

Ecological site R042CY123NM

Deep Sand Savanna

Last updated: 10/21/2024

Accessed: 03/23/2026

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.

Ecological site concept

This site occurs as coarse-textured eolian and alluvial sediments on upland plains. Slopes are generally less than 5 percent. Soils are very deep and excessively well-drained. The surface texture is loamy fine sand or fine sandy loam, and these textures extend to depths

of 60 inches or more.

Table 1. Dominant plant species

Tree	(1) <i>Juniperus</i> (2) <i>Pinus edulis</i>
Shrub	(1) <i>Artemisia bigelovii</i> (2) <i>Artemisia filifolia</i>
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Andropogon hallii</i>

Physiographic features

This site occurs as coarse-textured eolian and alluvial sediments on upland plains. Slopes are nearly level to gently undulating, generally less than 5 percent. Low stabilized hummocks or dunes may occur. Exposure varies but is not significant. Elevations range from 4,500 to 7,200 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Sand sheet
Elevation	1,372–2,195 m
Slope	0–5%
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 from April to October. Most of the summer precipitation falls 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 plant species. However, about 40 percent of the precipitation falls at a time favorable for cool-season plant growth.

This allows the cool-season species to occupy an important component in this site. Because of the coarse texture of the soil, the plant community can respond rapidly to any precipitation during the frost-free season. Strong winds blow from February to June, drying the soil during a critical stage for plant growth and causing the soil to blow, which can damage plants.

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
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 very deep and excessively well-drained. The surface textures are of loamy fine sand or fine sandy loam, and these textures extend to depths of 60 inches or more. The soils are rapidly permeable and have a low water-holding capacity. Surface runoff is very slow. Drying of the surface is fast and soil-blowing hazard is high.

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Fine sandy loam (3) Loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately slow to rapid
Soil depth	183 cm
Available water capacity (0-101.6cm)	7.62–15.24 cm

Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	15–35%

Ecological dynamics

Continuous grazing of this site during the growing season will cause the high producing desirable forage plants such as, big bluestem, little bluestem, Indiangrass, sideoats grama, black grama, and New Mexico feathergrass to decrease. As this occurs, there will be a corresponding increase in the dropseeds, threeawns, ring muhly, blue grama, pinyon and juniper. As the condition of this site deteriorates, a sharp increase of juniper will occur. As the tree canopy increases, the understory vegetation decreases rapidly. The increase in numbers of trees can be attributed in part to the control of fire. Brush management is needed to restore understory production once the canopy reaches 25 percent. Due to the sandy nature of the soil, mechanical control is not feasible on this site. A system of grazing that varies the season of use is most beneficial to maintaining or improving the plant community.

State and transition model

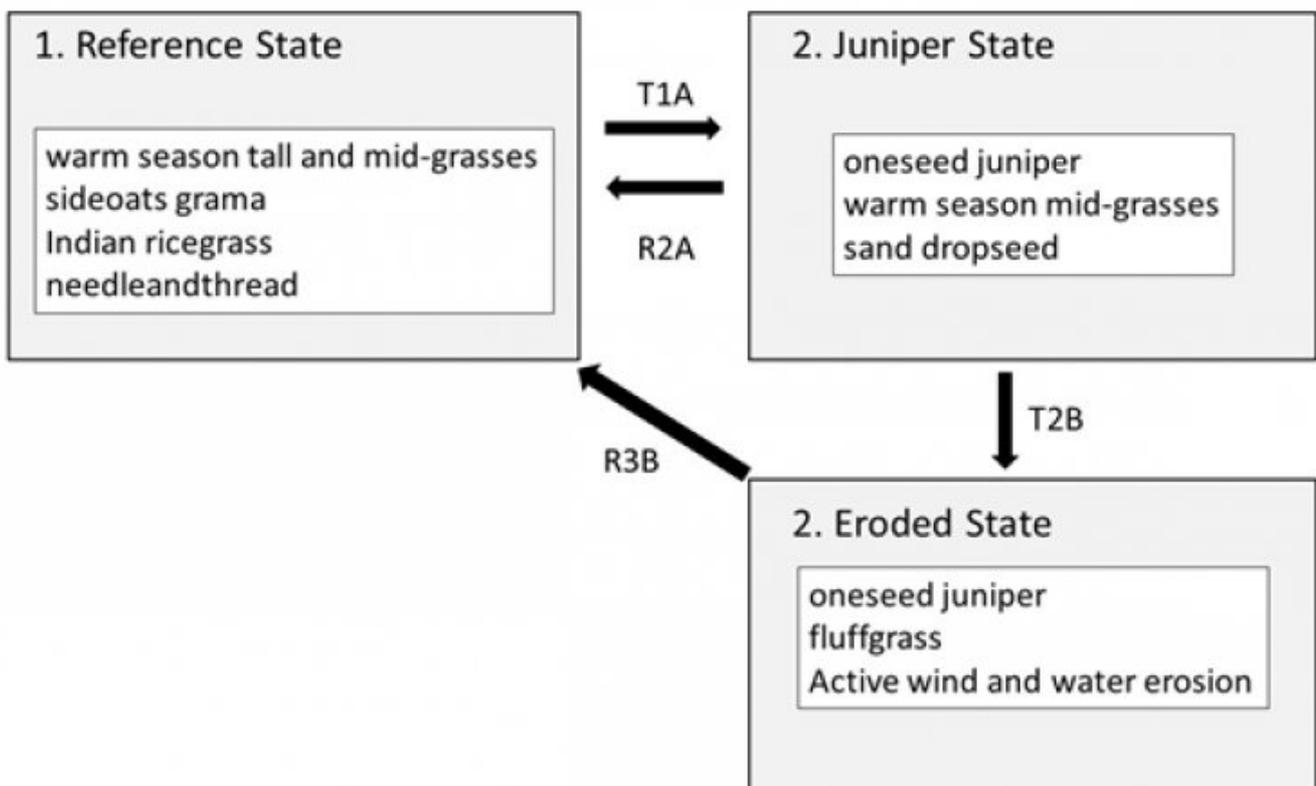


Figure 4. Generalized STM for sandy sites in 70C

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 phase has an open stand of pinyon and/or juniper with grass understory. Both warm/cool-season mid and tall grasses characterize the understory grasses with scattered shrubs 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 ranges from 10 to 25 percent. Other grasses that could appear on this phase include: switchgrass, mesa dropseed, alkali sacaton, threeawns, sandhill muhly, purple lovegrass, ring muhly, bottlebrush squirreltail, western wheatgrass, plains bristlegrass, green sprangletop, littleseed ricegrass, and prairie junegrass. Other woody plants include: feather dalea, cholla spp., ephedra spp., winterfat, rubber rabbitbrush, broom snakeweed, fourwing saltbush, yucca, and algerita. Other forbs include: tansymustard, locoweed, redstem milkvetch, scarlet globemallow, mariola, sand verbena, goldenrod, and threadleaf groundsel.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	247	885	1513
Forb	22	90	157
Total	269	975	1670

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	5-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%

Bedrock	0%
Water	0%
Bare ground	50-60%

**Figure 6. Plant community growth curve (percent production by month).
 NM4323, R070CY123NM Deep Sand Savanna Reference State.
 R070CY123NM Deep Sand Savanna Reference State Open stand of
 pinyon/uuniper w/mixed warm/cool-season mid and tall 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 Juniper

This state is characterized by an increased amount of juniper.

State 3 Eroded

This state exhibits evidence of significant erosion, such as micro-dunes and truncated topsoil.

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 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				112–179	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	118–177	–
	sand bluestem	ANHA	<i>Andropogon hallii</i>	118–177	–
2				112–179	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	118–177	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	118–177	–
3				56–112	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	59–118	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	59–118	–
4				56–112	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	59–118	–
5				112–179	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	118–177	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	118–177	–
6				56–112	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	59–118	–
7				112–179	
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	118–177	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	118–177	–
	giant dropseed	SPGI	<i>Sporobolus giganteus</i>	118–177	–

8				34–56	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	36–59	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	36–59	–
9				34–56	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	36–59	–
10				56–112	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	59–118	–
Forb					
11				0–56	
	buckwheat	ERIOG	<i>Eriogonum</i>	0–59	–
12				0–56	
	common sunflower	HEAN3	<i>Helianthus annuus</i>	0–59	–
13				0–56	
	leatherweed	CRPOP	<i>Croton pottsii</i> var. <i>pottsii</i>	0–59	–
14				0–56	
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	0–59	–
Tree					
15				112–291	
	juniper	JUNIP	<i>Juniperus</i>	118–295	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	118–295	–
Shrub/Vine					
16				56–112	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	59–118	–
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	59–118	–
17				56–112	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	59–118	–
18				34–56	
	oak	QUERC	<i>Quercus</i>	36–59	–
19				34–56	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	36–59	–

Type locality

Location 1: Lincoln County, NM
Location 2: Socorro County, NM
Location 3: 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:

Flugle, Mespun, Otero, Palma, Trail

Contributors

Christine Bishop

Don Sylvester

Elizabeth Wright

John Tunberg

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	03/23/2026
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):**

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:**
-