

Ecological site R070BY063NM

Deep Sand

Last updated: 9/12/2023

Accessed: 09/14/2026

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.

Ecological site concept

The central concept of this site is very deep soils with textures of fine sand or loamy fine sand throughout the upper 30 inches. Slopes range from 0 to 5 percent. Parent material is eolian and/or alluvial. This ecological site is often associated with the Sandy Loam, Sandy Plains, and Sandhill sites. Deep Sand site has coarser soil textures than Sandy Loam. Sandy Plains and Deep Sands have similar soil surface textures, but are differentiated by depth to a soil textural change. Sandy Plains exhibits an increase in clay content that can occur from 8 to 36 inches. Textural changes on Deep Sand do not occur until 40 inches or greater. Soils on Deep Sand sites are gently undulating sand sheets with slopes usually less than five percent, while sand hills with slopes ranging up to 25 percent define the Sandhill site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Quercus havardii</i> (2) <i>Artemisia filifolia</i>
Herbaceous	(1) <i>Andropogon hallii</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

This site occurs as the coarse-textured eolian and alluvial sediments on nearly level to undulating and hummocky upland plains, alluvial fans, and valley side slopes. Slopes are nearly level to gently undulating, generally ranging from 0 to 5 percent. Low stabilized hummocks or dunes frequently occur. Exposure varies, but is not ecologically significant. Elevation ranges from 3,500 to 4,200 feet.

Values listed below represent the characteristic soils for this site.

Characteristic soils:

Roswell

Jalmar

Table 2. Representative physiographic features

Landforms	(1) Dune (2) Sand sheet (3) Plain
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Flooding frequency	None
Ponding frequency	None
Elevation	1,070 – 1,280 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area can be classified as “semi-arid continental”.

Annual average precipitation ranges from 11 to 16 inches. Roughly 78 percent of the moisture falls during the 6-month period of May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thunderstorms. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm. Maximum temperature average above 90 degrees F from July to August, and an average summer includes about 80 days with high readings exceeding 90 degrees F and 10 days with readings above 100 degrees F. Temperatures usually fall rapidly after sundown and lows average 60 degrees F on most summer nights. Winters are mild, sunny, and dry. Daytime shade temperatures in midwinter usually rise to the 50's. However, freezing temperatures normally occur at night from mid-November to mid-March.

The freeze-free season ranges from 196 to 218 days. Dates of the last freeze range from April 11th to April 17th and the first freeze ranges from October 20th to October 25th.

Both temperature and rainfall distribution favor warm-season, perennial plant communities in the area. However, sufficient late winter and early spring moisture allows cool-season species to occupy a minor component within the plant community.

Climate data was obtained from <http://www.wrcc.dri.edu/summary/climsmnm.html> web site. Data were interpreted utilizing NM Climate Summarizer spreadsheet.

Table 3 Representative climatic features

Frost-free period (average)	190 days
Freeze-free period (average)	220 days
Precipitation total (average)	410 mm

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

Soils are deep and excessively drained. Surface and subsurface textures are fine sand and loamy fine sand and extend to a depth of 30 to 40 inches. Textures of the underlying material include fine sandy loam, loamy fine sand, and sandy clay loam; clay content ranges from 10 to 35 percent (an argillic horizon may occur at depths from 30 to 80 inches). In some pedons, a horizon containing 2 to 25 percent

calcium carbonate occurs at a depths between 60 and 80 inches. Permeability is rapid and available water-holding capacity is low. The plant-soil-air-water relationship is fair. Because of the coarse textures and rapid drying of the surface, the soil, if unprotected by plant cover and organic residue, becomes wind-blown, and hummocks or dunes appear around shrubs.

Values listed below represent the characteristic soils for this site.

Characteristic Soils:
Roswell

Table 4. Representative soil features

Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The reference plant community of the Deep Sand site is believed to be a Shinnery oak/Grass-mix composed predominantly of warm-season tall and mid grasses and sand shinnery oak. Continuous heavy grazing, especially in conjunction with drought, can result in a decrease or loss of tallgrasses and initiate a transition to a state dominated by sand shinnery oak. Light application rates of herbicide or long term grazing by goats may decrease shinnery oak and allow grasses to re-colonize, approximating reference plant community composition. Alternatively, heavier application rates of herbicide can dramatically reduce or kill sand shinnery oak, allowing grasses to dominate (Grassland state). This transition to grass dominance may be aided by decreased competition and a flush of nutrients from the decomposing oak. This transition requires the presence of perennial grasses prior to treatment, adequate rainfall, and proper management. If drought and/or mismanagement follow sand shinnery oak control, grasses may not establish and sparsely vegetated dunes and severe erosion (Active Dunes state) may result. Over a period of years, sand sagebrush may encroach on the Grassland state, perhaps due to proximity to a seed source, or because of reduced competition conferred by the loss of shinnery oak (Sand Sagebrush state).

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	hairy grama			90-269	
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	92-267	–
2	little bluestem			135-404	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	137-400	–
3	sand bluestem			135-404	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	137-400	–
4	threeawn			56-191	
	threeawn	ARIST	<i>Aristida</i>	57-187	–
5	dropseeds			135-404	
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-400	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-400	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0-400	–
6	sand paspalum			45-157	
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	46-160	–
7	tallgrasses			22-101	
	giant sandreed	CAGI3	<i>Calamovilfa gigantea</i>	0-106	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0-106	–
8	paniceae			22-101	
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0-106	–
Forb					

1	annual buckwheat			34-135	
	annual buckwheat	ERAN4	<i>Eriogonum annuum</i>	35-133	–
9	annual buckwheat			34-135	
	annual buckwheat	ERAN4	<i>Eriogonum annuum</i>	35-133	–
10	beeblossom			11-54	
	beeblossom	GAURA	<i>Gaura</i>	11-54	–
11	common sunflower			22-101	
	common sunflower	HEAN3	<i>Helianthus annuus</i>	22-106	–
12	scarlet globemallow			22-78	
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	22-80	–
13	western ragweed			22-78	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	22-80	–
Shrub/Vine					
14	shinnery oak			11-325	
	Havard oak	QUHA3	<i>Quercus havardii</i>	11-321	–
15	sand sagebrush			78-235	
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	80-240	–
16	broom snakeweed			11-56	
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	11-54	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Habitat for Wildlife: This site provides habitat which supports a resident animal community characterized by pronghorn antelope, badger, desert cottontail, spotted ground squirrel, plains pocket mouse, Ord's kangaroo rat, prairie falcon, lesser prairie chicken, burrowing owl, bullsnake, and little striped whiptail.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups. Hydrologic Interpretations Soil Series Hydrologic Group Roswell -----A Jalmar -----A

Recreational uses

Recreation potential is limited by the lack of access roads for two-wheel drive vehicles, loose sands, lack of surface water, and the lack of shade. The “wide open spaces” of the area enhance aesthetic appeal. Hunting for prairie chicken is good to excellent. Hunting for antelope is fair to good. Photography of prairie chickens during their “booming” season is excellent to good. The natural beauty is enhanced by the varying hues of bluestems and by the large variety of forbs that bloom from early spring to late fall.

Wood products

This site produces no wood products.

Other products

Grazing: This site can be grazed any season of the year except during the spring when shinnery oak is in the late bud and early leaf stage. During this period (normally six weeks) domestic livestock should be removed from pastures containing this site because shinnery oak is toxic. Care must be taken in years of high production of acorns, which are both poisonous and relished by livestock. Immediately following this stage, shinnery oak provides forage for livestock for about six weeks before the leaves become tough and brittle. Due to the variety of grasses, forbs and shrubs; cattle, goats, and sheep can graze this site. However, cattle most efficiently utilize it. Continuous, yearlong grazing by cattle results in a plant community of low forage value characterized by plants such as threeawns, field sandbur, shinnery oak, small soapweed, sand sagebrush, and forbs. Mesquite will easily invade where there is an available seed source. This condition is usually accompanied by reduced ground cover, causing wind erosion. A system of deferred grazing, which varies the season of grazing and rest, is needed to maintain or improve a healthy well-balanced plant community. Rest in different seasons benefits different plants. Winter rest will benefit all woody species. Spring rest will encourage forb production and benefit New Mexico feathergrass. Summer rest (July-September) allows species such as sand bluestem and little bluestem to grow and reproduce. Fall rest allows all warm-season species to complete their growth cycles and mature. Shinnery oak can be best utilized if cattle are concentrated into a small pasture immediately following the toxic state until leaves become tough and brittle.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index Ac/AUM 100 - 76 2.4 – 5.5 75 – 51 3.4 – 9.2 50 – 26 5.3 – 12.0 25 – 0 12.0+

Inventory data references

Data collection for this site was performed in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys, Major Land Resource Area 70 of New Mexico. This site has been mapped and correlated to soils in the following counties: San Miguel, Quay, Guadalupe, De Baca, and Chaves.

Other references

References

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7. Vermeire, L. T. and D. B. Wester. 2001. Shinnery oak poisoning of rangeland cattle: causes, effects, and solutions. *Rangelands*. 23: 19-21.
8. Villena, F. and J. A. Pfister. 1990. Sand shinnery oak as forage for Angora and Spanish goats. *Journal of Range Management*. 43: 116-122.

Contributors

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Approval

Kendra Moseley, 9/12/2023

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	09/14/2026
Approved by	
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:
