USDA Natural Resources
Conservation Service

Ecological site R042CY159NM
Shallow Loamy

Last updated: 10/21/2024
Accessed: 05/11/2025

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 gently sloping to moderately sloping plains and terraces. Slopes range from 0 to 9 percent but average less than 5 percent.
The soils on this site well-drained and shallow to moderately deep. Surface textures are loams and cobbly loams. Soil depth is from 15 to 30 inches, but averages 20 inches over indurated caliche.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua eriopoda* (2) *Bouteloua gracilis*

Physiographic features

This site occurs on gently sloping to moderately sloping plains and terraces. Slopes range from 0 to 9 percent but average less than 5 percent. Direction of slope varies and is not significant. Elevations range from 4,000 to 7,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Terrace
Flooding frequency	None
Elevation	4,000–7,000 ft
Slope	0–9%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area is “semi-arid continental.”

Annual average precipitation ranges from 11 to 19 inches. Variations of 5 inches, more or less, are not uncommon. Approximately 70 percent of this occurs from May through October. Most of the summer rain comes in the form of

high-intensity, short-duration thunderstorms. Winter moisture is usually negligible.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature ranges from 55 degrees to 60 degrees, with extremes of 20 degrees below zero in the winter to 110 degrees in the summer not uncommon.

The average frost-free season is 170 to 189 days. The last killing frost being in early April and the first killing frost in mid-October.

Both temperature and precipitation favor warm-season perennial plant growth. However, sufficient late winter and early spring moisture allows cool season species to occupy a minor component within the plant community. Due to the depth of the soil, vegetation responds well to light rains. However, there is also enough depth to allow for some water storage. Strong winds from the west and southwest blow during February to June. This speeds up soil drying during a critical period for cool season plant growth.

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

Table 3. Representative climatic features

Frost-free period (average)	189 days
Freeze-free period (average)	211 days
Precipitation total (average)	19 in

Influencing water features

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on moisture from landforms above and contribute runoff to landforms below.

Soil features

The soils on this site are moderately deep, well drained, loams and cobbly loams. Soil depth is from 15 to 30 inches, but average 20 inches in depth over indurated caliche. Permeability is moderate and water holding capacity is moderate. Wind and water erosion hazard can be severe.

Characteristic Soils are:
Petrocalcic Calciustolls, fine-loamy, mixed mesic
Ustallic Paleorthid, fine loamy, mixed thermic

Table 4. Representative soil features

Surface texture	(1) Loam (2) Cobbly loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	15–30 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–15%

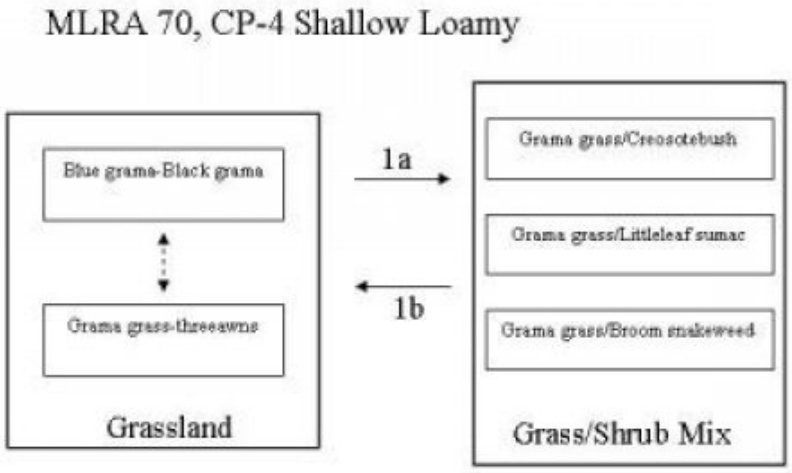
Ecological dynamics

MLRA-70, CP-4: Shallow Loamy

Overview

This site occurs in association with Shallow sites. The Shallow sites occur in repeating patterns of low elongated ridges adjacent to the Shallow Loamy site. The loamy textured soils and shallow depth to a petrocalcic horizon help to make this one of the most stable sites in the CP-4 resource unit. The loamy soils provide a favorable environment for grass production, and the petrocalcic horizon helps to store water and keep it perched and available to shallow rooted grasses.4 The historic plant community of the Shallow Loamy site has a grassland aspect with a fair amount of shrubs scattered across the site. Black grama and blue grama are the dominant grass species. Dispersal of littleleaf sumac fruits by birds and other wildlife may be important in the encroachment of this shrub.2 Overgrazing can reduce grass cover, effect a change in grass species dominance, and may facilitate the spread of shrubs. If fire was a natural component in the development of the historic plant community, then fire suppression may facilitate shrub increase.

State and transition model



1a. Seed dispersal, overgrazing, resource competition, lack of fire.

1b. Brush control, prescribed fire, prescribed grazing.

State 1
Grassland

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
Grassland

Grassland: Black grama and blue grama are co-dominants and together can comprise up to 70 percent of the total annual production of grasses. Other high percentage grasses common to this site include sideoats grama and tobosa. Tobosa is more common on areas with relatively deeper soils and in depressions, while higher densities of sideoats grama tend to occur on the shallower soils of the site. Some of the shrubs that occur on this site include

algerita, yucca species, fourwing saltbush, ephedra, cholla, pricklypear, creosotebush, broom snakeweed and juniper. If this site is overgrazed, there will be a decrease in black grama, sideoats grama, vine mesquite, fourwing saltbush, and winterfat. Species such as threeawns, burrograss, mat muhly, dropseeds, and broom snakeweed will increase in representation. The continued loss of grass cover and increases in bare patch size may facilitate the encroachment of shrubs. Diagnosis: Grass cover is uniform and evenly distributed, averaging 48 percent canopy cover. Black grama and blue grama are co-dominants. Slopes average less than 5 percent and litter movement is limited to smaller size class litter and short distances (

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	735	750	840
Shrub/Vine	105	135	158
Forb	50	75	105
Total	**890**	**960**	**1103**

Table 6. Ground cover

Tree foliar cover	0-5%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	25-45%
Forb foliar cover	3-8%
Non-vascular plants	0%
Biological crusts	0%
Litter	15-40%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	15-27%

Figure 5. Plant community growth curve (percent production by month). NM4609, R070DY159NM Shallow Loamy Reference State. R070DY159NM Shallow Loamy Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	8	10	10	25	30	7	3	0	0

State 2
Grass/Shrub-Mix

This state is characterized by mix of grasses and shrubs.

Community 2.1
Grass/Shrub-Mix

Grass/Shrub-mix: This state is characterized by the notable presence of shrubs, especially creosotebush, littleleaf sumac, and broom snakeweed. However, grasses remain dominant. Black grama and blue grama typically remain as the dominant grass species, with threeawns as sub-dominant. The susceptibility of the Shallow Loamy site to encroachment by creosotebush may be higher when located adjacent to other sites with high densities of creosotebush. Diagnosis: Black grama and blue grama remain as the dominant grass species. Grass cover varies inversely with shrub density, ranging from uniform to patchy. Shrubs are found at increased densities relative to the

grassland state, especially creosotebush, littleleaf sumac, or broom snakeweed. Transition to Grass/Shrub-mix (1a) Historically, fire may have kept creosotebush and other shrubs in check by completely killing some species, disrupting seed production cycles, and/or suppressing the establishment of shrub seedlings. Fire suppression combined with seed dispersal by birds and mammals are believed to be the factors responsible for the establishment and increase in shrubs.1 Loss of grass cover due to overgrazing, combined with prolonged periods of drought, increases the susceptibility of the site to shrub establishment. 3 Key indicators of approach to transition: Decrease or change in composition or distribution of grass cover. Increase in size and frequency of bare patches. Increase in amount of shrub seedlings. Transition back to Grassland (1b Brush control is necessary to initiate the transition back to the grassland state. If adequate fuel loads remain, possibly the reintroduction of fire as a management tool will assist in the transition, however, mixed results have been observed concerning the effects of fire on black grama grasslands.5 Littleleaf sumac is reported to be tolerant of fire due to its ability to root sprout, and fire may increase the germination rate of seeds stored in the soil.6 Prescribed grazing will help ensure adequate rest following brush control and will assist in the establishment and maintenance of grass cover capable of sustaining fire.

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				105–370	
	blue grama	BOGR2	*Bouteloua gracilis*	105–368	–
2				105–370	
	black grama	BOER4	*Bouteloua eriopoda*	105–368	–
3				55–105	
	sideoats grama	BOCU	*Bouteloua curtipendula*	53–105	–
4				55–85	
	ring muhly	MUTO2	*Muhlenbergia torreyi*	53–84	–
	burrograss	SCBR2	*Scleropogon brevifolius*	53–84	–
5				20–55	
	vine mesquite	PAOB	*Panicum obtusum*	21–53	–
6				105–210	
	tobosagrass	PLMU3	*Pleuraphis mutica*	105–210	–
7				10–55	
	dropseed	SPORO	*Sporobolus*	10–53	–
8				30–85	
	threeawn	ARIST	*Aristida*	32–84	–
9				30–85	
	Hall's panicgrass	PAHA	*Panicum hallii*	32–84	–
10				10–30	
	common wolfstail	LYPH	*Lycurus phleoides*	10–32	–
	tridens	TRIDE	*Tridens*	10–32	–
11	**Other Grasses**			55–105	
	littleawn needlegrass	ACLO7	*Achnatherum lobatum*	53–105	–
	silver bluestem	BOSA	*Bothriochloa saccharoides*	53–105	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	53–105	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	53–105	–

	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	53–105	–
	green sprangletop	LEDU	*Leptochloa dubia*	53–105	–
	curlyleaf muhly	MUSE	*Muhlenbergia setifolia*	53–105	–
	western wheatgrass	PASM	*Pascopyrum smithii*	53–105	–
	little bluestem	SCSC	*Schizachyrium scoparium*	53–105	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	53–105	–
Shrub/Vine					
12				20–75	
	algerita	MATR3	*Mahonia trifoliolata*	21–74	–
13				20–55	
	yucca	YUCCA	*Yucca*	21–53	–
14				20–55	
	fourwing saltbush	ATCA2	*Atriplex canescens*	21–53	–
15				10–30	
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	10–32	–
	jointfir	EPHED	*Ephedra*	10–32	–
16				10–30	
	sumac	RHUS	*Rhus*	10–32	–
17				10–30	
	winterfat	KRLA2	*Krascheninnikovia lanata*	10–32	–
18				10–30	
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	10–32	–
19				10–30	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–32	–
20	**Other Shrubs/Trees**			10–55	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	10–53	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	10–53	–
	prairie clover	DALEA	*Dalea*	10–53	–
	Apache plume	FAPA	*Fallugia paradoxa*	10–53	–
	oneseed juniper	JUMO	*Juniperus monosperma*	10–53	–
	creosote bush	LATR2	*Larrea tridentata*	10–53	–
	pale desert-thorn	LYPA	*Lycium pallidum*	10–53	–
	twoneedle pinyon	PIED	*Pinus edulis*	10–53	–
	oak	QUERC	*Quercus*	10–53	–
Forb					
21				10–30	
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	10–32	–
22				10–20	
	woolly groundsel	PACA15	*Packera cana*	10–21	–
23				10–20	
	Goodding's tansyaster	MAPIG2	*Machaeranthera pinnatifida ssp. gooddingii var. gooddingii*	10–21	–
24				10–20	

	croton	CROTO	*Croton*	10–21	–
25	**Other Forbs**			55–85	
	dwarf desertpeony	ACNA2	*Acourtia nana*	10–32	–
	tarragon	ARDR4	*Artemisia dracunculus*	10–32	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	10–32	–
	cudweed	GNAPH	*Gnaphalium*	10–32	–
	woolly plantain	PLPA2	*Plantago patagonica*	10–32	–
	threadleaf ragwort	SEFL3	*Senecio flaccidus*	10–32	–
	globemallow	SPHAE	*Sphaeralcea*	10–32	–
	common mullein	VETH	*Verbascum thapsus*	10–32	–

Inventory data references

Data collection for this site was done in
conjunction with the progressive soil surveys
within the Pecos-Canadian Plains and Valleys Major Land Resource Area of New Mexico (MLRA 70).

This site has been mapped and correlated with soils in the following soil surveys:
Otero, Eddy, Chaves, Lincoln

Other references

References

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3. Buffington, L.C., and C.H. Herbel. 1965. Vegetational changes on a semidesert grassland range from 1858 to 1963. Ecol. Monog. 35: 139-164.

4. Hennessy, J.T., R.P. Gibbens, J.M. Tromble, and M. Cardenas. 1983. Water properties of caliche. J. Range Manage. 36: 723-726.

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6. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, September). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [accessed 5/12/03]. Report: Littleleaf sumac; Fire Effects

Contributors

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Approval

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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	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:**

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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:**
