Ecological site R070BY062NM
Shallow

Last updated: 9/12/2023
Accessed: 04/19/2024

General information

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

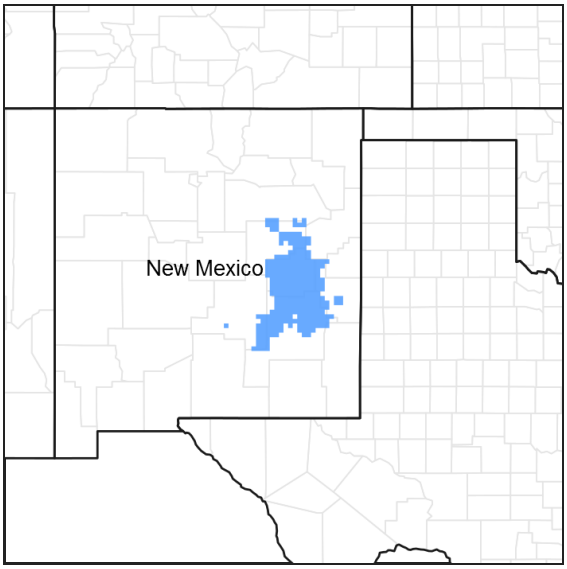


Figure 1. Mapped extent

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

Ecological site concept

This site occurs on soils that are shallow or very shallow to petrocalcic (caliche) layers. Base textures are sandy loam or fine sandy loam. Slopes range from 0 to 5 percent.
The Shallow ecological site typically occurs on mesas, high terraces, knolls, and ridges of uplands. It occurs as a distinct unit or in association with Sandy Loam, Sandy Plains, Loamy, or Very Shallow ecological sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Yucca glauca* (2) *Rhus trilobata*
Herbaceous	(1) *Bouteloua* (2) *Sporobolus cryptandrus*

Physiographic features

This ecological site occurs on calcareous, gravelly soils that formed in moderately fine textured sediments of the Blackwater Draw Formation of Pleistocene age. Landforms are nearly level to gently undulating, typically gently sloping plains, narrow ridges, and sideslopes along draws. Slope ranges from 0 to 5 percent. Exposure of

sandstone, mudstone, or conglomerates is varied and not significant. Elevation ranges from about 4,400 to 6,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Ridge (3) Fan remnant
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	4,400–6,000 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area can be classified as “semi-arid continental”.

Annual average precipitation ranges from 11 to 16 inches. Roughly 78 percent of the moisture falls during the 6-month period of 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. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm. Maximum temperature average above 90 degrees F from July to August, and an average summer includes about 80 days with high readings exceeding 90 degrees F and 10 days with readings above 100 degrees F. Temperatures usually fall rapidly after sundown and lows average 60 degrees F on most summer nights. Winters are mild, sunny, and dry. Daytime shade temperatures in midwinter usually rise to the 50’s. However, freezing temperatures normally occur at night from mid-November to mid-March.

The freeze-free season ranges from 196 to 218 days. Dates of the last freeze range from April 11th to April 17th and the first freeze ranges from October 20th to October 25th.

Both temperature and rainfall distribution favor warm-season, perennial plant communities in the area. However, sufficient late winter and early spring moisture allows cool-season species to occupy a minor component within the plant community.

Climate data was obtained from http://www.wrcc.dri.edu/summary/climsmnm.html web site. Data were interpreted utilizing NM Climate Summarizer spreadsheet.

Table 3. Representative climatic features

Frost-free period (average)	192 days
Freeze-free period (average)	218 days
Precipitation total (average)	16 in

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

Soils are well-drained and shallow to very shallow over hard caliche or petrocalcic material. Surface textures include gravelly fine sandy loam, very gravelly fine sandy loam, extremely gravelly fine sandy loam, loam, sandy loam, loamy sand, or very gravelly loamy fine sand. Subsurface textures are gravelly fine sandy loam, very gravelly fine sandy loam, extremely gravelly fine sandy loam, loam, sandy loam, loamy sand, or very gravelly loamy fine sand. Depth to petrocalcic horizon ranges from 8 to 20 inches. Subsoil horizons are loamy calcareous materials and often contain weakly cemented petronodes. Permeability is rapid. The available water-holding capacity is very low. The plant-soil-water-air relationship is good.

Characteristic Soils Are:
Blakeney
Conger
Kimbrough
Kolar
Neso
Sharvana

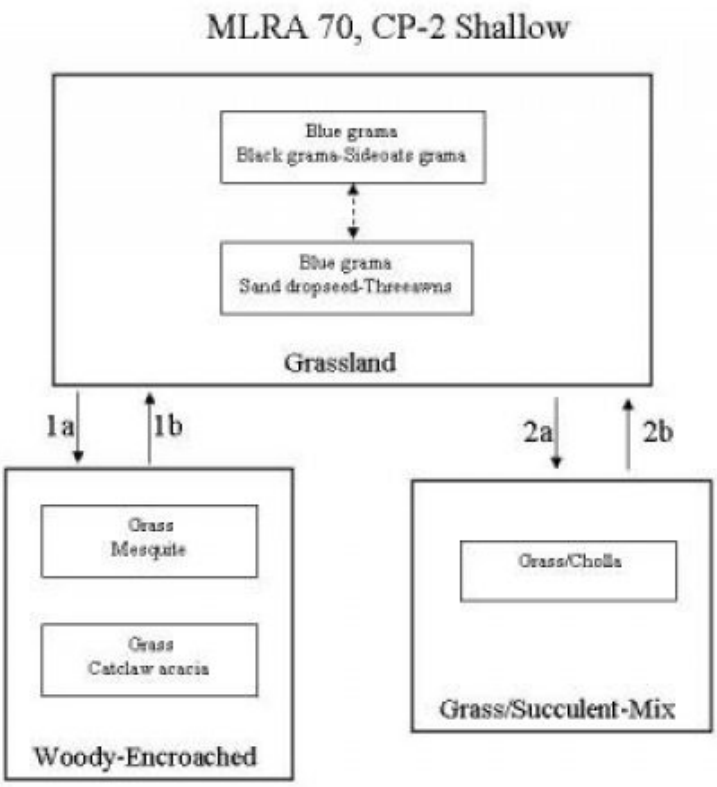
Table 4. Representative soil features

Surface texture	(1) Gravelly fine sandy loam (2) Cobbly loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderately rapid
Soil depth	4–20 in
Surface fragment cover <=3"	5–35%
Surface fragment cover >3"	1–10%
Available water capacity (0-40in)	3–6 in
Calcium carbonate equivalent (0-40in)	5–10%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–35%
Subsurface fragment volume >3" (Depth not specified)	1–10%

Ecological dynamics

The reference plant community of the Shallow ecological site is a grassland dominated by warm-season short- and mid-grasses dotted with shrubs. Forbs are typically a minor component with their distribution and abundance dependent on precipitation. Blue, black, and sideoats grama are the dominant grasses. Soapweed yucca, winterfat, and broom snakeweed are the characteristic shrubs. Dispersal of mesquite, catclaw acacia, or cholla propagules by wildlife and livestock and decreased fire frequency may lead to an increase in woody/succulent species and result in either a Woody-Encroached or Grass/Succulent-Mix state.

State and transition model



1a. Seed dispersal, lack of fire.
1b. Brush control, prescribed grazing.

2a. Dispersal of cholla propagules, lack of fire.
2b. Brush control, Prescribed grazing

State 1
Reference Plant Community

This state represents the most ecologically stable conditions in terms of resistance to erosion. Moreover, this state has the highest potential for productivity and plant diversity.

Community 1.1
Reference Plant Community

Grassland: In the historic plant community, blue grama, black grama, and sideoats grama are the dominant grasses. Other grasses that occur in significant amounts include little bluestem, hairy grama, New Mexico feathergrass, and sand dropseed. Shrubs including soapweed yucca, winterfat, and broom snakeweed are usually found scattered across most sites. Continuous grazing pressure can cause a decrease in sideoats grama, black grama, little bluestem, New Mexico feathergrass, and winterfat. This can result in a community dominated by blue grama, with sand dropseed and threeawns as sub-dominants. Other species that characteristically increase in representation include wolfstail and sand muhly. Diagnosis: Grass and litter cover is fairly uniform with few large (>1 meter) bare areas present. Shrubs constitute a minor portion of the plant community with combined canopy averaging five percent or less. Evidence of erosion is minimal.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	360	740	1120
Shrub/Vine	40	90	140
Forb	40	90	140
Total	**440**	**920**	**1400**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-5%
Grass/grasslike foliar cover	15-25%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	25-35%
Surface fragments >0.25" and <=3"	15-35%
Surface fragments >3"	15-35%
Bedrock	0%
Water	0%
Bare ground	35-45%

Figure 5. Plant community growth curve (percent production by month). NM4062, R070BY062NM Shallow Reference State. R070BY062NM Shallow Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	12	10	10	25	30	7	1	0	0

State 2
Woody-Encroached

This state contains abundant woody species.

Community 2.1
Woody-Encroached

This phase is characterized by a notable increase in mesquite or catclaw acacia, with the latter seeming to favor areas where the depth to the petrocalcic horizon is very shallow (10 inches or less). Other shrub/half-shrub species that typically increase in representation include broom snakeweed and soapweed yucca. Grasses include blue grama, hairy grama, sand dropseed, threeawns, and wolfstail. Diagnosis: Grass cover varies in response to the amount of grazing pressure and shrub cover, ranging from fairly uniform to patchy. Shrubs; especially mesquite, catclaw acacia, broom snakeweed, and yucca; occur at increased densities relative to the Grassland state. The transition to Woody-Encroached (1a) is believed to occur mainly in response to the dispersal of mesquite and catclaw acacia seed by livestock and wildlife. Drought may also favor the deeper rooted shrubs over grasses. If fire was historically important in controlling shrub densities on shallow sites, then decreased fire frequency may favor shrub encroachment. Although mesquite and catclaw acacia root-sprout following fire, periodic use of prescribed fire may help to check encroachment of these species by killing young seedlings, disrupting seed production cycles, and damaging the plants, making them more susceptible to disease and insects. Key indicators of approach to transition: Decrease in black and sideoats grama. Increase in size and number of bare patches. Increase in amount of mesquite or catclaw acacia seedlings. Transition back to Grassland (1b) Brush control is necessary to initiate the transition back to the Grassland state. Prescribed grazing will help ensure adequate rest following brush control and

will assist in the establishment and maintenance of grass cover.

Figure 6. Plant community growth curve (percent production by month). NM4062, R070BY062NM Shallow Reference State. R070BY062NM Shallow Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	12	10	10	25	30	7	1	0	0

State 3
Grass/Succulent-Mix

This state is a mix of grasses and succulents.

Community 3.1
Grass/Succulent-Mix

This phase is characterized by an increase in cholla. Light to medium cholla infestation does not seem to greatly reduce grass production, however it can restrict grazing access and interfere with livestock movement and handling. Blue grama, sand dropseed, and threeawns are the dominant grasses. Diagnosis: Cholla is a conspicuous component on this site. Grass cover is variable, ranging from fairly uniform to patchy with frequent areas of bare ground present. Blue grama, sand dropseed, and threeawns are the dominant grasses. Transition to Grass/Succulent-Mix (2a): Wildlife and livestock may act as dispersal agents for cholla. Fruits and seeds may be spread by wildlife species that feed on succulents. Wildlife and livestock can dislodge and transport sprouting stems of cholla. It has been reported that succulent densities may be higher on areas historically grazed by high numbers of sheep. If fire historically played a part in suppressing seedlings of succulents on this site, then reduced fire frequency may favor their increase. Key indicators of approach to transition: Decrease in black and sideoats grama. Increase in amount of succulent seedlings. Transition back to Grassland (2b) Fire is an effective means of controlling cholla if adequate grass cover remains to carry fire. Chemical control is an effective means of suppressing cholla; apply when growth starts in May. Hand-grubbing is also effective if cholla is severed 2-4 inches below ground and care is taken not to let broken joints take root. Stacking and burning piles and grubbing during winter or drought help keeps broken joints from rooting. Prescribed grazing will help ensure proper forage utilization and maintain grass cover.

Figure 7. Plant community growth curve (percent production by month). NM4062, R070BY062NM Shallow Reference State. R070BY062NM Shallow Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	12	10	10	25	30	7	1	0	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				185–200	
	blue grama	BOGR2	*Bouteloua gracilis*	185–204	–
2				160–180	
	black grama	BOER4	*Bouteloua eriopoda*	157–176	–
3				140–180	
	sideoats grama	BOCU	*Bouteloua curtipendula*	139–176	–
4				50–60	
	little bluestem	SCSC	*Schizachyrium scoparium*	46–65	–
5				50–60	

	hairy grama	BOHI2	*Bouteloua hirsuta*	46–65	–
6				60–70	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	56–74	–
7				20–50	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	23–46	–
8				20–40	
	threeawn	ARIST	*Aristida*	0–37	–
	sand muhly	MUAR2	*Muhlenbergia arenicola*	0–37	–
9				9–20	
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	9–23	–
10				0–20	
	Catalina grass	DICA5	*Dissanthelium californicum*	0–19	–
11				0–50	
Forb					
12				20–50	
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	0–46	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–46	–
	verbena	VEPO4	*Verbena polystachya*	0–46	–
13				0–40	
	mustard	BRASS2	*Brassica*	0–37	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–37	–
	globemallow	SPHAE	*Sphaeralcea*	0–37	–
14				0–20	
	locoweed	OXYTR	*Oxytropis*	0–19	–
15				20–40	
	Forb, perennial	2FP	*Forb, perennial*	19–37	–
16				20–40	
	Forb, annual	2FA	*Forb, annual*	19–37	–
Shrub/Vine					
17				20–50	
	soapweed yucca	YUGL	*Yucca glauca*	23–46	–
18				0–40	
	skunkbush sumac	RHTR	*Rhus trilobata*	0–37	–
19				0–20	
	catclaw acacia	ACGR	*Acacia greggii*	0–19	–
20				10–20	
	winterfat	KRLA2	*Krascheninnikovia lanata*	9–19	–
21				10–20	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–19	–
	ragwort	SENEC	*Senecio*	0–19	–
22				0–20	
	mesquite	PROSO	*Prosopis*	0–19	–

Animal community

Habitat for Wildlife: This site provides habitats which support a resident animal community characterized by pronghorn antelope, black-tailed jackrabbit, spotted ground squirrel, plains pocket mouse, southern plains woodrat, horned lark, scaled quail, side blotched lizard, and round-tailed horned lizard.

Hydrological functions

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

Hydrologic Interpretations
Soil Series Hydrologic Group
Blakeney ----------C
Conger ----------C or D
Kimbrough ----------D
Kolar ----------D
Neso ----------D
Sharvana ----------C

Recreational uses

Recreation potential is limited. Suitability for camping, picnicking, and hiking is fair, limited mainly by lack of surface water and shade. Hunting is good for antelope, quail, dove, and small game. The “wide open spaces” of the area enhance aesthetic appeal. The natural beauty of this site is enhanced by the large variety of plants that bloom from early spring to late fall following precipitation events.

Wood products

This site produces no wood products.

Other products

Grazing: All classes and kinds of livestock can graze this site during any season of the year. Approximately 90 percent of the total yield is from species that furnish forage for grazing animals. The large variety of grasses and forbs provides good forage and nutrition for grazing animals during most of the year. Supplemental protein is needed during the winter months. Due to the potential of this site to produce forbs, it may favor grazing by sheep and antelope. Continuous grazing by cattle, either yearlong or during the period from April through October, will cause the site to deteriorate and become less productive. Species, such as little bluestem, sideoats grama, black grama, plains bristlegrass, New Mexico feathergrass, and winterfat will decrease in abundance. Species such as blue grama, sand dropseed, threeawn spp., yucca, and broom snakeweed will increase under deteriorated conditions. A system of deferred grazing, which varies the season of rest and grazing during successive years, is needed to maintain or to improve a healthy, well-balanced plant community. Deferment during different seasons benefits different species. Rest during the winter benefits winterfat and black grama. Spring rest (April-June) will benefit cool-season grasses such as New Mexico feathergrass and early forbs. Summer rest will benefit warm-season species such as little bluestem, sideoats grama, black grama, and blue grama. Fall rest will allow warm-season plants to complete their growth cycle and mature.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index Ac/AUM
100 - 76 2.4 – 4.1
75 – 51 3.1 – 6.5
50 – 26 4.0 – 9.0
25 – 0 9.0+

Inventory data references

Data collection for this ecological site was performed in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys, Major Land Resource Area 70 of New Mexico. This site has been mapped and correlated with soils in the following counties: San Miguel, Quay, Guadalupe, De Baca, and Chaves.

Other references

References

1. Archer, S. 1989. Have Southern Texas savannas been converted to woodlands in recent history? The American Naturalist. 134: 545-561.

2. Bunting, S.C., H.A. Wright, and L.F. Neuenschwander. 1980. Long-term effects of fire on cactus in the Southern Mixed Prairie of Texas. J. Range. Manage. 33: 85-88.

3. Drewa, P.B., D.P.C. Peters, and K.M. Havstad. 2001. Fire, grazing and honey mesquite invasion in black grama-dominated grasslands of the Chihuahuan Desert: a synthesis. Pages 31-39 in K.E.M. Galley AND T.P. Wilson (eds.) Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, Fl.

4. Wright, H.A., S.C. Bunting, and L.F. Neuenschwander. 1976. Effect of fire on honey mesquite. Journal of Range Management 29:467-471.

Contributors

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Approval

Kendra Moseley, 9/12/2023

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	04/19/2024
Approved by	Kendra Moseley
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:**

_____

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

_____

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:

_____

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:**
