Ecological site DX035X03A113
Sandy

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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 usually occurs on level to gently sloping or undulating topography of upland plains. Slopes average less than 10 percent. The soils of this site are moderately deep to deep, well drained, and may or may not be calcareous throughout. Typically, the surface layer is a sandy loam, fine sandy loam, or loamy fine sand at least 5 or 6 inches thick over sandy loam to clay loam subsoils.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Pascopyrum smithii* (2) *Bouteloua gracilis*

Legacy ID

R035XA113NM

Physiographic features

This site usually occurs on level to gently sloping or undulating topography of upland plains. Slopes average less than 10 percent. Elevations range from about 6,000 feet to just over 7,200 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Fan remnant
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding frequency	None

Elevation	1,830 – 2,200 m
Slope	0 – 10 %
Water table depth	180 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 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 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 any given ecological 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.

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)	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 of this site are moderately deep to deep, well drained, and may or may not be calcareous throughout. Typically, the surface layer is a sandy loam, fine sandy loam, or loamy fine sand at least 5 or 6 inches thick over sandy loam to clay loam subsoils. Permeability is moderately slow to moderately rapid, and the available water-holding capacity is moderate to high.
The soils of this site are subject to blowing.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Fine sandy loam (3) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	50 – 180 cm
Surface fragment cover <=3"	10 – 40 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.3 – 10
Subsurface fragment volume <=3" (Depth not specified)	10 – 40 %

Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Overview
The Sandy Ecological Site typically occurs on upland plains, adjacent to or in a mosaic with Deep Sand or Loamy Ecological Sites. The reference plant community of the Sandy site has a grassland aspect characterized by warm- and cool-season grasses, scattered shrubs, and forbs. Blue grama is the dominant grass species accompanied by subdominant western wheatgrass. Fourwing saltbush and winterfat are the dominant shrubs. This site is susceptible to juniper invasion and shrub encroachment. Loss of grass cover and lack of fire may facilitate the transition to the Juniper State. Decreased grass cover due to overgrazing and drought in conjunction with resource competition may cause the transition to the Shrub-dominated State.

Catalog of states and community pathways

Reference State
Reference Plant Community: In the reference plant community, blue grama is the dominant grass species accompanied by subdominant western wheatgrass. Other species that occur in significant numbers include Indian ricegrass, sand dropseed, and spike dropseed. In addition to western wheatgrass and Indian ricegrass, other species such as needle and thread, bottlebrush squirreltail, and New Mexico feathergrass contribute to an important cool-season grass component on this site. Principal shrubs include fourwing saltbush, winterfat, and sand sagebrush. Rocky Mountain beeplant is often the most noticeable forb. Continuous heavy grazing will cause a decrease in cool-season grasses, especially western wheatgrass. The Warm-season Grass Community, dominated by blue grama with subdominant dropseeds, threeawns, and galleta, may result. Western wheatgrass is adapted to fine- to medium-textured soils, and may be naturally less dominant on coarser textured soils (7). Conversely, dropseeds are adapted to coarse- to medium-textured soils and may be naturally more dominant on soils with loamy sand surface textures (7). The Sod-bound Blue Grama Community may occur in response to increased fall/spring moisture following drought (2, 5) or continuous heavy grazing.

Diagnosis: Grass cover is relatively uniform; however, bare ground makes up a large percent of the total ground cover, and grass production during unfavorable years may only average 250 pounds per acre. Shrubs are scattered with canopy cover averaging 5%. Evidence of erosion such as rills and gullies is infrequent.

Additional States:
Shrub-Dominated State: This state is characterized by the predominance of shrubs, especially sand sagebrush, horsebrush, or rabbitbrush. Perennial grasses are subordinate. The grass component is typically a low-vigor, blue grama community with more threeawns, dropseeds, ring muhly, sandhill muhly, and bare ground than in the Reference State.

Diagnosis: Grass cover is patchy, usually dominated by low-vigor blue grama. Shrub cover averages 20% or more. Evidence of wind erosion, such as pedestalling of plants, blowouts, and soil deposition, may be common.

Transition to the Shrub-Dominated State (T1A). Loss of grass cover due to overgrazing or extended drought may facilitate the transition to the Shrub-Dominated State.

Key indicators of approach to transition:
--Loss of cool season grasses
--Decrease in grass and litter cover
--Increases in cover of bare ground
--Increases in shrub seedlings

Restoration Pathway to the Reference State (R2A). Brush control is necessary to reduce the competitive influence of shrubs and reestablish grass dominance. Chemical control or mowing for 2 consecutive years is effective in controlling sand sagebrush. Root plowing and other mechanical control methods that sever the plant below the sprouting zone may reduce horsebrush and rabbitbrush densities. Some positive results have been reported in controlling rabbitbrush with herbicides (1, 8). Follow-up spraying after the initial treatment is necessary to control horsebrush (9). Single treatments may actually increase horsebrush densities. Complete shrub removal should be attempted only after erosion hazard is evaluated. Seeding may be necessary if adequate seed source is not present. Rest from grazing followed by prescribed grazing afterward will help ensure grass establishment.

Juniper-invaded State. This state is characterized by the presence of juniper. Blue grama, dropseeds, galleta, Indian ricegrass, and threeawns are the primary grass species. Western wheatgrass may be present.

Diagnosis: Juniper is present. Grass cover is variable, ranging from relatively uniform to patchy with large, interconnected bare areas.

Transition to Juniper-invaded State (T1B). Loss of grass cover, resource competition, and lack of fire are believed to facilitate juniper

invasion. Climatic periods of mild winters and wet summers may produce conditions favorable to juniper establishment, and result in episodic events of juniper expansion (6). Seed dispersal by wildlife and livestock may contribute to the spread of juniper. Birds, rodents, deer and other small mammals may eat the fruits of juniper and aid in spreading juniper seed (3). Sheep and goats may browse juniper and can act as dispersal agents in some areas. Overgrazing and competition for resources in conjunction with drought may favor juniper invasion. During years of limited rainfall, good grass cover may suppress juniper seedling survival by competing directly for soil moisture. Resource competition is more important during juniper seedling establishment when their roots are in the same zone as the grasses (3). Overgrazing may facilitate the establishment of juniper seedlings by providing competition-free areas, but livestock exclusion alone would not prevent juniper establishment. During wet years, competition for available soil moisture is reduced, and juniper seedlings may even establish in good stands of grass (3). Additionally, the natural spatial variability of ground cover may allow woody species to establish on bare areas within good grass stands when adequate moisture is available (4). Where fire was historically important in the development of plant communities on Sandy Ecological Sites by suppressing juniper seedlings, then overgrazing and fire suppression can disrupt natural fire frequencies and may facilitate juniper 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 juniper seedlings

Restoration Pathway to the Reference State (R3A). Mechanical or chemical brush control can be used to remove juniper and facilitate grass recovery. After brush control, rest from grazing followed by prescribed grazing will assist in grass reestablishment and persistence.

References

1. Cluff, G.J., B.A. Roundy, R.A. Evans, and J.A. Young. 1983. Herbicidal control of greasewood (Sarcobatus vermiculatus) and salt rabbitbrush (Chrysothamnus nauseosus ssp. consimilis). Weed Science. 31: 275-279.

2. Jameson, D.A. 1970. Value of broom snakeweed as a range condition indicator. Journal of Range Management. 23: 302-304.

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

4. Jurena, P.N. and S. Archer. 2003. Woody plant establishment and spatial heterogeneity in Grasslands. Ecology 84: 907-919.

5. McDaniel, K.C., L.A. Torell, and J.W. Bain. 1993. Overstory-understory relationships for broom snakeweed-blue grama grasslands. Journal of Range Management. 46: 506-511.

6. Miller, R.F., and R.J. Tausch. 2001. The role of fire in pinyon and juniper woodlands: a descriptive analysis. Pages 15–30 in K.E.M. Galley and T.P. Wilson (eds.). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.

7. USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

8. Whisenant, S.G. 1988. Control of threadleaf rubber rabbitbrush with herbicides. Journal of Range Management. 41: 470-472.

9. William, R.D., D Ball, T.L. Miller, [and others], compilers. 2001. Pacific Northwest weed management handbook. Corvallis, OR: Oregon State University. 408 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				101-135	
	western wheatgrass	PASM	*Pascopyrum smithii*	99-132	–
2				168-202	
	blue grama	BOGR2	*Bouteloua gracilis*	165-197	–
3				34-67	

	Indian ricegrass	ACHY	*Achnatherum hymenoides*	33-66	–
4				34-67	
	squirreltail	ELEL5	*Elymus elymoides*	33-66	–
	needle and thread	HECO26	*Hesperostipa comata*	33-66	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	33-66	–
5				67-101	
	spike dropseed	SPCO4	*Sporobolus contractus*	66-99	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	66-99	–
6				6-34	
	James' galleta	PLJA	*Pleuraphis jamesii*	7-33	–
7				22-34	
	sand muhly	MUAR2	*Muhlenbergia arenicola*	20-33	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	20-33	–
8				6-34	
	threeawn	ARIST	*Aristida*	7-33	–
9				6-34	
	black grama	BOER4	*Bouteloua eriopoda*	7-33	–
10				6-22	
	spike muhly	MUWR	*Muhlenbergia wrightii*	7-20	–
Forb					
11				22-53	
	Forb, perennial	2FP	*Forb, perennial*	20-53	–
12				6-34	
	Forb, annual	2FA	*Forb, annual*	7-33	–
Shrub/Vine					
13				34-67	
	fourwing saltbush	ATCA2	*Atriplex canescens*	33-66	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	33-66	–
14				6-34	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	7-33	–
15				6-22	
	sand sagebrush	ARFI2	*Artemisia filifolia*	7-20	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	7-20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	7-20	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	7-20	–

Animal community

Habitat for Wildlife: This ecological site provides habitat which supports 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, ferruginous hawk, mourning dove, meadowlark, plains spadefoot toad, Eastern fence lizard, plateau whiptail, short-horned lizard, and prairie rattlesnake. Common raven and prairie falcon hunt over the site.

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 Bamac----------A Celacy----------C Charalito----------B Fruitland----------B Goesling----------B Guy----------B Hubbell----------B Loarc----------B Netoma----------B Otero----------B Royosa----------A Telescope----------B Tintero----------B Waumac----------B

Zia----------B

Recreational uses

This site offers fair potential for hiking, horseback riding, nature observation, photography, camping, and picnicking. It offers good to excellent potential for hunting pronghorn antelope. In years of favorable moisture, colorful wildflowers dot the landscape.

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, but is poorly suited for continuous yearlong grazing if potential natural vegetation is to be maintained. Under such use, cool-season grasses, such as western wheatgrass, Indian ricegrass, and needleandthread may decline or even disappear. If use is heavy and prolonged, many of the more palatable warm-season species will also decline. Low-vigor, sod-like blue grama and possibly some galleta may characterize the site in a typically deteriorated condition. Further deterioration is characterized by increasing amounts of bare ground, increases in ring muhly, sandhill muhly, threeawns and rabbitbrush, and by certain annual forbs. Production in these instances may be cut to one-third or less of the potential, and soil blowing may become severe. The site, in certain instances, is subject to invasion by woody species such as pinyon pine and juniper.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index----------Ac/AUM 100 - 76----------3.6 – 4.7 75 – 51---------- 4.5 – 7.0 50 – 26----------6.8 – 12.0 25 – 0----------12.0+

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, Sandoval, Cibola, Catron, Socorro
Characteristic Soils Are:
Telescope
Other Soils included are:
Bamac, Celacy, Fruitland, Goesling, Guy Hubbell, Loarc, Netoma, Otero, Palma Penistaja, Tintero, Waumac, Zia

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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	05/11/2026
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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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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:**
