

Ecological site R042CY113NM

Shallow

Last updated: 10/21/2024

Accessed: 03/29/2026

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.

LRU notes

This site is not yet assigned to an LRU.

Ecological site concept

These sites are located on soils that are usually less than 20 inches deep over a petrocalcic layer, weakly cemented caliche or unweathered bedrock. The landforms on which these occur can range from mesas, plateaus, piedmont slopes, structural benches, or mountain slopes.

Slopes 1-15%, shallow textures from loam to gravely loam.

Vegetation includes sideoats grama, black grama, little bluestem, blue grama, galleta, hairy grama, needlegrass, common wolftail, western wheatgrass, bottlebrush squirreltail, threeawn, wild buckwheat, Indian paintbrush, penstemon, algerita, broom snakeweed, fourwing saltbush, winterfat, and sagebrush.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Mahonia trifoliolata</i> (2) <i>Gutierrezia sarothrae</i>
Herbaceous	(1) <i>Bouteloua curtipendula</i> (2) <i>Bouteloua eriopoda</i>

Physiographic features

This site occurs on gently sloping to undulating terrain. Slopes vary from 1 to 15 percent. Aspect varies and is not significant. Elevations range from 5,000 to 7,000 feet above sea level.

Kech soils are on plateaus, mesas, and buttes. Slopes range from 0 to 40 percent. Elevations range from 5,500 to 7,000 feet. Soils formed in colluvium and alluvium derived from metamorphic and sedimentary rocks.

Oro Grande soils are on rocky ridges and sideslopes of the mountainous foothills at elevations of 5,700 to 7,000 feet. Slopes are 3 to 55 percent. The parent materials are fine grained mixed igneous materials consisting mainly of rhyolite and andesite.

The Pastura soils are on mesas, terraces, ridges and hills in areas associated with limestone. Slope ranges from 0 to 25 percent. The present topography is related to past truncation of pediment slopes. The soils formed in local medium textured material derived principally from sedimentary formations mixed with some eolian deposits.

Villario soils are on backslopes of scarp slopes of mesas and plateaus. They formed in colluvium derived from sandstone and shale over residuum weathered from shale of the Triassic Age Chinle Formation. Slopes are 30 to 45 percent. Elevation ranges from 6,000 to 7,100 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain
Elevation	1,524–2,134 m
Slope	1–15%

Aspect	Aspect is not a significant factor
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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 not uncommon. Seventy-five percent of the precipitation falls from April to October. Most of the summer precipitation comes in the form of high-intensity short-duration thunderstorms.

Distinct seasonal changes and large annual and diurnal temperature changes characterize temperatures. The average annual temperature is about 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 falling 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 fall at a time favorable to cool-season plant growth. The soil on this site cannot store much moisture. However, due to the depth and surface texture most of the precipitation that falls during the frost-free season is valuable. Strong winds blow across this area from February to June that carry wind-blown particles and rapidly dry out the soil 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.

Kech - Mean annual precipitation is 10 to 12 inches but has ranged to 15 inches in the past. Mean annual temperature is about 50 to 54 degrees F., and frost-free period is 130 to 180 days.

The climate is semiarid. The mean annual temperature is about 45 to 57 degrees F. The mean annual precipitation is 12 to 16 inches. The frost free season is 150 to 180 days. Mean annual precipitation ranges from 10 to 13 inches, but averages to 14 inches in some areas. Mean annual temperature ranges from 50 to 57 degrees F. The frost-free period ranges from 140 to 200 days and elevation ranges from 4,200 to 6,200 feet. The Thornwaite P-E Index is 25.

Villario - The mean annual precipitation is 12 to 14 inches with about 45 percent falling as rain from high-intensity convective thunderstorms between July and September. The mean annual air temperature is 49 to 51 degrees F. The frost-free period is 130 to 150 days.

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

Surface textures range from loam to gravelly loam. These soils are usually less than 20 inches deep over a petrocalcic layer, weakly cemented caliche or unweathered bedrock. Water intake is moderate to rapid, and water-holding capacity is usually low.

This site is correlated to components using the following soil series (Pastura is the series most commonly associated with this site).

Kech

Oro Grande

Pastura

Villario

The Kech series consists of shallow, well drained, soils that developed in material weathered from metamorphic and sedimentary rocks. Kech soils are on plateaus, mesas, and buttes and have slopes ranging from 0 to 40 percent. Well drained; medium to rapid runoff, moderate permeability.

The Oro Grande series consists of shallow, well drained soils that formed in material weathered from rhyolite and andesite. Oro Grande soils are on rocky ridges and sideslopes of mountainous foothills. Slopes are 3 to 55 percent. Well drained; medium to rapid runoff; moderate permeability.

The Pastura series consists of soils that are shallow to a petrocalcic horizon. They are well drained, moderately permeable soils formed in material derived from sedimentary formations mixed with eolian deposits. These soils are on mesas, terraces, hills, and ridges. Slope ranges from 0 to 25 percent. Well drained. Permeability of the soil is moderate above a very slowly permeable petrocalcic horizon. Runoff is low on slopes less than 1 percent, medium on 1 to 3 percent slopes, high on 3 to 5 percent slopes, and very high on slopes greater than 5 percent.

The Villario series consists of well drained soils that are shallow to cemented shale bedrock. Villario soils formed in colluvium derived from sandstone and shale over residuum weathered from shale. They are on backslopes of scarp slopes of mesas and plateaus. Slopes are 30 to 45 percent. Well drained; high surface runoff; moderate permeability.

Table 4. Representative soil features

Surface texture	(1) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	5–152 cm
Available water capacity (0-101.6cm)	2.54–10.16 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	15–35%

Ecological dynamics

Kech soils are used mainly for rangeland. Common plants are sideoats grama, galleta, black grama, three-awn, blue grama, and little bluestem.

Oro Grande native vegetation is blue grama, black grama, hairy grama, sideoats grama, bluestem spp., muhly, galleta, cacti spp., and pinyon juniper trees.

Pastura soils are used for livestock grazing and wildlife habitat. Present vegetation is mainly consists of black grama, hairy grama, sideoats grama, and New Mexico feathergrass.

Villario soils are used for livestock grazing, wildlife habitat, and recreation. Present vegetation is blue grama, galleta, black grama, broom snakeweed, and oneseed juniper.

State and transition model

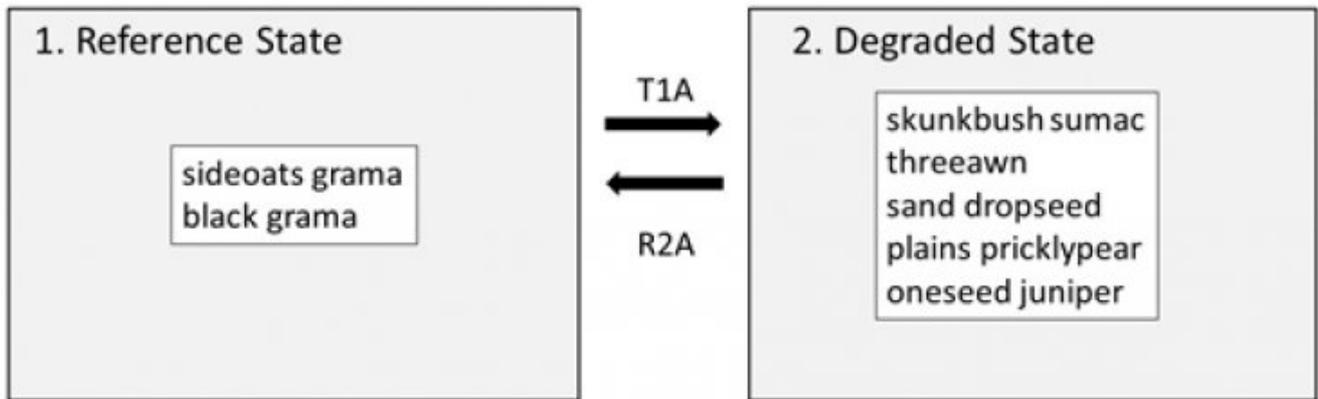


Figure 4. Generalized STM for shallow sites in 70C

State 1 Reference State

This state includes plants such as sideoats grama, black grama, little bluestem, needleandthread, New Mexico feathergrass, fourwing saltbush, and winterfat.

Community 1.1 Reference Plant Community

This is a grassland phase characterized by a mixture of warm/cool-season perennial grasses. There are a large number of shrubs and trees throughout. Forbs are scattered and may be plentiful during years of abundant rainfall. Other grasses that could appear on this phase include: sand dropseed, mesa dropseed, alkali sacaton, mountain muhly, curlyleaf muhly, silver bluestem, big bluestem, buffalograss, tridens spp., sand muhly, ring muhly, mat muhly, spike muhly, Indian ricegrass, and bush muhly. Other Shrubs can include: wolfberry, fringed sagewort, yucca spp., cacti spp., feather dalea, catclaw, skunkbush sumac, oak spp., pinyon and juniper. Other forbs include: purple nightshade, scarlet globemallow, croton spp., threadleaf groundsel, and Russian thistle.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	269	583	897
Forb	34	67	112
Tree	22	56	90
Total	325	706	1099

Table 6. 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	8-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	25-40%

Figure 6. Plant community growth curve (percent production by month). NM4313, R070CY113NM Shallow Reference State. R070CY113NM Shallow Reference State Mixed warm/cool-season perennial grassland with a major shrub and tree component and scattered forbs. .

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

increasers: blue grama, threeawn, algerita, and broom snakeweed.

Characteristics and indicators. Under prolonged and intense continuous grazing, range deterioration is characterized by a decrease in sideoats grama, black grama, little bluestem, needleandthread, New Mexico feathergrass, fourwing saltbush, and winterfat. There will also be an increase in plants such as blue grama, threeawn, algerita, and broom snakeweed. As deterioration continues, a very low-vigor sod-type blue grama will

dominate. This will cause a drop in total production and an increase in bare ground and erosion. In some areas, this site will support a stand of pinyon and/or juniper, as the condition deteriorates.

Resilience management. This site is suited to grazing by all kinds and classes of livestock during all times of the year. However, this site is not suited for continuous yearlong or growing season grazing. This will cause a drop in total production and an increase in bare ground and erosion. Practice deferred grazing and rotation.

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 Statement: "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

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				112–146	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	110–146	–
2				34–112	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	37–110	–
3				34–67	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	37–73	–
4				67–112	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	73–110	–

	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	73–110	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	73–110	–
5				34–67	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	37–73	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	37–73	–
6				22–34	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	22–37	–
7				34–67	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	37–73	–
8				22–34	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	22–37	–
9				22–34	
	threeawn	ARIST	<i>Aristida</i>	22–37	–
10				56–67	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	52–73	–
Forb					
11				6–17	
	buckwheat	ERIOG	<i>Eriogonum</i>	8–15	–
12				6–17	
	scarlet Indian paintbrush	CACO17	<i>Castilleja coccinea</i>	8–15	–
	scarlet Indian paintbrush	CACO17	<i>Castilleja coccinea</i>	8–15	–
13				6–17	
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	8–15	–
14				6–17	
	beardtongue	PENST	<i>Penstemon</i>	8–15	–
15				6–17	
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	8–15	–
Shrub/Vine					
16				11–34	
	algerita	MATR3	<i>Mahonia trifoliolata</i>	15–37	–
17				6–22	
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	8–22	–

18				34–67	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	37–73	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	37–73	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	37–73	–
19				11–34	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	15–37	–

Type locality

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

Hogadero, Kech, Oro Grande, Pastura, Pena, Plack

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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	03/29/2026
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):**
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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:

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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