USDA Natural Resources
Conservation Service

Ecological site R070CY108NM
Limy

Last updated: 10/21/2024
Accessed: 11/23/2024

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.

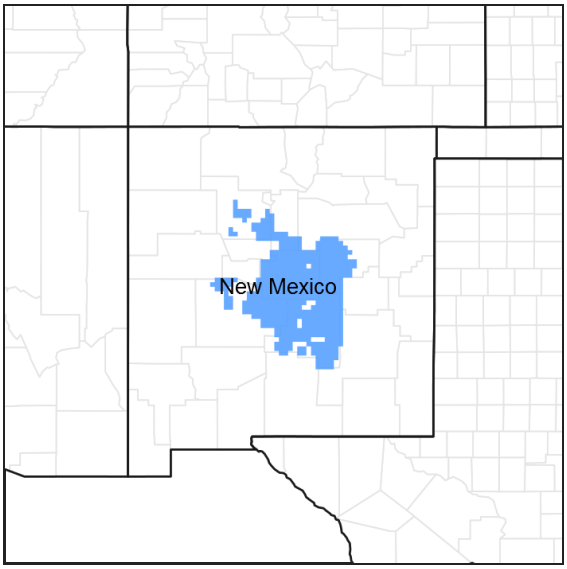


Figure 1. Mapped extent

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.

MLRA notes

Major Land Resource Area (MLRA): 042C–Central New Mexico Highlands

Major Land Resource Area (MLRA) 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 does not yet have an LRU designation.

Ecological site concept

The Limy site occurs on broad Piedmont or Plains landscapes that have well-developed soils high in secondary calcium carbonates. shallow to deep, sandy loam to clay loam.

Slopes range from 0 to 5% but can be as steep as 15%, . Vegetation includes black grama, sideoats grama, needlegrass, western wheatgrass, blue grama, galleta, hairy grama, little bluestem, ricegrass, bottlebrush squirreltail, dotted grayfeather, silverleaf nightshade, whooly indianwheat plantain, winterfat, fourwing saltbush, ephedra, sagebrush, rabbitbrush, and snakeweed.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Krascheninnikovia lanata* (2) *Atriplex canescens*
Herbaceous	(1) *Bouteloua eriopoda* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on level to strongly sloping piedmont slopes and plains. Slopes average 5 percent or less, althoght they may range to 15 percent. Elevation ranges from 5,000 to 7,000 feet above sea level. Aspect varies but is not significant.

The properties of this site will exist within the ranges of the following soil series, but are not necessarily characterized by their full range.
The Willard soils are on level to nearly level lacustrine terraces. The soils formed in stratified, moderately fine textured lacustrine deposits from mixed alluvium. Slope ranges 0 to 1 percent. Elevation ranges from 5,400 to 7000 feet.
Harvey soils are on hills, swales, plateaus, bajadas, mesas, and fan piedmonts. Slope gradients range from 0 to 15 percent. elevation ranges from 4,700 to 7,800 feet.
Dean soils are on bajadas, ridges, mesas, and fan terraces. Dean soils formed in alluvium derived dominantly from limestone, but also may contain material derived from granite, quartzite, gypsum rock, sandstone or eolian sand deposits. Slopes range from 0 to 20 percent. Elevation ranges from 4,500 to 7,200 feet.
Ildefonso soils formed mostly on mesas, eroded fan remnants, escarpments, fan terraces, and hills. The soils formed from alluvium, colluvium and eolian materials derived from quartzite, monzonite, granite, basalt, gneiss, schist and limestone. Elevation ranges from 5,000 to 7,000 feet. Slope ranges from 0 to 75 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Plain
Elevation	1,524–2,134 m
Slope	5–15%
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 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 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. The soils of the site can also store water from winter and early spring moisture for use by cool-season species. This allows the cool-season species to occupy an important component of this site. Strong winds that blow from the west and southwest from February to June can dry the soil profile quickly during a critical period for cool-season 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.

The properties of this site will exist within the ranges of the following soil series, but are not necessarily characterized by their full range.
Willard - Average annual precipitation ranges from 11 to 13 inches with most being received during the summer months. Average annual temperature ranges from 52 to 54 degrees F. Frost free season ranges from 120 to 140 days.
Harvey - Mean annual precipitation typically ranges from 10 to 14 inches with a summer maximum. In some areas the series has ranged to 16 inches of precipitation. In Utah the annual precipitation ranges as low as 8 inches. Mean annual temperature ranges from 47 to 57 degrees F. The frost-free period ranges from 120 to 190 days
Dean - Mean annual precipitation ranges from 10 to 13 inches, but ranges to 16 inches in some areas. Mean annual temperature ranges from 46 to 58 degrees F. The average frost-free period is typically 130 to 180 days.
Ildefonso - The average mean annual temperature is 48 to 55 degrees F. The mean annual precipitation is 9 to 13 inches. Frost-free period is 120 to 175 days. Some area outside of New Mexico have been correlated with elevations as low as 4500 feet, precipitation as high as 15 inches, temperatures as low as 42 degrees, and frost free period as long as 180 days.

Table 3. Representative climatic features

Frost-free period (average)	173 days
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 of this site are well drained, moderately deep to deep. The surface texture ranges from fine sandy loam to clay loam. Water-holding capacity is moderately high to high, and permeability is moderate to moderately slow. These soils are highly calcareous on the surface and throughout the profile. There is a calcic horizon within 20 inches of the surface that may be weakly cemented. This can affect the rooting depth of the vegetation. If exposed to bare ground, these soils are highly susceptible to wind and water erosion.

The Willard series consists of very deep, well drained, moderately slowly permeable soils that formed in stratified, moderately fine textured lacustrine deposits from mixed alluvium. These soils are typically on level to nearly level lake terraces. Slope ranges from 0 to 1 percent. The average annual precipitation about 11 inches and the average annual air temperature is about 52 degrees F. Well drained. Permeability is moderately slow. Runoff is low.
The Harvey series consists of very deep, well drained, moderately permeable soils that formed in alluvium and windblown sediments derived dominantly from sandstone, shale, and limestone. Harvey soils are on hills, swales, plateaus, bajadas, mesas, and fan piedmonts . Slopes are 0 to 15 percent. Mean annual precipitation is about 12 inches and mean annual air temperature is about 52 degrees F. well drained. Permeability is moderate. Runoff is negligible on slopes less than 1 percent, low on 1 to 5 percent slopes, and medium on 5 to 15 percent slopes.
The Dean series consists of very deep, well drained soils that formed in alluvium derived dominantly from limestone. Permeability is moderately slow or moderate. Dean soils are on bajadas, ridges, mesas and fan terraces. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 12 inches and mean annual air temperature is about 52 degrees F. Well drained. Permeability is moderate. Runoff is negligible on slopes less than 1 percent,

very low on 3 to 5 percent slopes, low on 3 to 5 percent slopes, medium on 5 to 20 percent slopes, and high on slopes greater than 20 percent.
The Ildefonso series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvium, colluvium and eolian sediments derived from quartzite, monzonite, granite, basalt, gneiss, schist and limestone. Ildefonso soils are on mesas, fan terraces, eroded fan remnants, escarpments, and hills. Slopes are 0 to 75 percent. The mean annual precipitation is 11 inches and the mean annual temperature is 50 degrees F. Well drained. Permeability is moderately rapid. Runoff is negligible on slopes less than 1 percent, very low on 1 to 5 percent slopes, low on 5 to 20 percent slopes, and medium on slopes greater than 20 percent.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Clay loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	51–183 cm
Available water capacity (0-101.6cm)	15.24–30.48 cm
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	15–35%

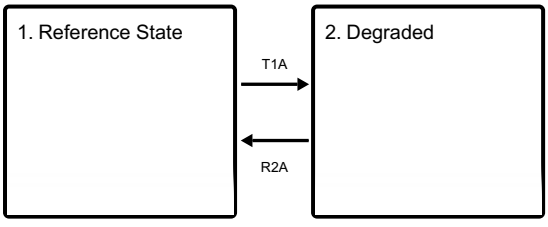
Ecological dynamics

Slopes up to 15%, shallow to moderately deep to deep, sandy loam to clay loam, highly calcareous. Vegetation includes black grama, sideoats grama, needlegrass, western wheatgrass, blue grama, galleta, hairy grama, little bluestem, ricegrass, bottlebrush squirreltail, dotted grayfeather, silverleaf nightshade, whooly indianwheat plantain, winterfat, fourwing saltbush, ephedra, sagebrush, rabbitbrush, and snakeweed.

Continuous grazing year-long or grazing continually during the growing season will cause this site to deteriorate. Species such as black grama, sideoats grama, New Mexico feathergrass, western wheatgrass, winterfat, and fourwing saltbush will decrease. They will be replaced by alkali sacaton, blue grama, inland saltgrass, broom snakeweed, and yucca. Continued deterioration of this site can cause severe erosion that would require extensive structural work and management to correct. The site responds best to a system of grazing that rotates the season of use. In some areas, pinyon and juniper have invaded or have increased on this site and may appear as even-aged long-lived stands.

State and transition model

Ecosystem states



State 1 submodel, plant communities

1.1. Reference Plant Community

State 1
Reference State

Approximately 90 percent of the total annual production is from species that furnish quality forage to grazing animals including species such as black grama, sideoats grama, New Mexico feathergrass, western wheatgrass, winterfat, and fourwing saltbush

Resilience management. The site responds best to a system of grazing that rotates the season of use.

Community 1.1
Reference Plant Community

This is a grassland phase characterized by a mixture of warm- and cool-season mid and short perennial grasses. Woody species occupy an important, although minor portion of the plant community. Forbs are a minor component of this phase. However, during years of abundant spring and fall moisture, a large variety of forbs occur throughout. The carbonate content of the soils has a direct effect on the kinds as well as amount of vegetation produced. Other grasses that could appear on this phase include: black grama, sideoats grama, needlegrass, western wheatgrass, blue grama, galleta, hairy grama, little bluestem, ricegrass, bottlebrush squirreltail Other shrubs include: winterfat, fourwing saltbush, ephedra, sagebrush, rabbitbrush, and snakeweed Other forbs include: dotted grayfeather, silverleaf nightshade, whooly indianwheat plantain

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	381	908	1423
Forb	34	90	135
Total	**415**	**998**	**1558**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	15-20%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-50%

Figure 5. Plant community growth curve (percent production by month). NM4208, R070CY108NM Limy Reference State. R070CY108NM Limy

Reference State.

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

Continuous grazing year-long or grazing continually during the growing season will cause this site to deteriorate. Species such as black grama, sideoats grama, New Mexico feathergrass, western wheatgrass, winterfat, and fourwing saltbush will decrease. Continued deterioration of this site can cause severe erosion that would require extensive structural work and management to correct

Characteristics and indicators. Decreasers will be replaced by alkali sacaton, blue grama, inland saltgrass, broom snakeweed, and yucca. Continued deterioration of this site can cause severe erosion that would require extensive structural work and management to correct. In some areas, pinyon and juniper have invaded or have increased on this site and may appear as even-aged long-lived standsIn some areas, pinyon and juniper have invaded or have increased on this site and may appear as even-aged long-lived stands.

Resilience management. The site responds best to a system of grazing that rotates the season of use

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

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				157–269	
	black grama	BOER4	*Bouteloua eriopoda*	160–267	–
2				101–157	
	sideoats grama	BOCU	*Bouteloua curtipendula*	106–160	–
3				101–314	
	needle and thread	HECO26	*Hesperostipa comata*	106–319	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	106–319	–
4				56–101	
	western wheatgrass	PASM	*Pascopyrum smithii*	54–106	–
5				101–157	

	blue grama	BOGR2	*Bouteloua gracilis*	106–160	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	106–160	–
	James' galleta	PLJA	*Pleuraphis jamesii*	106–160	–
6				34–56	
	little bluestem	SCSC	*Schizachyrium scoparium*	33–54	–
7				22–56	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	21–54	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	21–54	–
8				34–56	
	squirreltail	ELEL5	*Elymus elymoides*	33–54	–
9				34–56	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	33–54	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	33–54	–
10				34–56	
	threeawn	ARIST	*Aristida*	33–54	–
11				56–90	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	54–85	–
Forb					
12				11–22	
	dotted blazing star	LIPU	*Liatris punctata*	11–21	–
13				11–22	
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	11–21	–
14				21–56	
	woolly plantain	PLPA2	*Plantago patagonica*	21–54	–
15				11–22	
	ragwort	SENEC	*Senecio*	11–21	–
16				11–34	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	11–33	–
Shrub/Vine					
17				56–112	
	winterfat	KRLA2	*Krascheninnikovia lanata*	54–106	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	54–106	–
18				34–56	
	fourwing saltbush	ATCA2	*Atriplex canescens*	33–54	–
19				11–34	
	jointfir	EPHED	*Ephedra*	11–33	–
20				11–34	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	11–33	–
21				34–56	
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	33–54	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	33–54	–
22				34–56	

Type locality

Location 1: De Baca County, NM
Location 2: Guadalupe County, NM
Location 3: Lincoln County, NM
Location 4: San Miguel County, NM
Location 5: Torrance County, NM
Location 6: Chaves 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: Dean, Ildefonso, Harvey, Willard

Other Soils included are:
Rock Outcrop, Tulargo

Contributors

Christine Bishop
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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	11/23/2024
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):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**