USDA Natural Resources
Conservation Service

Ecological site DX035X03A115
Deep Sand

Accessed: 05/12/2025

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.

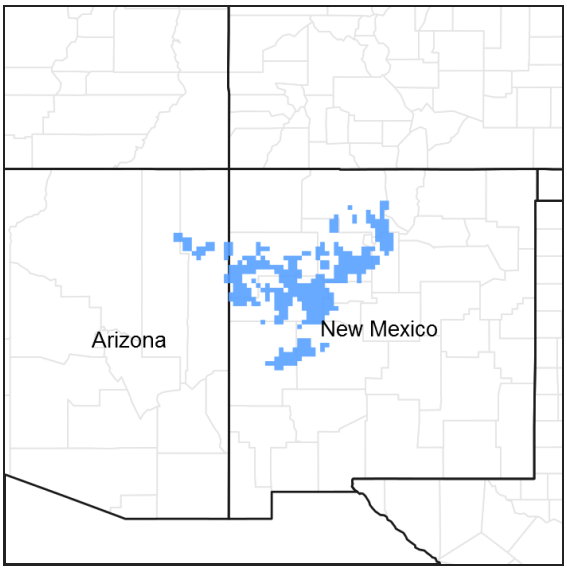

Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua gracilis* (2) *Achnatherum hymenoides*

Legacy ID

R035XA115NM

Physiographic features

This site occurs on level to gently sloping or undulating topography. Slopes range most often from 1 to 10 percent. Elevations vary from about 6,000 to 7,300 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Cuesta (3) Hill

Flooding frequency	None
Ponding frequency	None
Elevation	1,829–2,225 m
Slope	1–10%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation varies from about 10 inches to just over 16 inches. Fluctuations ranging from about 5 inches to 25 inches are not uncommon. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. As much as half or more of the annual precipitation can be expected to come during the period of July through September. Thus, fall conditions are often more favorable for good growth of cool-season perennial grasses, shrubs, and forbs than are those of spring.

The average frost-free season is about 120 days and extends from approximately mid May too early or mid September. Average annual air temperatures are 50 degrees F or lower and summer maximums rarely exceed 100 degrees F. Winter minimums typically approach or go below zero. Monthly mean temperatures exceed 70 degrees F for the period of July and August.

Rainfall patterns generally favor warm-season perennial vegetation, while the temperature regime tends to favor cool-season vegetation. This creates a somewhat complex community of plants on a given ecological site, which is quite susceptible to disturbance and is at or near its productive potential only when both the natural warm/cool-season dominants are present.

Climate data was obtained from ttp://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)	148 days
Freeze-free period (average)	174 days
Precipitation total (average)	406 mm

Influencing water features

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

Soil features

The soils of this site are typically eolian deposits of coarse sands, fine sands, or loamy sands over similarly coarse textured underlying layers. They are deep, have rapid permeability, and moderate to low available water-holding capacity. They are subject to severe soil blowing whenever plant cover becomes sparse.

Table 4. Representative soil features

Surface texture	(1) Loamy sand (2) Fine sand (3) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to very rapid

Soil depth	183 cm
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0–3%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	1–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–35%
Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

Overview
The Deep Sand site occurs on piedmont slopes, cuestas, and hill slopes, often in association with sandy sites. The historic plant community of the Deep Sand site has a grassland aspect characterized by both warm and cool season grasses, scattered shrubs and forbs. Indian ricegrass and blue grama are the dominant grasses, with spike dropseed and sand dropseed occurring as subdominants. Sand sagebrush and fourwing saltbush are characteristic shrubs. Purple aster, threadleaf groundsel, globemallow, and spectacle pod are forbs common to this site. This site is susceptible to shrub encroachment and juniper invasion. Decreased grass cover due to overgrazing and drought in conjunction with resource competition may cause the transition to the Shrub-Dominated state. Dispersal of juniper seeds, competition for resources, loss of grass
cover, and possibly lack of fire may facilitate the transition to a Juniper-Invaded state.

State and transition model

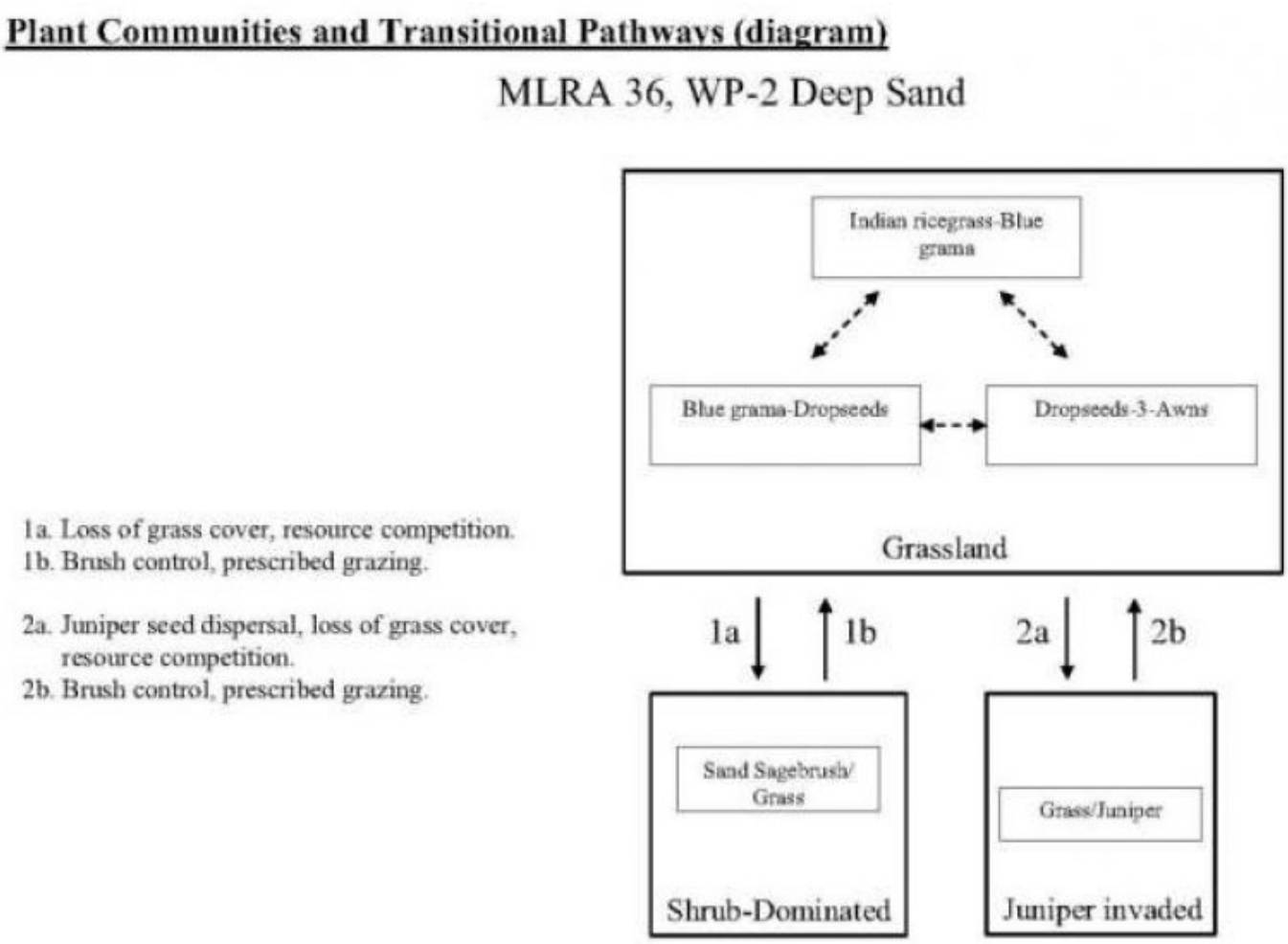

Figure 4. MLRA 36, WP-2 Deep Sand

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

State Containing Historic Climax Plant Community Grassland State: Indian ricegrass and blue grama are co-dominants in the historic plant community, with sand dropseed and spike dropseed occurring as the sub dominant grasses. Other grass species that often occur in significant amounts include galleta, western wheatgrass, bottlebrush squirreltail, needle and thread, and New Mexico feathergrass. Principal shrubs include sand sagebrush and fourwing saltbush. Rabbitbrush, broom snakeweed, and yucca may also be found scattered across the site. Continuous heavy grazing can cause a decrease in coolseason grasses, such as Indian ricegrass and western wheatgrass. Communities dominated by blue grama or dropseeds may result. Diagnosis: Grass cover is relatively uniform, however, bare ground typically makes up a large percent of the total ground cover. Shrubs are scattered with canopy cover averaging 5 percent. The soils exhibit rapid permeability limiting the effects of water erosion. With adequate grass cover there is usually limited evidence of blowouts and coppicing.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	247	527	807
Forb	37	80	121
Total	**284**	**607**	**928**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	2-8%
Grass/grasslike basal cover	10-15%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	0-3%
Surface fragments >3"	0-3%
Bedrock	0%
Water	0%
Bare ground	70-75%

Figure 6. Plant community growth curve (percent production by month). NM0306, R035XA115NM-Deep Sand-HCPC. Mixed warm/cool-season grassland w/low growing shrubs and half-shrubs and a variety of 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
Shrub-Dominated

Community 2.1
Shrub-Dominated

Additional States: Shrub-Dominated: This state is characterized by the predominance of shrubs, especially sand sagebrush. Perennial grasses are the subordinate component. The grass component is typically a low-vigor, blue grama-dropseeds community with increased amounts of threeawns, ring muhly, sandhill muhly and bare ground. Diagnosis: Grass cover is patchy, usually dominated by low-vigor blue grama and dropseeds. Shrub cover averages 20 percent or greater. Evidence of wind erosion such as pedestalling of plants, and soil deposition may be common. Transition to Shrub-Dominated (1a) Loss of grass cover due to overgrazing and/or extended drought, and increased competition for resources by shrubs may facilitate the transition to the Shrub-Dominated State. Sand sagebrush is well adapted to the sandy soils of this site. Prolific seed production, rapid germination, its ability to remain viable over time, and adaptability to low fertility soils enable this species to take advantage of favorable climatic conditions and quickly occupy a site. Transition back to Grassland (1b) Brush control is necessary to reduce the competitive influence of shrubs and reestablish grass dominance. Follow up treatment may be necessary due to re-growth the following year and seed reserves remaining in the soil.1 Impacts on erosion and wildlife habitat should be a carefully considered part of the brush management plan. The amount of soil degradation may dictate the degree to which the system is capable of recovery.

State 3
Juniper-Invaded

Community 3.1
Juniper-Invaded

Juniper-Invaded State: This state is characterized by the presence of juniper. Blue grama is often the dominant grass with dropseeds, galleta, Indian ricegrass, and threeawns occurring as the subdominants. Western wheatgrass may or may not be present. Diagnosis: Juniper is present on the site. Grass cover is variable, ranging from relatively uniform to patchy with large connected bare areas present. Evidence of erosion such as pedestalling of plants, wind

scoured areas, or blowouts may be common. Transition to Juniper-Invaded State (2a) Seed dispersal, loss of grass cover, and resource competition are all believed to facilitate juniper invasion. Wildlife (especially birds) are considered important dispersal agents facilitating the encroachment of juniper.4 Sites adjacent to areas with existing juniper communities may be at increased risk of juniper seed introduction and establishment. Competition is most important during shrub seedling establishment, during which time juniper seedlings and grasses may be competing directly for limited soil moisture.2 Overgrazing may facilitate the establishment of juniper seedlings by providing competition free areas, but livestock exclusion alone may not prevent juniper establishment. During wet years competition for available soil moisture is reduced and juniper seedling may establish in healthy stands of grass.2 Additionally, the natural spatial variability of ground cover may allow shrubs to establish on bare areas within good grass stands when adequate moisture is available.3 Key indicators of approach to transition: # Increase in size and frequency of bare patches. # Increase in amount of juniper seedlings. Transition back to Grassland (2b) Prescribed grazing is necessary to restore and maintain adequate grass cover and limit further erosion. Brush control, either mechanical or chemical can be used to remove juniper and facilitate grass recovery.

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				132–165	
	blue grama	BOGR2	*Bouteloua gracilis*	132–165	–
2				132–165	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	132–165	–
3				99–132	
	spike dropseed	SPCO4	*Sporobolus contractus*	99–132	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	99–132	–
4				7–20	
	sand muhly	MUAR2	*Muhlenbergia arenicola*	7–20	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	7–20	–
	James' galleta	PLJA	*Pleuraphis jamesii*	7–20	–
5				33–99	
	squirreltail	ELEL5	*Elymus elymoides*	33–99	–
	needle and thread	HECO26	*Hesperostipa comata*	33–99	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	33–99	–
	western wheatgrass	PASM	*Pascopyrum smithii*	33–99	–
6				7–20	
	sideoats grama	BOCU	*Bouteloua curtipendula*	7–20	–
	black grama	BOER4	*Bouteloua eriopoda*	7–20	–
7				7–20	
	threeawn	ARIST	*Aristida*	7–20	–
Forb					
8				7–66	
	Forb, perennial	2FP	*Forb, perennial*	7–66	–
9				7–33	
	Forb, annual	2FA	*Forb, annual*	7–33	–
Shrub/Vine					
10				7–33	
	sand sagebrush	ARFI2	*Artemisia filifolia*	7–33	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	7–33	–
	soapweed yucca	YUGL	*Yucca glauca*	7–33	–
11				7–20	
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	7–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	7–20	–
12				7–20	
	Shrub, deciduous	2SD	*Shrub, deciduous*	7–20	–

Animal community

Habitat for Wildlife:
This ecological site provides habitats which support a resident animal community that is characterized by

pronghorn antelope, kit fox, badger, desert cottontail, spotted ground squirrel, Ord's kangaroo rat, white-throated woodrat, Botta's pocket gopher, plains pocket mouse, northern grasshopper mouse, sparrow hawk, mourning dove, meadowlark, chipping sparrow, plains spadefoot toad, eastern fence lizard, plateau whiptail, short-horned lizard and prairie rattlesnake. Common raven and prairie falcon hunt over the site and black-chinned sparrow nest here. Where dense stands of large pinyon, juniper or ponderosa pine occur, woodland wildlife species such as mule deer, gray fox, rock squirrel, harlequin quail, pinyon jay, scrub jay, chipping sparrow and Cassin's kingbird become site-characteristic.

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
Berent----------A
Loarc----------B
Mespun----------A
Mido----------A
Pinaventes----------A
Razito----------A
Royosa----------A
Sheppard----------A
Telescope----------A

Recreational uses

This site offers fair potential for hiking, horseback riding, nature observation, photography, camping, and picnicking. It also provides fair to good opportunity for pronghorn antelope hunting. Natural beauty is dependent upon scattered flowering shrubs and forbs, and the general open grassland character of the site.

Wood products

This site has no significant value for wood products.

Other products

Grazing:
This site is suitable for grazing by most kinds and classes of livestock in all seasons of the year. It is, however, poorly suited for continuous yearlong use if the natural potential vegetation is to be maintained. Under such use, cool-season grasses such as Indian ricegrass may decline rapidly. If use is heavy and prolonged, such species as blue grama and black grama will also decline. Increased amounts of bare soil, an increase or invasion by woody plants and annuals, and such grasses as sandhill muhly, threeawns, and ring muhly characterize severe site deterioration. Soil blowing and hummocking also occur under this condition and production is cut severely. The site is also sometimes invaded by woody species such as pinyon pine and juniper, or in rare instances, ponderosa pine and may support relatively long-lived stands of these species.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity----------Index Ac/AUM
100 - 76----------3.7 – 5.0
75 – 51----------4.8 – 7.0
50 – 26----------6.8 – 13.0
25 – 0----------13.0+

Type locality

Location 1: Catron County, NM
Location 2: Socorro County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus and Mesas 36 Major Land Resource Area of New Mexico.
This site has been mapped and correlated with soils in the following soil surveys: McKinley, Cibola, Catron, Socorro, Sandoval.
1. Bovey R.W. 1964. Aerial application of herbicides for control of sand sagebrush. Journal of Range Management. 17: 253-256
2. Johnsen, T.N., Jr. 1962. One-seeded juniper invasion of northern Arizona grasslands. Ecological Monographs. 32:187-207.
3. Jurena, P.N. and S. Archer. 2003. Woody plant establishment and spatial heterogeneity in Grasslands. Ecology 84: 907-919
4. Phillips, F. J. 1910. The dissemination of junipers by birds. Forest Quart. 8: 60-73. (From Expt. Sta. Rec. 22: 644.)

Characteristic Soils Are:
Berent, Loarc, Mespun, Mido, Palma Penavetes, Razito, Royosa, Sheppard, Telescope

Contributors

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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	
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):**

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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:**
