USDA Natural Resources Conservation Service

Ecological site R070CY119NM
Gravelly

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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.

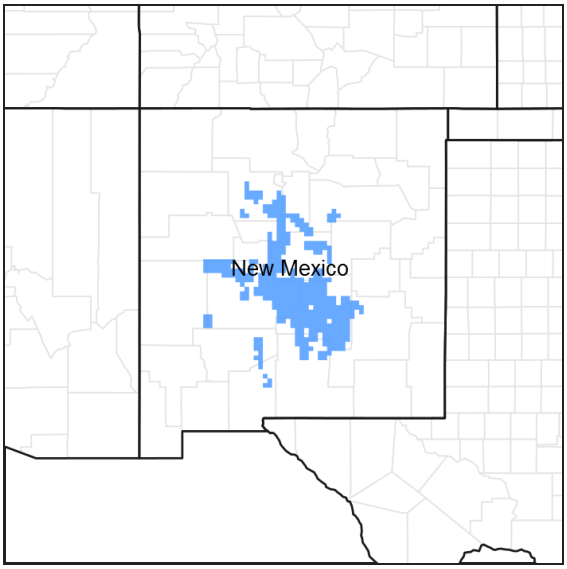

Figure 1. Mapped extent

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): 042C–Central New Mexico Highlands

Major Land Resource Area (MLRA): 070C–Central New Mexico Highlands

Major Land Resource Area (MLRA) 70C - will become 42C - is a high elevation portion of central New Mexico that is the convergence of four major physiographic provinces: Basin and Range, Southern Rocky Mountains, Great Plains, and Colorado Plateau. As such, it contains parts or characteristics of each, though tectonically, as a region, it is the easternmost extent of the Basin and Range Province and, more specifically, a structural expression of the Rio Grande Rift. It consists mostly of rangeland with some forested areas associated with numerous disconnected mountain ranges such as the Guadalupe, Sacramento, and Manzano Mountains. Other major physiographic features include the Galisteo Basin or the enclosed Estancia Basin, the structural Chupadera and Glorieta Mesas, and the piedmonts of the Buchanan and Guadalupe Mesas.

Ecological site concept

This site occurs on piedmont slopes and ridges, usually at the toe of slopes of higher hills and mountains. Slopes vary from 0 to 30 percent, but are generally 5 to 15 percent.
The soils on this site are well-drained and very deep. Surface textures range from loam to sandy loam. Fragments usually make up 25 to 60 percent of the volume of the soil profile and are the key soil factor that characterizes this

site.

Table 1. Dominant plant species

Tree	(1) *Juniperus* (2) *Pinus edulis*
Shrub	(1) *Fallugia paradoxa* (2) *Rhus trilobata*
Herbaceous	(1) *Bouteloua eriopoda* (2) *Bouteloua gracilis*

Physiographic features

This site occurs on piedmont slopes and ridges, usually at the toe of slopes of higher hills and mountains. Slopes vary from 0 to 30 percent, but are generally 5 to 15 percent. Direction of slope varies but is not significant. Elevations range from 5,400 to 7,000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Ridge
Elevation	1,646–2,134 m
Slope	0–30%
Aspect	Aspect is not a significant factor

Climatic features

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

The average annual precipitation ranges from 13 to 16 inches. Variations of 5 inches, more or less, are common. Seventy-five percent of the precipitation falls during the frost-free season. Most of the summer moisture falls in the form of high-intensity, short-duration thunderstorms. Winter precipitation is mostly in the form of snowfalls of less than 6 inches.

Temperatures are characterized by moderately warm summers and fairly cool, dry winters. The average annual temperature is 50 degrees F with extremes of –29 degrees F in the winter and 103 degrees F in the summer.

The average frost-free season is 130 to 160 days. The last killing frost falls in early May and the first killing frost in early October.

Both temperature and precipitation favor warm season perennial species. However, about 40 percent of the annual precipitation falls at a time favorable to cool season plant growth. This allows the cool season species to occupy an important component of this site. Strong winds blow across this area form the west and southwest from February through June which can dry the soil profile rapidly 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 using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

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 very deep and well drained to excessively well drained. Surface textures range from loam to sandy loam with gravels and stones on the surface and throughout the profile. They usually make up 25 to 60 percent of the volume of the soil profile and are the key soil factor, which characterizes this site. Permeability is moderate to moderately rapid. The water-holding capacity is moderate. Due to the elevated position on the landscape, this soil is subject to scouring by high winds. Soils on this site cause quick plant response to light showers since gravels in the soil concentrate available moisture.

Table 3. Representative soil features

Surface texture	(1) Gravelly loam (2) Stony sandy loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Very slow to moderately rapid
Soil depth	10–183 cm
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	15–35%
Available water capacity (0-101.6cm)	5.08–12.7 cm
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	15–60%
Subsurface fragment volume >3" (Depth not specified)	15–60%

Ecological dynamics

Grazing:
This site is suited for grazing by all classes and kinds of livestock during all seasons of the year. Grazing animals tend to prefer this and other upland sites early in the spring due to warmer soil temperatures, and earlier growth of plants than nearby lowland sites. Due to the variety of potentially grazeable plants and their growth response during different seasons of the year, this site is well suited to grazing management, which includes deferment on a regular basis during the growing season of the key grazing species. Spring and fall deferment will aid in increasing New Mexico feathergrass, needleandthread, and bottlebrush squirreltail. Summer deferment will favor an increase of the grama grasses, plains lovegrass, and plains bristlegrass. Continuous yearlong grazing will lead to a decrease in these desirable species and an increase in unpalatable species such as threeawn, sand dropseed, broom snakeweed, and undesirable forbs, and a subsequent increase in wind and water erosion.

State and transition model

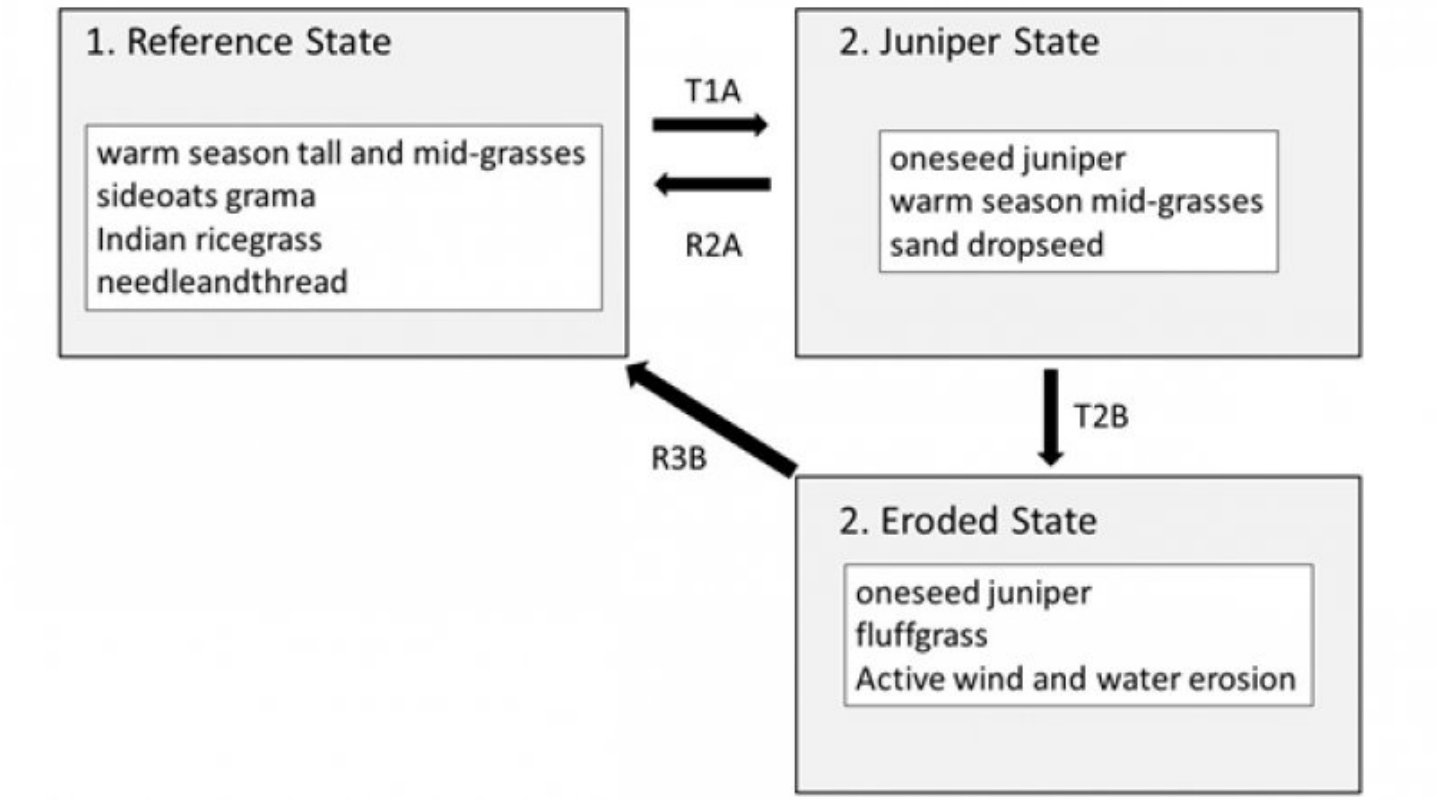

Figure 4. Generalized STM for sandy sites in 70C

State 1
Reference State

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

This site is characterized by mid- and short grasses with scattered shrubs and half-shrubs also quite prevalent. Scattered oneseed juniper and occasional pinyon are also found on this site, increasing in density with increase in elevation. Other grasses that can appear on this site include: threeawn, pinyon and littleseed ricegrass, sand dropseed, little bluestem, curlyleaf muhly, cane and silver bluestem, scribner needlegrass, and bush muhly. Other shrubs can include: fourwing saltbush, Bigelow sagebrush, sagewort spp., fringed sage, wolfberry, sacahuista, broom snakeweed. Other forbs can include: soft groundcherry, wooly Indianwheat, and fleabane.

Table 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	325	616	897
Tree	67	123	179
Forb	34	67	101
Total	**426**	**806**	**1177**

Table 5. Ground cover

Tree foliar cover	3-5%
Shrub/vine/liana foliar cover	3-5%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%

Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	20-35%

Figure 6. Plant community growth curve (percent production by month). NM4319, R070CY119NM Gravelly Reference State. R070CY119NM Gravelly Reference State Mixed short/mid-grassland w/ major shrub component and scattered oneseed juniper and pinyon. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

State 2
Juniper

This state contains significant amounts of juniper.

State 3
Eroded

This state exhibits evidence of significant erosion, such as rills, pedestaling, and truncated topsoils.

Transition T1A
State 1 to 2

Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization.

Restoration pathway R2A
State 2 to 1

Legacy text: "Restoration pathway resulting from the implementation of prescribed grazing." It should be noted that prescribed grazing alone may not effectively diminish woody plants here. Brush control may also be required. Future work on this ESD should seek to clarify this.

Conservation practices

Grazing Management Plan - Applied

Transition T2A
State 2 to 3

Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization. This leads to pronounced erosion.

Restoration pathway R3A
State 3 to 1

In theory, a very high-energy input--including the addition of topsoil and seeding--could lead to the re-establishment

of the reference community.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				123–247	
	black grama	BOER4	*Bouteloua eriopoda*	127–252	–
2				78–168	
	blue grama	BOGR2	*Bouteloua gracilis*	84–168	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	84–168	–
3				78–247	
	sideoats grama	BOCU	*Bouteloua curtipendula*	84–252	–
4				123–247	
	needle and thread	HECO26	*Hesperostipa comata*	127–252	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	127–252	–
5				45–78	
	common wolfstail	LYPH	*Lycurus phleoides*	43–84	–
6				45–67	
	plains lovegrass	ERIN	*Eragrostis intermedia*	43–67	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	43–67	–
7				22–45	
	squirreltail	ELEL5	*Elymus elymoides*	26–43	–
8				0–45	
	vine mesquite	PAOB	*Panicum obtusum*	0–43	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–43	–
9				22–45	
	threeawn	ARIST	*Aristida*	26–43	–
10				11–45	
	James' galleta	PLJA	*Pleuraphis jamesii*	9–43	–
11				11–45	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	9–43	–
Forb					
12				11–22	
	beardtongue	PENST	*Penstemon*	9–26	–
	beardtongue	PENST	*Penstemon*	9–26	–
13				11–22	
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	9–26	–
14				11–22	
	scarlet Indian paintbrush	CACO17	*Castilleja coccinea*	9–26	–
15				6–22	
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	4–26	–
16				6–17	

	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	4–17	–
Tree					
17				11–45	
	juniper	JUNIP	*Juniperus*	17–43	–
	twoneedle pinyon	PIED	*Pinus edulis*	17–43	–
Shrub/Vine					
18				11–45	
	Apache plume	FAPA	*Fallugia paradoxa*	9–43	–
	Apache plume	FAPA	*Fallugia paradoxa*	9–43	–
19				11–45	
	littleleaf sumac	RHMI3	*Rhus microphylla*	9–43	–
	skunkbush sumac	RHTR	*Rhus trilobata*	9–43	–
20				45–84	
	winterfat	KRLA2	*Krascheninnikovia lanata*	43–84	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	43–84	–
21				11–22	
	mormon tea	EPVI	*Ephedra viridis*	9–26	–
22				17–45	
	yucca	YUCCA	*Yucca*	17–43	–
23				11–22	
	algerita	MATR3	*Mahonia trifoliolata*	9–26	–
24				11–45	
	Shrub, deciduous	2SD	*Shrub, deciduous*	9–43	–

Type locality

Location 1: Lincoln County, NM
Location 2: Chaves County, NM
Location 3: De Baca County, NM
Location 4: Guadalupe County, NM
Location 5: San Miguel County, NM
Location 6: Santa Fe County, NM
Location 7: Socorro County, NM
Location 8: Torrance County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys 70 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: Chaves, De Baca, Guadalupe, Lincoln, Sna Miguel, Santa Fe, Torrance.

Characteristic Soils Are:
Andergeorge, Andok, Chilton, Hogadero, Ildefonso, Oro Grande, Pajara, Patos, Plack Scholle, Tesajo, Washoe

Contributors

Christine Bishop
Don Sylvester
Elizabeth Wright
John Tunberg

Approval

Kendra Moseley, 10/21/2024

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	05/13/2025
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):**

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

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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:**
