USDA Natural Resources
Conservation Service

Ecological site R070CY104NM
Deep Sand

Last updated: 10/21/2024
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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.

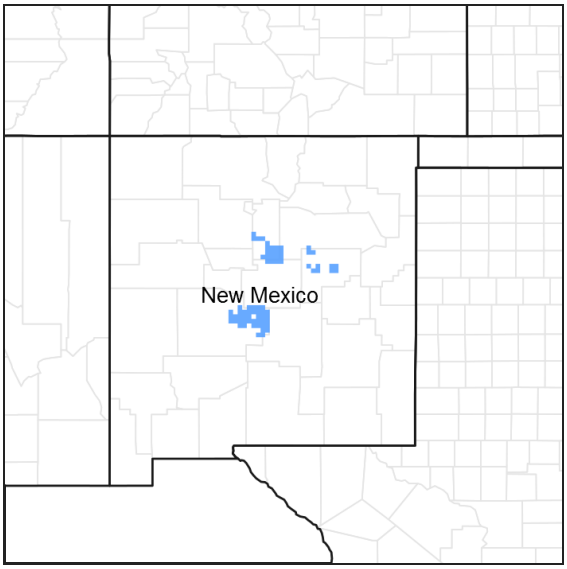


Figure 1. Mapped extent

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) 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

This site occurs on sand sheets of mostly eolian origin. The sand is deposited downwind from various sources including river valleys and areas of eroding sandstone breaks. The soils are deep and textures are generally sandy

loams or sandier with rarely any fragments.

Vegetation includes blue grama, galleta, black grama, bluestem, Indian ricegrass, sideoats grama, needlegrass, dropseeds, switchgrass, wild buckwheat, annual sunflower, croton, skunkbush sumac, sagebrush, and feather dalea.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia bigelovii* (2) *Artemisia filifolia*
Herbaceous	(1) *Bouteloua gracilis* (2) *Pleuraphis jamesii*

Physiographic features

This site occurs as the coarse-textured eolian and alluvial sediments on the upland plains. Slopes are nearly level to gently undulating, generally less than 5 percent. Low stabilized hummocks or dunes frequently occur. Exposure varies and is not significant. Elevations range from 5,000 to 7,000 feet above sea level.

The properties of this site will exist within the ranges of the following soil series, but are not necessarily characterized by their full range.
Mespun soils are overlying alluvial fans, cuestas, fan remnants, fan piedmonts, hills, dunes, undulating benches and plateaus at elevations of 3,500 to 7,000 feet. Slopes are 0 to 30 percent. These soils formed in deposits of wind blown sand from sandstone.
Mido soils are on mesas, benches, plateaus, stabilized dunes, hills, sand sheets, broad valleys and dunes on structural benches. They formed in eolian deposits or alluvium from sandstone. Slopes are 0 to 40 percent. Elevations are 3,500 to 7,010 feet.
Davishat soils are located on structural benches of undulating plateaus and eolian plains that formed from eolian material and slope alluvium derived from sandstone and limestone. Slopes are 3 to 15 percent. Elevation is 6,200 to 7,100 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Sand sheet
Elevation	1,524–2,134 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

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.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is about 50 degrees F with extremes of -29 in the winter and 103 degrees F in the summer.

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

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.
Mespun - The mean annual air temperature is 45 to 59 degrees F., and the mean summer temperature is 76 to 79 degrees F. The average annual precipitation is 8 to 14 inches. Freeze-free period is 110 to 170 days.
Mido - The mean annual precipitation is 8 to 14 inches. The mean annual air temperature is 45 to 56 degrees F. The frost-free period is 100 to 180 days.
Davishat - mean annual temperatures range from 49 to 51 degrees F, and mean annual precipitation typically ranges from 11 to 13 inches with the peak periods occurring from July through October and January through March. The frost-free period is 140 to 160 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 and/or throughflow moisture from landforms above and contribute throughflow to landforms below.

Soil features

The soils on this site are deep and excessively drained. The surface textures are loamy fine sand and sand that extend to a depth of 60 inches or more. The soils are rapidly permeable and a low water-holding capacity. Surface runoff is very slow. Drying surface is fast and soil blowing hazard is high.
The Mespun series consists of very deep, excessively drained rapidly permeable soils that formed in eolian deposits derived mainly from sandstone. Mespun soils are on alluvial fans, fan remnants, fan piedmonts, cuestas, hillslopes and plateaus. Slope ranges 0 to 30 percent. The average annual precipitation is about 13 inches, and the mean annual air temperature is about 53 degrees F.
The Mido series consists of very deep, excessively drained, rapidly permeable soils that formed in eolian material and alluvium derived mainly from sandstone. Mido soils are on mesas, benches, plateaus, stabilized dunes, hills, sand sheets, dunes on structural benches, and in broad valleys. Slopes are 0 to 40 percent. Average annual precipitation is about 11 inches and mean annual air temperature is about 49 degrees F.
The Davishat series consists of very deep, well drained, moderately rapidly permeable soils that formed in eolian sediments and slope alluvium derived from sandstone and limestone on structural benches of undulating plateaus and eolian plains. Slopes range from 1 to 15 percent. Mean annual precipitation is about 12 inches and the mean annual temperature is about 51 degrees F.

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Rapid
Soil depth	152–183 cm
Available water capacity (0-101.6cm)	7.62–15.24 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4

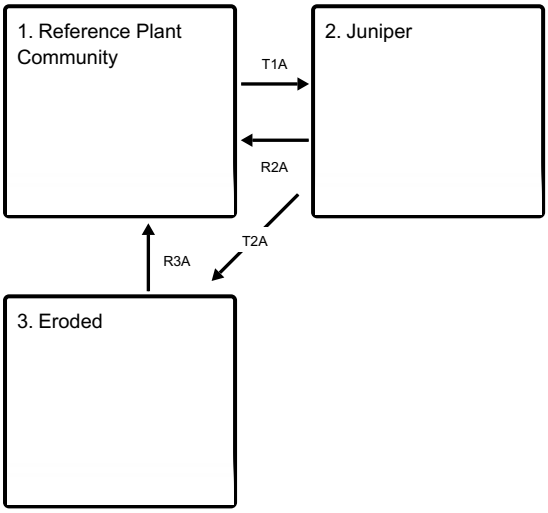
Ecological dynamics

Reference state is dominated by warm season tall and mid-grasses. Site degredation leads to a juniper-dominated state with a dominance of increaser species.
Where soils have argillic horizons (clay bulge at depth), they have the added benefit of water retention within the shallow (grass) rooting zone and will typically demonstrate higher productivity to grasses.
This site can respond rapidly to good management and responds best to a system of grazing which rotates the season of use. This site is poorly suited for continuous year-long grazing. If grazing is continued year long or grazing pressure is too heavy, the dominant grasses such as black grama, little bluestem, cane bluestem, sand bluestem, Indian ricegrass,and sideoats grama will decrease rapidly. This will cause a corresponding increase in woody species, annuals, and grasses like threeawn, sand dropseed, sandhill muhly, and ring muhly. This will also cause a decrease in the forage production. Severe site deterioration is characterized by increased amounts of bare soil which causes soil blowing and hummocking. The site is sometimes invaded by woody species such as pinyon and juniper, or in rare cases, ponderosa pine, and may support relatively long-lived stands of these species.

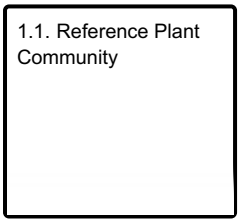
Vegetation includes blue grama, galleta, black grama, bluestem, Indian ricegrass, sideoats grama, needlegrass, dropseeds, switchgrass, wild buckwheat, annual sunflower, croton, skunkbush sumac, sagebrush, and feather dalea.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference Plant Community

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.

Characteristics and indicators. black grama, little bluestem, cane bluestem, sand bluestem, Indian ricegrass,and sideoats grama

Resilience management. This site can respond rapidly to good management and responds best to a system of grazing which rotates the season of use.

Community 1.1
Reference Plant Community

The phase is a grassland characterized by both warm- and cool-season perennial tall and mid-grasses, low growing shrubs and half-shrubs, and a variety of forbs. Forb poduction fluctuates greatly from year to year. In years of significant spring and fall moisture, forb composition and production are a very important part of the plant community. Other grasses that could appear on this phase include: alkali sacaton, threeawn spp., sandhill muhly, purple lovegrass, ring muhly, bottlebrush squirreltail, western wheatgrass, plains bristlegrass, green sprangeltop, and bush muhly. Other shrubs include: ephedra spp., winterfat, rabbitbrush, broom snakeweed, fourwing saltbush, yucca spp., cacti spp., juniper, pinyon, algerita, and oak spp.. Other forbs include: Tansymustard, locoweed spp., red stem milkvetch, scarlet globemallow, mariola, sand verbena, goldenweed,and threadleaf groundsel.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	1054	1883
Forb	22	105	188
Total	**246**	**1159**	**2071**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	5-8%
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	55-65%

Figure 5. Plant community growth curve (percent production by month). NM4304, R070CY104NM Deep Sand HCPC. R070CY104NM Deep Sand HCPC Mixed warm and cool-season mid and tall perennial grassland with shrubs and half-shrubs and 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
Juniper

The site is sometimes invaded by woody species such as pinyon and juniper, or in rare cases, ponderosa pine, and may support relatively long-lived stands of these species.

State 3
Eroded

This site is poorly suited for continuous year-long grazing. If grazing is continued year long or grazing pressure is too heavy, the dominant grasses such as black grama, little bluestem, cane bluestem, sand bluestem, Indian

ricegrass,and sideoats grama will decrease rapidly. This will cause a corresponding increase in woody species, annuals, and grasses like threeawn, sand dropseed, sandhill muhly, and ring muhly. This will also cause a decrease in the forage production.

Characteristics and indicators. Severe site deterioration is characterized by increased amounts of bare soil which causes soil blowing and hummocking.

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 significantly reduce juniper cover. Brush control may also be required.

Conservation practices

Grazing Management Plan - Applied

Transition T2A
State 2 to 3

Additional continuous grazing leads to pronounced erosion. Continuous grazing can be specified here as: Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization.

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 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				132–197	
	blue grama	BOGR2	*Bouteloua gracilis*	132–197	–
	James' galleta	PLJA	*Pleuraphis jamesii*	132–197	–
2				66–132	
	black grama	BOER4	*Bouteloua eriopoda*	66–132	–
3				132–330	
	big bluestem	ANGE	*Andropogon gerardii*	132–330	–
	sand bluestem	ANHA	*Andropogon hallii*	132–330	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	132–330	–
	little bluestem	SCSC	*Schizachyrium scoparium*	132–330	–
4				132–197	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	132–197	–

	Indian ricegrass	ACHY	*Achnatherum hymenoides*	132–197	
5				66–132	
	sideoats grama	BOCU	*Bouteloua curtipendula*	66–132	–
6				66–132	
	giant sandreed	CAGI3	*Calamovilfa gigantea*	66–132	–
	switchgrass	PAVI2	*Panicum virgatum*	66–132	–
	Indiangrass	SONU2	*Sorghastrum nutans*	66–132	–
7				39–66	
	needle and thread	HECO26	*Hesperostipa comata*	39–66	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	39–66	–
8				132–197	
	spike dropseed	SPCO4	*Sporobolus contractus*	132–197	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	132–197	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	132–197	–
	giant dropseed	SPGI	*Sporobolus giganteus*	132–197	–
9				66–132	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	66–132	–
Forb					
10				13–39	
	buckwheat	ERIOG	*Eriogonum*	13–39	–
11				13–39	
	common sunflower	HEAN3	*Helianthus annuus*	13–39	–
12				13–39	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	66–132	–
	sand sagebrush	ARFI2	*Artemisia filifolia*	668–132	–
	croton	CROTO	*Croton*	13–39	–
13				13–39	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	13–39	–
Shrub/Vine					
14				66–132	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	66–132	–
	sand sagebrush	ARFI2	*Artemisia filifolia*	66–132	–
15				27–66	
	littleleaf sumac	RHMI3	*Rhus microphylla*	27–66	–
	skunkbush sumac	RHTR	*Rhus trilobata*	27–66	–
16				13–39	
	featherplume	DAFO	*Dalea formosa*	13–39	–
17				13–39	
	Shrub, deciduous	2SD	*Shrub, deciduous*	13–39	–

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:
Benevides, Valent,

Other Soils included are:
Mido

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	11/21/2024
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:**