Ecological site R042BB027NM
Hills, Desert Shrub

Accessed: 05/19/2024

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 as a complex of different soils, exposures, and degrees of slopes, and in close association with igneous or sedimentary rock formations other than limestone. It is characterized by rolling to steep hills and mountain footslopes. Slopes average more than 15 percent and range frequently to 50 percent, while direction of slopes is variable. Elevations range from 4,000 feet to 5,000 feet.

*Note: Lozier and Courthouse soil series may be outside of the slope range for this ESD

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,219–1,524 m
Slope	5–50%
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7.35 to 11.90 inches. Wide fluctuations from year to year are common, ranging from a low of abut 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 61 degrees F. Summer maximums usually exceed 100 degrees F., and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both the temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of the year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	227 days
Precipitation total (average)	305 mm

Influencing water features

This site is not influenced by water from wetlands or streams.

Soil features

Soils are generally shallow. Surface textures range from stony loam, gravelly clay loam, cobbly loam, extreamely stony sandy loam, very gravelly fine sandy loam, or cobbly loam. The subsoil is a very gravelly sandy loam, cobbly silt loam, very cobbly sandy clay loam, stony clay loam, cobbly clay or gravelly sandy loam. The soils are calcareous throughout the profile ranging from 2 to 40 percent. Runoff is moderately rapid to rapid. Slopes average more than 15 percent.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic Soils:
Lehmans
Ledru
Luxor
Lozier*
Courthouse*
Lemitar
Motoque
Pilabo
Laborcita

*Note: Lozier and Courthouse may be outside of the slope range for this ESD

Table 4. Representative soil features

Surface texture	(1) Stony loam (2) Extremely stony sandy loam (3) Cobbly loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately slow
Soil depth	0–51 cm
Surface fragment cover <=3"	15–60%
Surface fragment cover >3"	5–25%
Available water capacity (0-101.6cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–45%
Subsurface fragment volume >3" (Depth not specified)	5–20%

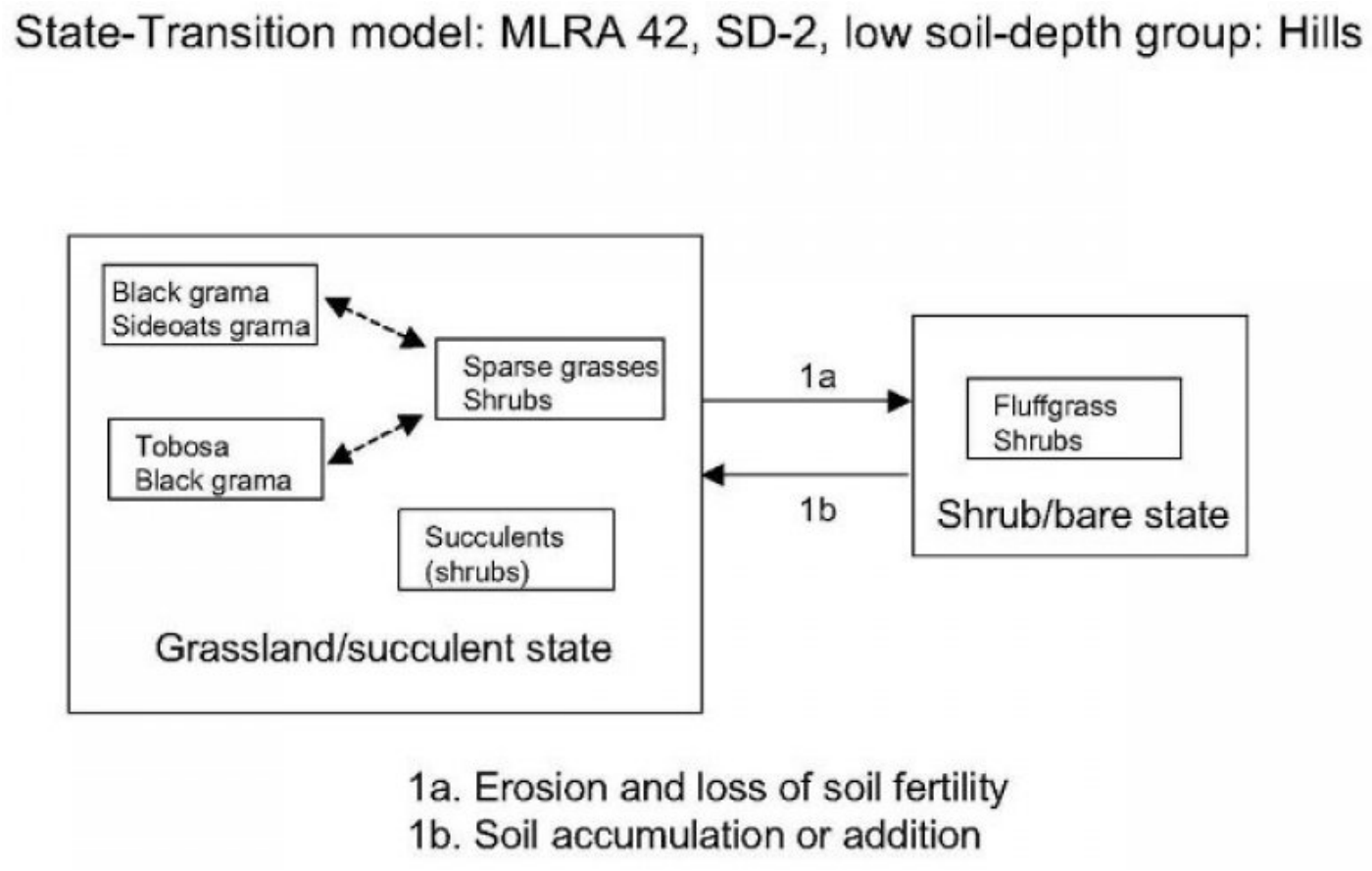
Ecological dynamics

Overview

This site frequently intergrades with gravelly and limestone hills sites. This site tends to occur at or approaching transitions to higher-elevation land resource units (e.g. CP-4) so plant community composition may grade continuously across relatively short distances. The historic plant community type of the hills site is dominated by black grama (*Bouteloua eriopoda*) and sideoats grama (*Bouteloua curtipendula*). Other grasses, including blue grama (*Bouteloua gracilis*) may be subordinates depending upon aspect and hillslope position. Tobosa (*Pleuraphis mutica*) may dominate on stony loams/clay loams. Shrubs and succulents are common, especially on south-facing slopes. Hills sites often exhibit more shrub cover than adjacent limestone hills sites. The Hills site is resistant to grass loss compared with other sites in SD-2, perhaps due to the presence of a rough, stony surface that 1) retards sheet flow velocity and erosional soil loss and 2) protects the crowns of grasses from herbivory by livestock.

No systematic studies of communities, states or transitions have been performed in the hills site.

State and transition model



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Figure 4. Grassland/succulent state

Grassland/Succulent State Black grama is typically dominant and bush muhly (*Muhlenbergia porteri*), blue grama, and sideoats grama are subordinates. On heavier soils, tobosa may be dominant. Succulents are also common subordinate plants, including banana yucca (Yucca bacata), sotol (Dasylirion spp.), ocotillo (*Fouquieria splendens*) and agaves (Agave spp.). Cool season grasses, such as New Mexico feathergrass (*Hesperostipa neomexicana*) may also be present. Creosotebush (*Larrea tridentata*) may also be present. Heavy grazing or drought disturbance within this state leads to increasing bare ground and/or increases in the representation of threeawns (Aristida spp.), hairy grama (*Bouteloua hirsuta*), fluffgrass (*Dasyochloa pulchella*), and snakeweeds (Gutierrezia spp.). Drier, south-facing slopes tend to have a greater representation of succulents and shrubs, more bare ground, and less grass cover even when currently ungrazed. Abundant rocks and very shallow soils may also restrict grass cover. Steep, northerly-facing slopes often exhibit surprisingly abundant grass growth even where adjacent sites are degraded. With heavy grazing, grasses may be restricted to spaces between rocks but may increase with good management and adequate rainfall. Shrub encroachment (e.g., by creosotebush) that results in competitive influences on grasses is generally not observed. On some soils in some areas, however, whitethorn acacia (*Acacia constricta*) is becoming an important, and apparently recent, invader. It may prove useful to consider a shrub-invaded state if whitethorn dominance proves detrimental to grasses. Diagnosis: Black grama (or tobosa) is usually dominant in undisturbed settings. Grass cover is more or less continuous, with patches of bare ground becoming more common on the drier slopes and with grazing pressure. Shrubs and succulents may be common, especially on south-facing slopes. In cases of drought or heavy grazing, grasses may be inconspicuous and found only alongside rocks. Additional States: Transition to bare state (1a): Sites with steep slopes and relatively smooth surfaces may be susceptible to erosion if overgrazing/drought is severe. Gullies may need to be blocked and water flow redistributed more evenly. Sites with shallower slopes and more rough surfaces may be less likely to experience this transition under similar environmental conditions. Key indicators of approach to transition: Increases in bare ground, evidence of sheet flow including litter dams and loss of soil around rocks, rills, gullies.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	254	421	588
Shrub/Vine	84	139	193
Forb	26	43	59
Total	**364**	**603**	**840**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	18%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	22%

Figure 6. Plant community growth curve (percent production by month). NM2514, R042XB027NM-Hills-Warm Season Plant HCPC. SD-2 Warm Season Plant Community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

State 2
Shrub / Bare

Community 2.1
Shrub / Bare

Shrub/Bare: These communities are largely barren with a variable cover of fluffgrass, snakeweeds, and annuals in addition to some succulents and woody plants. Gullies may be present. Transition to grassland/succulent state (1b): If soil loss exposes the stony substrate, then soil would need to accumulate or be added before large perennial grasses could recover. Gullies may need to be blocked and water flow redistributed more evenly. Seeding would likely be required if source populations were unavailable. Information sources and theoretical background: Communities, states, and transitions are based upon information in the ecological site description and observations by Jim Powell, NRCS, retired, and Brandon Bestelmeyer, Jornada Experimental Range. The speculations regarding the role of surface roughness in providing resistance to grass degradation can and should be empirically verified.

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				151–180	

	black grama	BOER4	*Bouteloua eriopoda*	151–180	–
2				61–91	
	bush muhly	MUPO2	*Muhlenbergia porteri*	61–91	–
3				61–91	
	sideoats grama	BOCU	*Bouteloua curtipendula*	61–91	–
	blue grama	BOGR2	*Bouteloua gracilis*	61–91	–
4				6–18	
	threeawn	ARIST	*Aristida*	6–18	–
5				6–30	
	tobosagrass	PLMU3	*Pleuraphis mutica*	6–30	–
6				6–18	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	6–18	–
7				30–61	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	30–61	–
	Arizona cottontop	DICA8	*Digitaria californica*	30–61	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	30–61	–
	tanglehead	HECO10	*Heteropogon contortus*	30–61	–
	green sprangletop	LEDU	*Leptochloa dubia*	30–61	–
8				6–18	
	Hall's panicgrass	PAHA	*Panicum hallii*	6–18	–
	tridens	TRIDE	*Tridens*	6–18	–
9				6–30	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	6–30	–
Shrub/Vine					
10				48–73	
	agave	AGAVE	*Agave*	48–73	–
	common sotol	DAWH2	*Dasylirion wheeleri*	48–73	–
	ocotillo	FOSP2	*Fouquieria splendens*	48–73	–
	yucca	YUCCA	*Yucca*	48–73	–
11				6–18	
	sacahuista	NOMI	*Nolina microcarpa*	6–18	–
12				6–18	
	fourwing saltbush	ATCA2	*Atriplex canescens*	6–18	–
13				6–30	
	oak	QUERC	*Quercus*	6–30	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	6–30	–
14				0–18	
	juniper	JUNIP	*Juniperus*	0–18	–
15				6–18	
	featherplume	DAFO	*Dalea formosa*	6–18	–
16				6–18	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–18	–
Forb					
17				6–30	

	buckwheat	ERIOG	*Eriogonum*	6–30	–
	woolly plantain	PLPA2	*Plantago patagonica*	6–30	–
	globemallow	SPHAE	*Sphaeralcea*	6–30	–
18				18–48	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	18–48	–

Animal community

This site provides habitat which support a resident animal community that is characterized by mule deer, spotted skunk, ringtail, desert cottontail, Texas antelope squirrel, rock pocket mouse, cactus mouse, white throated woodrat, turkey vulture, phrrhuloxia, cactus wren, curve billed thrasher, blue gray gnatchatcher, brown towhee, rufous crowned sparrow, rock rattlesnake, mountain patchnosed snake, canyon treefrog, red spotted toad, long tailed brush lizard, and collared lizard.

Where high cliffs and ledges are present, golden eagles and prairie falcons perch to hunt over the surrounding terrain. This site is considered ancestral range of the desert bighorn sheep.

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
Lehmans D
Ledru D
Luxor D
Lozier D
Courthouse D
Lemitar D
Motoque B
Pilabo B
Laborcita B

Recreational uses

Recreation potential is limited largely by the hot daytime temperatures of summer and windy spring weather of the lower Sonoran Life Zone, within which the site is located. Suitability for camping and picnicking is fair, limited mostly by rockiness and stoniness of the soils, The site has high suitability for “rock - hounding”, hiking, rock climbing and observation of nature. Hunting is fair for deer, desert bighorn and introduced ibex, fair to good for quail, dove and small game.

Wood products

This site has insignificant value for wood products.

Other products

This site, at its potential, is suitable for grazing in all seasons of the year, although most of the green forage is produced during summer months. The site is suitable for grazing by all classes of livestock. In order to maintain and improve this site, grazing management that includes a flexible stocking rate is especially important.
As long as woody species do not dominate the site recovery from retrogression can be made at a reasonable rate through good grazing management.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index Ac/AUM
100 - 76---------- 3.8 – 4.7
75 – 51---------- 4.5 – 7.2
50 – 26---------- 7.0 – 11.3
25 – 0---------- 11.3 - +

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 Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:
Lehmans stony loam, rocky loam

Other Soils included are:
Ledru gravelly clay loam
Lehmans (gravelly sandy clay loam)-Lithic Haplargids complex
Brewster stony loam
Graham clay loam (Grant County
Tidwell stony loam
Lithic Haplargids

Contributors

Don Sylvester
Dr. Brandon Bestelmeyer

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:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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):**

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:**