

Ecological site DX035X03A131 Foothills

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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.

Ecological site concept

This site occurs on soils that are moderately deep to very deep. Parent materials are variable, but sandstone and limestone are excluded. Slopes range from 2 to 50 percent. This site occupies a transition zone between lowlands and mountains.

Table 1. Dominant plant species

Tree	(1) <i>Juniperus monosperma</i> (2) <i>Pinus edulis</i>
Shrub	(1) <i>Nolina micrantha</i> (2) <i>Yucca</i>
Herbaceous	(1) <i>Bouteloua gracilis</i> (2) <i>Bouteloua hirsuta</i>

Legacy ID

R035XA131NM

Physiographic features

This site occurs as rolling to steep hills, foot slopes of steep mountains, and side slopes of high mesas. Exposures and soils are variable. Slopes range from 2 to 50 percent. Elevations range from 6,000 to 7,000 feet above sea level. This is a transitional area between the SD-1 and the WP-2 MLRAs.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,830 – 2,130 m

Slope	0 – 50 %
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 to 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 any given range site which is quite susceptible to disturbance and is at or near its productive potential only when both the natural warm and cool-season dominants are present.

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	250 days
Precipitation total (average)	410 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 range from moderately deep to deep. They are derived from, shale and other parent materials other than limestone or sandstone. Surface textures range from sandy loams to clay loams, and the surface is high in amounts of coarse fragments. They are well drained, slowly to moderately permeable, and runoff is slow to moderate.

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Clay loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Well drained

Permeability class	Slow to moderate
Soil depth	50 – 180 cm

Ecological dynamics

Overview

This site occurs as rolling to steep hills, footslopes of mountains, and sideslopes of mesas. It often occurs adjacent to Malpais, Shallow Sandstone, and Loamy Ecological Sites. The reference plant community of the Foothills site is a grass-shrub-tree mix, with grasses being the dominant component. Blue grama, sideoats grama, and black grama are the dominant grasses. Sacahuista, yucca, fourwing saltbush, and oak are a few of the characteristic shrubs. Pinyon and juniper are the tree species common to this site. Overgrazing, drought, and decreased fire frequency may facilitate the transition to the Pinyon-juniper State.

Catalog of states and community pathways

Reference State

Reference Plant Community: The reference plant community is dominated by blue grama, sideoats grama, and black grama. Changes in species dominance and composition may occur naturally with respect to aspect and elevation. Blue grama, cool-season grasses, and pinyon-juniper are favored on cooler sites (north aspects, higher elevations), while black grama, other warm-season grasses, and some shrubs are favored on warmer sites (south aspects, lower elevations). Heavy continuous use by livestock can result in a decrease in black grama, sideoats grama, little bluestem, New Mexico muhly, cool-season grasses, fourwing saltbush, and winterfat. A community dominated by blue grama with galleta as the subdominant may result.

Diagnosis: Grass cover is uniform with few large bare areas present. Shrubs and trees constitute a noticeable component of this site. Evidence of erosion such as pedestalling of grasses, rills and gullies is infrequent.

Additional States:

Pinyon-juniper State: This state is characterized by the noticeable increase of pinyon, juniper, or sacahuista and decreased cover and production of grasses. Sacahuista is not as widespread, as pinyon and juniper tend to occur in localized areas. Where it does occur, sacahuista is more common on south aspects. Blue grama is typically the dominant grass species. Galleta, hairy grama, wolfstail, threeawns, and dropseeds may also increase in representation.

Diagnosis: Pinyon, juniper, or sacahuista are found at increased densities relative to the reference plant community. Grass cover is variable ranging from fairly uniform to patchy with large bare areas present. Blue grama is the dominant grass. Evidence of erosion such as pedestalling of plants, elongated water flow patterns, and litter dams may be common. Rills and small gullies may also be present, especially on slopes >10%.

Transition to Woody Encroached State (T1A) Loss of grass cover, resource competition, and lack of fire are believed to facilitate invasion of pinyon-juniper (1, 2, 3) and sacahuista (4). During years of limited rainfall, good grass cover may help to suppress woody seedlings by competing directly for soil moisture. Loss of grass cover due to overgrazing and drought can provide competition-free areas for the establishment of woody seedlings and reduce fuel loads below the level necessary to carry fire. Where fire was historically important in the development of plant communities on these sites by suppressing woody seedlings, suppression of natural fire frequencies may facilitate shrub invasion.

Key indicators of approach to transition

- Decrease or change in composition or distribution of grass cover
- Increase in size and frequency of bare patches
- Increase in amount of pinyon-juniper or sacahuista seedlings

Restoration Pathway to Reference State (R2A) Brush control may be necessary to reduce the competitive influence of shrubs and trees and increase grass cover and production. Prescribed grazing will help ensure adequate rest following brush control and will assist in the establishment and maintenance of grass cover. Prescribed fire may be a valuable tool in the control of pinyon, juniper, and sacahuista if adequate fine fuels are present.

References

1. Brockway, D.G., R.G. Gatewood, and R.B. Paris. 2002. Restoring grassland savannas from degraded pinyon-juniper woodlands: effects of mechanical overstory reduction and slash treatment alternatives. *Journal of Environmental Management*. 64: 179-197.
2. Fuchs, E.H. 2002. Historic increases in woody vegetation in Lincoln County, New Mexico. Albuquerque, NM, USA:Vanguard Printing

3. Johnsen, T.N., Jr. 1962. One-seeded juniper invasion of northern Arizona grasslands. *Ecological Monographs*. 32:187-207.

4. Van Dyne, G M., and G. F. Payne, compilers. 1964. *Grazing responses of western range plants*. Bozeman, MT: Montana State College, Department of Animal and Range Sciences. 69 p.

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				123-191	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	127-189	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	127-189	–
2				258-62	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	31-63	–
3				62-123	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	63-127	–
4				34-62	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	31-63	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	31-63	–
5				34-127	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	31-127	–
6				17-45	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	19-44	–
7				6-34	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	7-31	–
	New Mexico muhly	MUPA2	<i>Muhlenbergia pauciflora</i>	7-31	–
8				6-34	
	threeawn	ARIST	<i>Aristida</i>	7-31	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	7-31	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	7-31	–
9				6-34	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	31-63	–
10				17-50	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	19-50	–
Forb					
11				17-34	
	Forb, perennial	2FP	<i>Forb, perennial</i>	19-31	–
12				6-17	
	Forb, annual	2FA	<i>Forb, annual</i>	7-19	–
Tree					
13				34-62	
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	31-63	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	31-63	–

Shrub/Vine				
14				0-127
	sacahuista	NOMI	<i>Nolina microcarpa</i>	0-127
15				6-34
	yucca	YUCCA	<i>Yucca</i>	7-31
16				6-34
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	7-31
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	7-31
17				6-34
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	7-31
	oak	QUERC	<i>Quercus</i>	7-31
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	7-31
18				6-34

Animal community

Habitat for Wildlife: No Data

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 Alesna-----C Bamac-----A Espiritu-----B Fragua-----B Mion-----D Pojoaque-----B Poley-----C & D Sedillo-----B Westmion-----D

Recreational uses

This site is suited to hunting, hiking, horseback riding, and nature observation.

Wood products

This site has a limited potential for wood products. Wood product uses include fuelwood, fence posts, and landscape trees.

Other products

Grazing: Approximately 80 percent of the vegetative production on this site are suitable as forage for domestic livestock and wildlife. Where slopes are steep, accessibility may become limited and suggested initial stocking rates need to be adjusted. A decrease in production and/or a change in composition indicate deterioration of the potential plant community due to inadequate management. Plants that decrease include black grama, sideoats grama, little bluestem, New Mexico muhly, cool-season grasses, fourwing saltbush, and winterfat. Plants that increase include blue and hairy grama, galleta, wolftail, dropseed spp., threeawn spp., and undesirable woody species. Because mechanical treatments are seldom justifiable on this site, a planned grazing system with periodic deferment using both browsing and grazing kinds of livestock may be the best means of maintaining a healthy balance of woody and herbaceous vegetation.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index-----Ac/AUM 100 - 76-----3.9 - 5.2 75 - 51-----5.0 - 7.8 50 - 26-----7.5 - 15.6 25 - 0-----15.6+

Type locality

Location 1: Cibola County, NM
Location 2: Valencia 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: Socorro, Sierra, Grant, Hidalgo, Catron.

Characteristic Soils Are:

Pojoaque, Silver

Other Soils included are:

Alesna, Bamac, Espiritu, Fragua, Mion, Poley, Sedillo, Westmion

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Approval

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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	04/29/2026
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:
