms. Hail may accompany the more severe summer storms. Spring precipitation (March, April, May) accounts for approximately 25 percent of the annual precipitation. Most of this comes as light rain showers. Winter moisture may occur as either rain or snow and usually averages less than ½ inch per month.
Temperatures are characterized by distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm; maximum temperatures average above 90 degrees F in July and August. Temperatures usually fall rapidly after sundown and range in the low 60’s on most summer nights. Winters are mild, sunny and dry. Daytime shade temperatures in mid-winter usually rise to the 50’s. However, freezing temperatures normally occur at night from mid-November to mid-March.
The frost-free season ranges from 181 to 199 days. Dates of the last freeze vary from April 10th to April 23rd and the first freeze varies from October 18th to October 26th.
Wind velocities in this area are high and average about 5.3 miles per hour on an annual basis. The spring months are characterized by frequent windstorms with velocities in excess of 45 miles per hour, which cause excessive erosion on soils not protected by a good ground cover of vegetation. Humidity is low and evaporation is high.
Both temperature and rainfall distribution favor production of warm-season, perennial plants in this area. However, sufficient late winter and early spring moisture allows cool-season species to occupy an important component within most plant communities.
Climate data was obtained from the WCCR web site using 50 % probabilities for freeze-free and frost-free season using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	140-145 days
Freeze-free period (characteristic range)	169-170 days
Precipitation total (characteristic range)	17-18 in
Frost-free period (actual range)	139-147 days
Freeze-free period (actual range)	168-170 days
Precipitation total (actual range)	16-18 in
Frost-free period (average)	143 days
Freeze-free period (average)	169 days
Precipitation total (average)	17 in

Climate stations used

- (1) ROSEBUD 7NW [USC00297585], Mosquero, NM
- (2) MCCARTY RCH [USC00295516], Nara Visa, NM
- (3) UTE DAM [USC00299284], Logan, NM
- (4) AMISTAD 5 SSW [USC00290377], Amistad, NM
- (5) DALHART 6 SW [USC00412235], Hartley, TX
- (6) CLAYTON 1 N [USC00291883], Clayton, NM

Influencing water features

Water features are not an influencing factor in this site.

Wetland description

None.

Soil features

These are moderately deep and deep, well drained soils on uplands and alluvial fans. The surface layers are silt loam, loam or clay loam. The subsoil and substratum ranges in texture from sandy loam through clay loam. The surface runoff is medium. The permeability is slow to moderately rapid. Infiltration rate is medium to moderately slow. Available water-holding capacity is high. Effective rooting depth is 20 to 60 inches or more.

Soils correlated to this site: Bascom fine sandy loam

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock (2) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly loam (2) Gravelly fine sandy loam (3) Gravelly sandy clay loam
Family particle size	(1) Fine-loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	10–80 in
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–6 in
Calcium carbonate equivalent (0-40in)	5–55%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (0-40in)	35–60%
Subsurface fragment volume >3" (0-40in)	15–35%

Ecological dynamics

Warm-season short grasses, principally blue grama and buffalograss dominate this site. Mid-grasses and forbs are in smaller amounts. Cool-season grasses make up a minor component of the plant community. Few woody species are found in the plant community. Western wheatgrass and switchgrass usually grow in the small depressions in which water collects.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Reference community phase

State 1
Reference State

The reference vegetation consists of midgrasses and shortgrasses with scattered forbs and shrubs.

Dominant plant species

- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Community 1.1
Reference community phase

Warm-season short grasses, principally blue grama and buffalograss dominate this site. Mid-grasses and forbs are in smaller amounts. Cool-season grasses make up a minor component of the plant community. Few woody species are found in the plant community. Western wheatgrass and switchgrass usually grow in the small depressions in which water collects.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	560	800	1280
Forb	105	150	240
Shrub/Vine	35	50	80
Total	**700**	**1000**	**1600**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	2%
Grass/grasslike foliar cover	40%
Forb foliar cover	2-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	20%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%

Bedrock	0%
Water	0%
Bare ground	0%

Figure 9. Plant community growth curve (percent production by month). NM4726, R077BY026NM Gravelly Loam Reference State. R077BY026NM Gravelly Loam Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	3	3	5	5	25	30	15	10	2	0

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Blue Grama**			300–350	
	blue grama	BOGR2	*Bouteloua gracilis*	300–350	–
2	**Galleta Tobosa**			100–120	
	James' galleta	PLJA	*Pleuraphis jamesii*	100–120	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	100–120	–
3	**Buffalograss**			80–100	
4	**Sideoats grama**			80–100	
	sideoats grama	BOCU	*Bouteloua curtipendula*	80–100	–
5	**sand dropseed**			50–70	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	50–70	–
6	**western wheatgrass switchgrass**			50–70	
	western wheatgrass	PASM	*Pascopyrum smithii*	50–70	–
	switchgrass	PAVI2	*Panicum virgatum*	50–70	–
7	**ring muhly wolftail**			30–50	
	common wolfstail	LYPH	*Lycurus phleoides*	30–50	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	30–50	–
8	**Threeawn Spp.**			30–50	
	threeawn	ARIST	*Aristida*	30–50	–
9	**vine-mesquite**			30–50	
	vine mesquite	PAOB	*Panicum obtusum*	30–50	–
10	**cane and silver bluestem**			30–50	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	30–50	–
	silver bluestem	BOSA	*Bothriochloa saccharoides*	30–50	–
11	**Bottlebrush squirreltail**			30–50	
	squirreltail	ELEL5	*Elymus elymoides*	30–50	–
12	**Little bluestem**			30–50	
	little bluestem	SCSC	*Schizachyrium scoparium*	30–50	–
13	**needleand thread black grama plains bristlegrass s**			30–50	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	30–50	–

	black grama	BOER4	*Bouteloua eriopoda*	30–50	–
	needle and thread	HECO26	*Hesperostipa comata*	30–50	–
	Hall's panicgrass	PAHA	*Panicum hallii*	30–50	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	30–50	–
	slim tridens	TRMU	*Tridens muticus*	30–50	–
Forb					
14	**globemallow**			10–30	
	globemallow	SPHAE	*Sphaeralcea*	10–30	–
15	**annual sunflower**			10–30	
	common sunflower	HEAN3	*Helianthus annuus*	10–30	–
16	**astragulas spp.**			10–30	
	milkvetch	ASTRA	*Astragalus*	10–30	–
17	**annual forbs**			30–50	
	Forb, annual	2FA	*Forb, annual*	30–50	–
18	**perennial forbs**			30–50	
	Forb, perennial	2FP	*Forb, perennial*	30–50	–
Shrub/Vine					
19	**yucca spp.**			10–30	
	yucca	YUCCA	*Yucca*	10–30	–
20	**winterfat groundsel spp.**			10–30	
	winterfat	KRLA2	*Krascheninnikovia lanata*	10–30	–
	ragwort	SENEC	*Senecio*	10–30	–
21	**pricklypear cholla cactus**			0–10	
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–10	–
	pricklypear	OPUNT	*Opuntia*	0–10	–

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Soil Series----Hydrologic Group
Amarillo-------B
Bascom---------B
Clovis---------B
Friona---------C
Larimer--------B
Mansker--------B
Olton----------C
Portales-------B
Potter---------D, B
Pullman--------C
Slaughter-------C

Recreational uses

Recreation potential is limited largely by the lack of water and firewood. Suitability for camping, hiking and picnicking is fair. The terrain typical of the “wide open spaces” of the area enhances aesthetic appeal. Hunting is fair for small game and upland game birds and hunting is good for antelope.

Wood products

This site produces no wood products.

Other products

Grazing:
This site can be grazed any season of the year by all classes and ages of livestock. The site provides good winter grazing but offers little natural protection against storms. It is better suited to cow-calf or yearlings due to the large percentage of grass in the potential plant community. Continuous yearlong grazing or grazing continually during the period from March through October by cattle will result in a decrease of species such as sideoats grama, vine-mesquite, little bluestem, western wheatgrass, bottlebrush squirreltail and winterfat. Species such as blue grama, galleta or tobosa, buffalograss, ring muhly, threeawn spp. and broom snakeweed will increase. Cholla cactus will increase on this site under continuous heavy grazing pressure where there is an available seed source. Blue grama will form a low dense turf under continuous grazing pressure. A system of deferred grazing by domestic livestock, which varies the season of grazing and rest during successive years, will result in healthy, high forage producing plant community. Fall and winter rest will benefit species such as winterfat. Spring rest (April-June) will allow species such as western wheatgrass and bottlebrush squirreltail to grow and reproduce. Summer rest will benefit warm-season species such as blue grama, sideoats grama and vine-mesquite to gain vigor and produce. Ninety-five percent of the annual production is from species that provide forage for grazing animals. Where the plant community has deteriorated to low turflike blue grama, buffalograss and ring muhly, grazing management alone may not achieve the desired range improvement. Mechanical range treatment and interseeding may be needed also.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index-----Ac/AUM
100 - 76----------2.3 – 4.9
75 – 51----------2.8 – 5.9
50 – 26----------4.0 – 9.0
25 – 0----------9.0+

Type locality

Location 1: Curry County, NM
Location 2: Harding County, NM
Location 3: Quay County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern High Plains 77 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: Curry, Harding & Quay

Contributors

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Approval

Bryan Christensen, 9/11/2023

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)	
Contact for lead author	
Date	05/11/2025
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

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

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

5. **Number of gullies and erosion associated with gullies:**

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

7. **Amount of litter movement (describe size and distance expected to travel):**

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial**

distribution on infiltration and runoff:

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
