

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Hills

Site ID: R042XB027NM

Major Land Resource Area: 042 - Southern Desertic Basins, Plains, and Mountains

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%, while direction of slopes is variable. Elevations range from 4,000 feet to 5,000 feet.

Land Form: (1) Hill
(2) Mountain slope

	<u>Minimum</u>	<u>Maximum</u>
<u>Elevation (feet):</u>	4000	5000
<u>Slope (percent):</u>	15	50
<u>Water Table Depth (inches):</u>	N/A	N/A
<u>Flooding:</u>		
Frequency:	None	None
Duration:	None	None
<u>Ponding:</u>		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
<u>Runoff Class:</u>	High	Very High
<u>Aspect:</u>	Aspect has a significant influence on plant community.	

Climatic Features

Annual average precipitation ranges from 8 to 10.5 inches. Wide fluctuations from year to year are common, ranging from a low of about 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.

	<u>Minimum</u>	<u>Maximum</u>
<u>Frost-free period (days):</u>	179	212
<u>Freeze-free period (days):</u>	200	233
<u>Mean annual precipitation (inches):</u>	8.0	10.5

Monthly precipitation (inches) and temperature (°F):

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Precip. Min.	0.37	0.36	0.23	0.18	0.29	0.57	1.42	1.92	1.53	1.01	0.48	0.57
Precip. Max.	0.54	0.39	0.27	0.36	0.45	0.64	1.9	2.2	1.66	1.07	0.58	0.78
Temp. Min.	20.8	25.5	31.2	38.0	46.4	54.3	61.1	59.1	51.5	39.8	28.8	22.3
Temp. Max.	58.1	63.8	71.0	79.3	87.4	96.4	95.5	92.7	87.5	78.7	67.2	58.8

- Climate Stations:
- (1) NM3855, Hatch. Period of record 1961 - 1990
 - (2) NM8387, Socorro. Period of record 1961 - 1990

Influencing Water Features

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

<u>Wetland Description:</u> (Cowardin System)	<u>System</u>	<u>Subsystem</u>	<u>Class</u>
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Representative Soil Features

Soils are generally shallow and well drained. Typically, they are loamy to clayey and may be skeletal underlain by igneous or sedimentary bedrock other than limestone. They may be calcareous throughout the profile. They are moderately to slowly permeable and runoff is rapid. Slopes average more than 15 percent.

Predominant Parent Materials:

Kind: Slope alluvium

Origin: Mixed-igneous & sedimentary

Surface Texture: (1) Gravelly Loam
(2) Cobbly Clay loam
(3) Clay

Subsurface Texture Group: Clayey

Surface Fragments <=3" (% Cover): 15

Surface Fragments > 3" (% Cover): 35

Subsurface Fragments <=3" (% Volume): 20

Subsurface Fragments > 3" (% Cover): 10

Drainage Class: Moderately well drained To Well drained

Permeability Class: Slow To Moderately slow

	<u>Minimum</u>	<u>Maximum</u>
<u>Depth (inches):</u>	0	60
<u>Electrical Conductivity (mmhos/cm):</u>	0	4
<u>Sodium Absorption Ratio:</u>	N/A	N/A
<u>Calcium Carbonate Equivalent (percent):</u>	N/A	N/A
<u>Soil Reaction (1:1 Water):</u>	6.6	8.4
<u>Soil Reaction (0.01M CaCl₂):</u>	N/A	N/A
<u>Available Water Capacity (inches):</u>	1.0	3.0

Plant Communities

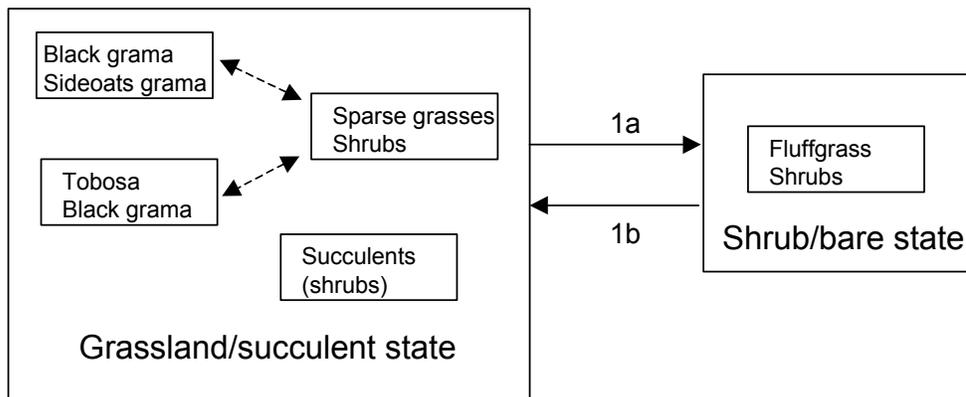
Ecological Dynamics of the Site

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-Transition model: MLRA 42, SD-2, low soil-depth group: Hills



- 1a. Erosion and loss of soil fertility
- 1b. Soil accumulation or addition

Grassland/succulent state



- Black grama, yucca, feather dalea
- Left is drier, S. facing slope
- Right is looking down a N. facing slope.
- Rock outcrop-Torriorthents association, Robledos Mtns, Dona Ana Co. NM

Grassland/succulent state



- Left- Black grama, various shrubs
- Stonier surface, ungrazed 40 years
- Rock land, warm, White Sands Missile Range, NM
- Right-Black grama, creosotebush
- Steep (ca. 30% slope)—note shrubs on south face of ridge
- Rock outcrop-Torriorthents ass., extremely steep, Caballo Mtns, Sierra Co., NM

Grassland/succulent state



- Black and sideoats grama, whitethorn, creosotebush
- S. facing slope, moderate grazing use
- Bare ground high, many live plants
- Rock outcrop-Torriorthents ass., extremely steep, Sierra Co. NM

Grassland/succulent state



- Left--tobosa, some whitethorn, creosotebush, above roadcut and inaccessible to livestock
- Right—whitethorn, creosotebush dominates, below roadcut nearer to water source
- Stony loam soil in Courthouse-Rock outcrop ass. Sierra Co. NM

Plant Community Name: Historic Climax Plant Community

Plant Community Sequence Number: 1 Narrative Label: HCPC

Plant Community Narrative:

State Containing Historic Climax Plant Community

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 (*Dasyliirion* 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.

Grassland/succulent:

Ground Cover (Average Percent of Surface Area).

Grasses & Forbs	18
Bare ground	22
Surface gravel	15
Surface cobble and stone	35
Litter (percent)	10
Litter (average depth in cm.)	3

Plant Community Annual Production (by plant type):

Plant Type	Annual Production (lbs/ac)		
	Low	RV	High
Grass/Grasslike	227	376	525
Forb	23	38	53
Tree/Shrub/Vine	75	124	172
Lichen			
Moss			
Microbiotic Crusts			
Totals	325	538	750

Grassland Succulent State species Composition: Plant species are grouped by annual production **not** by functional groups.

Group	Grass/Grasslike Common Name	Scientific Name	Annual Production in Pounds Per Acre	
			Low	High
1	black grama	<i>Bouteloua eriopoda</i>	135	161
2	bush muhly	<i>Muhlenbergia porteri</i>	54	81
3	blue grama	<i>Bouteloua gracilis</i>	54	81
	sideoats grama	<i>Bouteloua curtipendula</i>		
4	threeawn	<i>Aristida</i>	5	16
5	tobosagrass	<i>Pleuraphis mutica</i>	5	27
6	New Mexico feathergrass	<i>Hesperostipa neomexicana</i>	5	16
7	cane bluestem	<i>Bothriochloa barbinodis</i>	27	54
	Arizona cottontop	<i>Digitaria californica</i>		
	plains lovegrass	<i>Eragrostis intermedia</i>		
	tanglehead	<i>Heteropogon contortus</i>		
	green sprangletop	<i>Leptochloa dubia</i>		
8	Hall's panicgrass	<i>Panicum hallii</i>	5	16
	tridens	<i>Tridens</i>		
9	Graminoid (grass or grasslike)		5	27
Group	Shrub/Vine Common Name	Scientific Name	Annual Production in Pounds Per Acre	
			Low	High
10	agave	<i>Agave</i>	43	65
	common sotol	<i>Dasyilirion wheeleri</i>		
	ocotillo	<i>Fouquieria splendens</i>		
	yucca	<i>Yucca</i>		
11	sacahuista	<i>Nolina microcarpa</i>	5	16
12	fourwing saltbush	<i>Atriplex canescens</i>	5	16
13	oak	<i>Quercus</i>	5	27
	littleleaf sumac	<i>Rhus microphylla</i>		
14	juniper	<i>Juniperus</i>	0	16
15	feather dalea	<i>Dalea formosa</i>	5	16
16	broom snakeweed	<i>Gutierrezia sarothrae</i>	5	16

<u>Group</u>	<u>Common Name</u>	<u>Scientific Name</u>	Annual Production in Pounds Per Acre	
			<u>Low</u>	<u>High</u>
17	Forb			
	buckwheat	<i>Eriogonum</i>	5	27
	woolly plantain	<i>Plantago patagonica</i>		
	globemallow	<i>Sphaeralcea</i>		
18	Forb (herbaceous, not grass nor grasslike)		16	43

Plant Growth Curve:

Growth Curve Number:

NM2514

Growth Curve Name:

Grassland Succulent State

Growth Curve Description:

SD-2 Warm Season Plant Community.

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	10	10	25	30	15	5	0	0

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.

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.

Ecological Site Interpretations

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.

Hydrology 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

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.

Supporting Information

Associated Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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Similiar Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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State Correlation:

This site has been correlated with the following states: Texas

Inventory Data References:

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
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Type Locality:

Relationship to Other Established Classifications:

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	
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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	

Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Dr. Brandon Bestelmeyer	02/27/03	George Chavez	03/04/03
George Chavez	02/27/03		