Ecological site R042BE061NM
Clayey, Cool Desert Grassland

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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.

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	Not specified

Physiographic features

This site occurs on piedmont slopes and moderately sloping broad valleys and benches. Often, it is found below interbedded shale and sandstone breaks. Run-on from adjacent sites increases effective soil moisture, which results in high production during favorable years. Slopes range from 3 to 15 percent, but average less than 8 percent. Elevations range from 4,500 to 5,500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Valley floor (3) Alluvial flat
Flooding frequency	None
Ponding frequency	None
Elevation	1,372–1,676 m
Slope	0–5%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

This site has an arid climate with distinct seasonal temperature variations and large annual and diurnal temperature changes characteristic of a continental climate.
Precipitation averages 8 to 10 inches annually. Deviations of 4 inches or more from the average are quite common. Fifty percent of the precipitation is received from July to November, which is the predominant growing season of native plants. Summer precipitation is characterized by high-intensity, short-duration rainstorms. Winter precipitation averages less than one half inch per month, usually in the form of rain. There are occasional snowstorms of short duration.
Temperatures vary from a mean monthly average of 77 F in July to 34 F in January, with a maximum of 104 F and

a minimum of -10 F. The average last killing frost in spring is April 15, and the average first killing frost in fall is October 28. Frost-free season averages 185 days. Temperatures are conducive to native grass and forb growth from March through November.
Spring winds of 15 to 40 miles per hour are common from February to June. These winds increase transpiration rates of native plants and rapidly dry the surface soil. Small soil particles are often displaced by the wind near the soil surface, often resulting in structural damage to native plants, especially young seedlings.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html 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)	152 days
Freeze-free period (average)	201 days
Precipitation total (average)	229 mm

Influencing water features

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

Soil features

Soils are deep and very deep. Surface textures are Clay, Silty Clay Loam, Silty sandy clay, some have loam and fery fine sandy loam. Subsoil textures are silty clay, clay, silty clay loam with some horizons with loam. The substratum textures are silty clay, clay, silty clay loam with some horizons with loam.

Coarse fragments throughout the soil profile is not uncommon.

Minimum and maximum values listed below represent the characteristic soil (s) for this site.

Characteristic soils:
Armijo
Barana

Table 4. Representative soil features

Surface texture	(1) Very fine sandy loam (2) Silty clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately slow
Soil depth	183 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	3–10%

Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

MLRA-42, SD-1: Clayey

Overview

The clayey site occurs on mostly level, lower piedmont slope/basin floor within the Jornada del Muerto Basin. The Barana series is the predominant soil in this ecological site.

The historic community type is strongly dominated by alkali sacaton (*Sporobolus airoides*). Galleta (*Pleuraphis jamesii*) is subdominant. Under continuous heavy grazing, these species decline and burrograss (*Scleropogon brevifolius*) increases in cover. Loss of alkali sacaton, galleta, and other grasses signals a transition to a burrograss state, which may be associated with extensive bare ground, erosional deflation, and soil sealing. Recovery can be achieved through seeding and soil modification or in some cases recovery may occur unassisted over several decades.

Catalog of states and community pathways

State Containing Historic Plant Community

Alkali sacaton: The historical community type is strongly dominated by alkali sacaton (over half of total production) and galleta is subdominant. Grama grasses (*Bouteloua gracilis*, *B. eriopoda*) and bottlebrush squirreltail (*Elymus elymoides*) are present and diversity is high. Shrubs are scattered or absent. Diversity decreases with grazing pressure, and both alkali sacaton and galleta decline. In some cases, galleta is rare or declines and alkali sacaton is co-dominant with burrograss. Burrograss increases in absolute abundance as it colonizes bare areas. Drought cycles may also lead to sacaton mortality and replacement by other grasses. Erosion may occur in limited areas.

Diagnosis: Alkali sacaton is dominant or has sufficient cover for rapid recovery during wet periods. Grass cover is uniform with bare patches typically > 30 cm in width. Litter covers much of interspaces such that raindrop impact on the soil surface is low.

Additional States:

Burrograss -dominated: Burrograss is highly dominant, accounting for up to 100% of total grass cover. Other grasses may be present in scattered patches (e.g., alkali sacaton in depressions). Long-term monitoring data indicate that burrograss cover on Barana loam may fluctuate widely but maintain dominance over 20 yr4,5. Burrograss cover may become very low with drought and heavy grazing use and may take decades to recover, although other grasses may not recover. Burrograss tolerates drought periods better than many other grasses2.This may constitute a “bare ground” state but none has yet been observed. Erosional deflation and soil sealing during periods of low cover, and burrograss possesses adaptations to recolonize under these soil conditions1. This state may occur in patches within the alkali sacaton state.

Diagnosis: Alkali sacaton is rare or absent and burrograss dominates. Bare patches may be interconnected and bare areas may exceed 1 m width. Soil sealing is common and may be evidence of erosional deflation or rills.

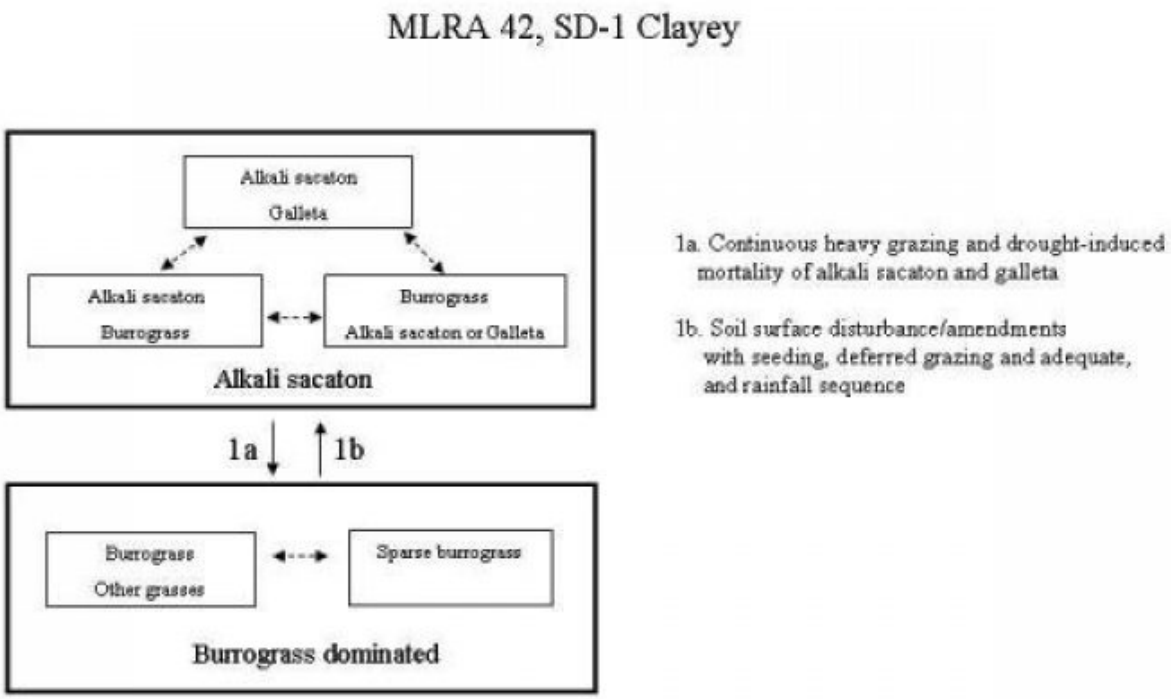
Transition to Burrograss-dominated (1a) Loss of grass cover due to continuous heavy grazing through drought periods causes the transition. Once most plants are eliminated, erosion and soil sealing occurs such that alkali sacaton and galleta do not reestablish. Burrograss, however, can establish in these conditions3.

Key indicators of approach to transition:
? Overutilization, decadence, and mortality of alkali sacaton and galleta.
? Increases in the relative cover of burrograss
? Increasing size of bare ground patches
? Deflation and soil sealing within bare patches.

Transition back to Alkali sacaton (1b) The recolonization of alkali sacaton may be facilitated by prescribed grazing and seeding in SD-1. The soil surface would need to be disturbed to overcome soil sealing, and soil amendments may be need if deflation has been severe.

Contributors. Data and ideas were provided by Darrel Reasner, Gary Garrison, George Chavez, Elizabeth Wright, Will Hooper, and David Trujillo.

State and transition model



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

This grassland site is strongly dominated by alkali sacaton. Shrubs are scattered about the site and a few one-seed

juniper and pinyon trees are not uncommon. Forbs comprise a minor component on this site. Other grasses that could appear on this site include: cane bluestem, giant dropseed, ring muhly, and burrograss. Other woody plants include: broom snakeweed, yucca spp., and cactus spp. Other forbs include milkweed and silverleaf nightshade.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	476	810	1143
Shrub/Vine	56	95	135
Forb	28	48	67
Total	**560**	**953**	**1345**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	46%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	16%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40%

Figure 7. Plant community growth curve (percent production by month). NM2301, R042XA061NM-Clayey Warm Season Plants-HCPC. SD-1 Clayey HCPC Warm Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	10	10	25	30	12	5	0	0

Figure 8. Plant community growth curve (percent production by month). NM2302, R042XA061NM-Clayey Cool Season Plant-HCPC. SD-1 HCPC Clayey Cool Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	15	20	20	2	5	10	15	13	0	0

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	**Warm Season**			429–525	
	alkali sacaton	SPAI	*Sporobolus airoides*	429–525	–
2	**Warm Season**			95–143	
	James' galleta	PLJA	*Pleuraphis jamesii*	95–143	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	95–143	

	tobosagrass	PLMU3	*Pleuraphis mutica*	95–143	–
3	**Warm Season**			48–95	
	blue grama	BOGR2	*Bouteloua gracilis*	48–95	–
4	**Cool Season**			48–76	
	squirreltail	ELEL5	*Elymus elymoides*	48–76	–
5	**Warm Season**			48–76	
	black grama	BOER4	*Bouteloua eriopoda*	48–76	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	48–76	–
6	**Cool/Warm Season**			29–48	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	29–48	–
	dropseed	SPORO	*Sporobolus*	29–48	–
7	**Warm Season**			10–48	
	vine mesquite	PAOB	*Panicum obtusum*	10–48	–
8	**Warm Season**			0–48	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–48	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–48	–
Shrub/Vine					
9	**Shrub**			48–95	
	fourwing saltbush	ATCA2	*Atriplex canescens*	48–95	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	48–95	–
10	**Shrub**			10–29	
	winterfat	KRLA2	*Krascheninnikovia lanata*	10–29	–
11	**Shrub/Tree**			0–29	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–29	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	0–29	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–29	–
	twoneedle pinyon	PIED	*Pinus edulis*	0–29	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–29	–
Forb					
12	**Forb**			29–48	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	29–48	–
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	29–48	–
	buckwheat	ERIOG	*Eriogonum*	29–48	–
	woolly plantain	PLPA2	*Plantago patagonica*	29–48	–
	Russian thistle	SAKA	*Salsola kali*	29–48	–
	globemallow	SPHAE	*Sphaeralcea*	29–48	–

Animal community

This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, silky pocket mouse, horned lark, black-throated sparrow, little striped whiptail, and western diamondback rattlesnake.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series Hydrologic Group
Armijo C
Barana B

Recreational uses

This site is not normally considered for its recreational value other than for nature obervation, hunting, and horseback riding. The beauty of this site may be enhanced by its proximity to a colorful mesa setting.

Wood products

This site has no significant wood products in its potential plant community.

Other products

Approximately 90 percent of the vegetative production on this site is suitable as forage for domestic livestock and wildlife. Grazing distribution is generally not a problem on this site if water facilities are adequately located. Inadequate management of the site leads to repetitive grazing of the most desirable plant species, reducing the vigor and productivity of these plants. The result is a deterioration of the potential plant community. Deterioration is indicated by a decrease in blue grama, black grama, sideoats grama, bush muhly, bottlebrush squirreltail, Indian ricegrass, saltbush, and winterfat.
A planned grazing system with periodic deferment is best to maintain the desirable balance between plant species and to maintain the natural productivity and plant vigor.

In addition to domestic livestock, this site is used by deer, pronghorn, small mammals, and birds.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index-----Ac/AUM
100 - 76----------2.4 – 3.2
75 – 51----------3.1 – 4.8
50 – 26----------4.6 – 9.5
25 – 0----------9.5 +

Other references

Other References:
Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Area 42, of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: Valencia and Bernalillo.

Characteristic Soils Are:
La Fonda loams
Barana
Bucklebar
Hagerman
Armijo

References

1. Allred, K.W. 1989. Observations on seed dispersal and implantation in burrograss (*Scleropogon brevifolius* -

Gramineae). Sida 13:493-496.

2. Campbell, R.S. 1931. Plant succession and grazing capacity on clay soils in southern New Mexico. Journal of Agricultural Research 43:1027-1051.

3. Devine, D.L., M.K. Wood, and G.B. Donart. 1998. Runoff and erosion from a mosaic tobosagrass and burrograss community in the northern Chihuahuan Desert grassland. Journal of Arid Environments 39:11-19.

4. Ryerson, D. E. and R. R. Parmenter. 2001. Vegetation change following removal of keystone herbivores from desert grasslands in New Mexico. Journal of Vegetation Science 12: 167-180.

5. Ryerson, D. 1996. BLM desertification transects 1976, 86, 96 (SEV109/SEV110). Sevilleta LTER database, http://sevilleta.unm.edu/data/contents/SEV109/blmtransects/ [11/1/04]

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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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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:**
