

# Ecological site R070CY121NM Shallow Limy Savanna

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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.

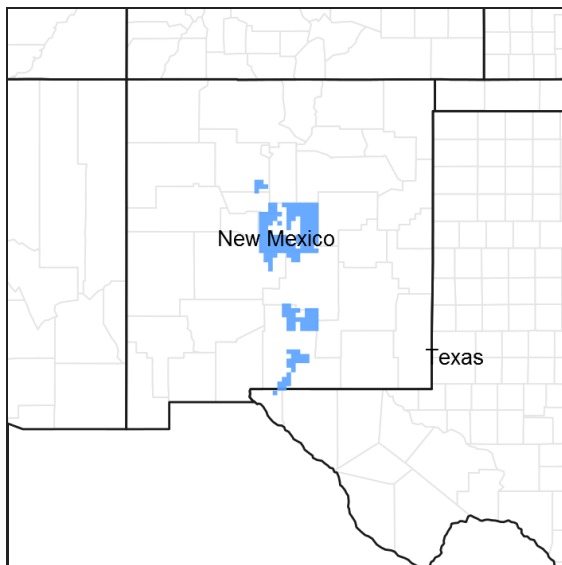


Figure 1. Mapped extent

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

The soils on this site are well-drained, and shallow or very shallow over limestone bedrock. The surface texture is usually loam, channery loam, or stony loam. Soils are usually calcareous (strong or violent reaction to dilute HCl) throughout.

This site is nearly level to moderately sloping side slopes of foothills and tops of hills and mesas. Slopes range from

3 to 25 percent but usually are less than 10 percent.

**Table 1. Dominant plant species**

Tree	(1) <i>Juniperus</i>
Shrub	(1) <i>Rhus trilobata</i> (2) <i>Mahonia trifoliolata</i>
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Bouteloua curtipendula</i>

## Physiographic features

This site is nearly level to moderately sloping side slopes of foothills and tops of hills and mesas. Typically, the Savanna site grades down from the steep slopes of physiographic breaks. Slopes range from 3 to 25 percent but usually are less than 10 percent. Direction of slopes varies and is only significant on the steeper north-facing slopes. Elevations ranges from 6,000 to 7,500 feet above sea level. This site has potential to produce both forage for grazing and limited wood products.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Mesa (3) Ridge
Elevation	1,829–2,286 m
Slope	3–25%
Aspect	N

## 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 rainfall distribution favor warm-season, perennial plant communities in this area. However, about 40 percent of the precipitation falls at a time favorable to cool-season plant growth. This allows the cool-season species to occupy a very important component in this plant community. Vegetation responds well to light rains, due to the shallow soil depth. Heavy rains produce excess runoff and cause flash floods. Strong winds from the west and southwest blow across the area from February to June, causing the soil to dry out during a critical growth period for cool-season species. The wind also causes the soil to blow, which can cause plant damage and reduce 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.

**Table 3. Representative climatic features**

Frost-free period (average)	173 days
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Freeze-free period (average)	187 days
Precipitation total (average)	406 mm

## 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 well drained, shallow to very shallow over limestone. The surface textures are usually limy loams, channery loam or stony loams. The subsurface is limy or channery loams. The parent material or root restricting layer is at depths of 20 inches or less, and is limestone or indurate caliche. Permeability is moderate. Runoff is moderate. Available water-holding capacity is low. Air-water-plant relationship is fair.

**Table 4. Representative soil features**

Surface texture	(1) Stony loam (2) Channery
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	25–51 cm
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	15–35%
Available water capacity (0-101.6cm)	2.54–5.08 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	15–35%

## Ecological dynamics

### Grazing:

This site can be grazed any season of the year by all classes and kinds of livestock. Because of the rock outcrop, younger classes of livestock utilize this site best. Browsing animals may be favored because of the site's potential to produce shrubs and forbs. Continuous grazing during the growing season will cause the more desirable forage plants, such as sideoats grama, little bluestem, New Mexico feathergrass, big bluestem, and pinyon ricegrass to decrease. Species most likely to increase are blue grama, oneseed juniper, ring muhly, oak spp., and cholla spp. As the ecological condition deteriorates, it is accompanied by a sharp increase in juniper, which may give the appearance of dominating the site. Small patches of oak spp. will also increase. As the potential plant community deteriorates, the tree canopy increases and the understory grass production decreases. Fires started naturally keep the wood species decimated, leaving grass between. The increased numbers of juniper and pinyon per acre may be attributed in part to control of fire, to reduced competition from grasses as a result of overgrazing, and in part to increased scattering of seeds by grazing animals. Brush management is needed once the tree canopy reaches 25 percent plus, in order to sustain the understory production of grasses. Mechanical control is not feasible due to the shallow soils. A system of deferred grazing, which varies the time of grazing and rest in a pasture during successive

years, is needed to maintain or to improve the plant community. A late winter rest is beneficial to shrubby species such as winterfat and mountainmahogany. Rest during April, May and June is beneficial to New Mexico feathergrass, western wheatgrass, needleandthread, and pinyon ricegrass. Rest during the summer is beneficial to all warm-season grasses and forbs.

## State and transition model

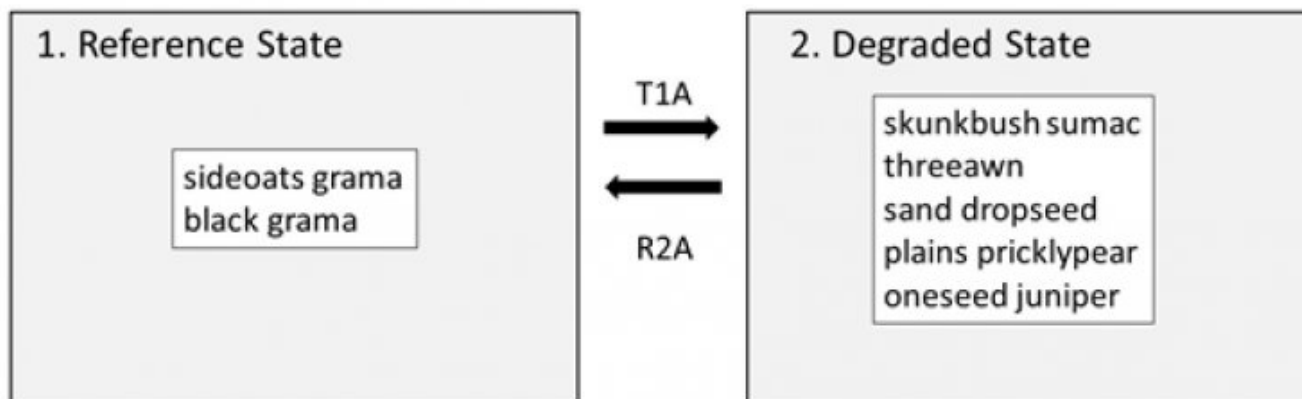


Figure 4. Generalized STM for shallow sites in 70C

### 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 phase is an open stand of pinyon pine and/or juniper with a grass understory. The understory grasses are characterized by both warm and cool-season mid-grasses with scattered shrub throughout. Half-shrubs and forbs are a minor part of the plant community. The open stand of pinyon and juniper at one time may have been maintained by natural fire. The overstory tree canopy cover ranges from 10 to 25 percent. Other grasses that could appear on this phase include: plains lovegrass, spike muhly, mountain muhly, silver bluestem, metcalf muhly, ring muhly, mat muhly, threeawns spp., alkali sacaton, pine dropseed, prairie junegrass, dryland sedges, and Indian ricegrass. Other shrubs include: rubber rabbitbrush, fourwing saltbush, sand sagebrush, threadleaf groundsel, broom snakeweed, yucca spp., sacahuista, and ponderosa pine. Other forbs include: penstemon spp., locoweed, redstem milkvetch, Indian paintbrush, fetid marigold, sand verbena, woolly Indianwheat, and tansymustard.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	258	616	964
Tree	45	101	157
Forb	22	67	101
<b>Total</b>	<b>325</b>	<b>784</b>	<b>1222</b>

Table 6. Ground cover

Tree foliar cover	10-25%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	6-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	20-30%

Figure 6. Plant community growth curve (percent production by month).  
 NM4321, R070CY121NM Shallow limy Savanna Reference State.  
 R070CY121NM Shallow limy Savanna Reference State Open stand of pinyon  
 pine and/or juniper w/a warm/cool-season mid-grass understory w/  
 scattered shrubs. .

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 Degraded

Species most prevalent in this state are blue grama, oneseed juniper, ring muhly, oak spp., and cholla spp. As the ecological condition deteriorates, it is accompanied by a sharp increase in juniper, which may give the appearance of dominating the site.

### 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

### Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				112–157	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	118–157	–
2				112–157	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	118–157	–
3				34–78	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	39–78	–
4				112–157	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	118–157	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	118–157	–
5				22–34	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	24–39	–
6				34–78	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	39–78	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	39–78	–
7				22–34	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	24–39	–
8				22–34	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	24–39	–
9				22–34	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	24–39	–
10				22–34	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	24–39	–
11				22–34	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	24–39	–
12				11–34	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	16–39	–
	pinon ricegrass	PIFI	<i>Piptochaetium fimbriatum</i>	16–39	–
13				22–34	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	24–39	–
<b>Forb</b>					
14				22–34	
	buckwheat	ERIOG	<i>Eriogonum</i>	24–39	–
15				22–34	
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	24–39	–
16				22–34	
	milkvetch	ASTRA	<i>Astragalus</i>	24–39	–
	milkvetch	ASTRA	<i>Astragalus</i>	24–39	–

17				22-34	
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	24-39	-
<b>Tree</b>					
18				78-157	
<b>Shrub/Vine</b>					
19				22-34	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	24-39	-
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	24-39	-
20				22-34	
	algerita	MATR3	<i>Mahonia trifoliolata</i>	24-39	-
21				22-34	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	24-39	-
22				22-34	
	rubber rabbitbrush	ERNAN5	<i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i>	24-39	-
23				22-34	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	24-39	-
24				22-34	
	oak	QUERC	<i>Quercus</i>	24-39	-
25				22-34	
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	24-39	-
26				22-34	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	24-39	-

### Type locality

Location 1: Guadalupe County, NM
Location 2: San Miguel County, NM
Location 3: Santa Fe County, NM
Location 4: 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:

Laport, Laporte, Dean(as mapped in San Miguel County), Pino Pinyon(as mapped in Torrance County)

### Contributors

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## 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	11/21/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

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

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

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

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

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

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

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

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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:**

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