UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Gravelly Sand

Site ID: R042XB024NM

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

Physiographic Features

This site usually occurs as arroyo terraces, alluvial fans or dissected piedmont slopes. Slopes range to 30 percent, but average less than 15 percent. Direction of slope is not usually a factor, except on ridge slopes where aspect is variable. Elevations range from 3,700 feet to 5,000 feet.

Land Form:
(1) Alluvial fan
(2) Pediment
(3) Terrace

	Minimum	Maximum
Elevation (feet):	3700	5000
Slope (percent):	0	30
Water Table Depth (inches):	N/A	N/A
Flooding:		
Frequency:	Occasional	Frequent
Duration:	Extremely brief	Very brief
Ponding:		
Depth (inches):	N/A	N/A
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Very High
Aspect:		

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.

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	58.5

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.

Wetland Description: System Subsystem Class
(Cowardin System)

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Representative Soil Features

Soils are moderately deep to deep and excessively drained. Typically, the surface and underlying layers are gravelly or very gravelly sandy loams, loamy sands, or sands. They are non-calcareous to moderately calcareous throughout. Permeability is rapid or very rapid. Runoff is slow.

Predominant Parent Materials:
Kind: Alluvium
Origin: Mixed-igneous-metamorphic & sedimentary

Surface Texture:
(1) Gravelly Sandy loam
(2) Very gravelly Loamy sand
(3) Sand

Subsurface Texture Group:	Sandy	
Surface Fragments	<=3" (% Volume):	35
Surface Fragments	> 3" (% Volume):	5
Subsurface Fragments	<=3" (% Volume):	40
Subsurface Fragments	> 3" (% Volume):	0
Drainage Class:	Well drained To Excessively drained	
Permeability Class:	Moderately slow To Moderate	

	Minimum	Maximum
Depth (inches):	24	72
Electrical Conductivity (mmhos/cm):	0	4
Sodium Absorption Ratio:	N/A	N/A
Calcium Carbonate Equivalent (percent):	N/A	N/A
Soil Reaction (1:1 Water):	7.4	8.4
Soil Reaction (0.01M CaCl2):	N/A	N/A
Available Water Capacity (inches):	.04	.05

Plant Communities

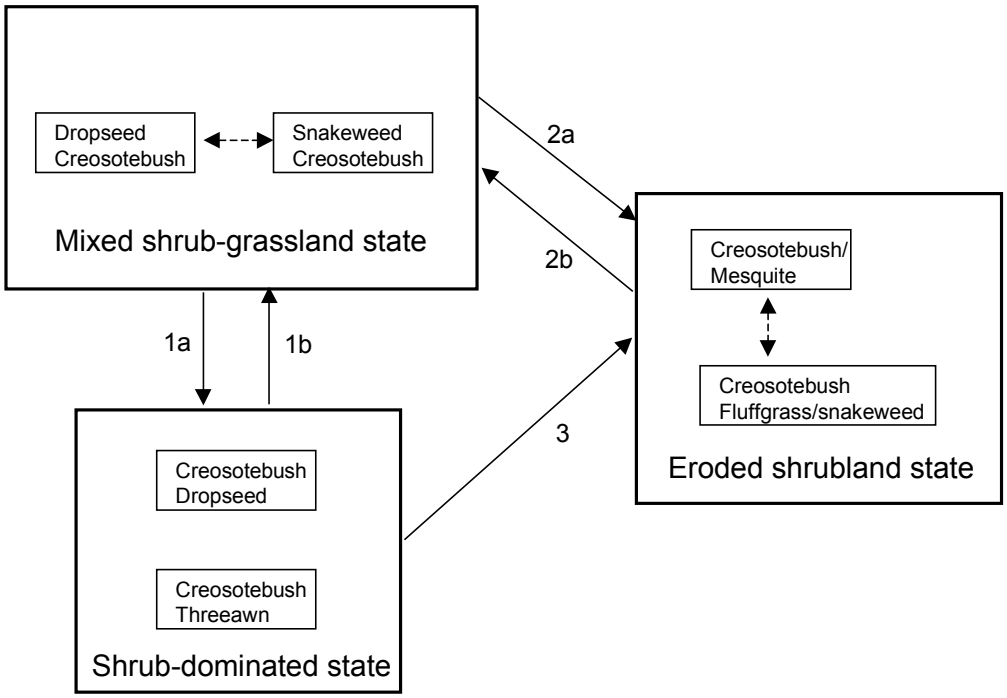
Ecological Dynamics of the Site

Overview

This ecological site is associated with the gravelly ecological site and may grade into sandy or deep sand ecological sites. This site often occupies arroyos and is flanked by gravelly sites (e.g. Caliza gravelly sandy loam). In some cases, Bluepoint loamy sand soils (classified as deep sand sites) on dissected piedmont slopes may contain sufficient gravel so as to behave similarly to gravelly sands (e.g. in the Bluepoint-Caliza-Yturbide complex). The historic plant community type is generally assumed to exhibit dominance by dropseed grasses (mesa dropseed, *Sporobolus flexuosus* and sand dropseed, *Sporobolus cryptandrus*), and, secondarily black grama (*Bouteloua eriopoda*) and bush muhly (*Muhlenbergia porteri*). Creosotebush (*Larrea tridentata*) is a secondary dominant and annuals may be important components. Loss of these grasses due to overgrazing and/or drought, or due to climate change, may lead to a transition to dominance by creosotebush and mesquite (*Prosopis glandulosa*). Persistent lack of grass permits wind erosion, leading to loss of soil fertility and eventual loss of the A horizon and exposure of the calcic horizon on some soils (transition to eroded shrubland state).

No studies have been conducted on the ecology of the gravelly sand ecological site. Generally, this site is less susceptible to effects of erosion than the gravelly ecological site due to the absence of a shallow petrocalcic horizon. The coarse texture of the soils and lack of a restrictive layer, on the other hand, increase percolation from shallow soil layers and overall productivity is slightly lower.

State-Transition model: MLRA 42, SD-2, Gravelly subgroup: Gravelly sand



1a. Reduction of grass cover, grazing, drought, climate change favoring shrubs
1b. Shrub removal
2a, 3. Persistent absence of grass, erosion, loss of soil fertility, loss of A horizon, exposure of calcic horizon
2b. Removal of exposed calcium carbonate, soil addition, or adding organic matter

MLRA 42; SD-2; Gravelly sand

Mixed shrub grassland state

•Dropseeds, bush muhly, threeawns are co-dominant. Snakeweed is abundant. Degraded but reversible community.
•Cover of grasses moderate
•Gullies present, signs of erosion (litter dams, rills, pedestalling)
•Caliza gravelly sand, College Ranch Dona Ana Co.

Eroded shrubland, creosotebush/mesquite

•Creosotebush, some fluffgrass
•Cover of grasses very low
•Gullies present, many signs of erosion and soil loss. Coppicing evident
•Caliza gravelly sand, College Ranch Dona Ana Co.

State Containing the Historic Climax Plant Community

Mixed-shrub grassland: The historic plant community is believed to be dominated by dropseeds and secondarily, bush muhly and black grama. Creosotebush and mesquite are subdominant to the grasses and their combined dry mass is less than a third of that of the grasses. Grazing-induced retrogression from this community is characterized by a reduction in the cover of black grama, bush muhly and then dropseeds, and an increase in the proportional representation creosotebush, fluffgrass (*Dasyochloa pulchella*) and snakeweed (*Gutierrezia sarothrae*; Snakeweed/dropseed community and several variants). While black grama may be extirpated from this site, dropseeds are wind-dispersed and may recolonize and regain dominance if soil degradation has not occurred.

Diagnosis: Creosotebush density is low and perennial grasses are dominant. Evidence of erosion is infrequent.

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	11
Bare ground	45
Surface gravel	35
Surface cobble and stone	5
Litter (percent)	4
Litter (average depth in cm.)	1

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	79	173	268
Forb	21	47	72
Tree/Shrub/Vine	25	55	85
Lichen			
Moss			
Microbiotic Crusts			
Totals	125	275	425

Historic Climax Plant Community Plant Species Composition: Plant species are grouped by annual production **not** by functional groups.

Grass/Grasslike

Group	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
1	sand dropseed mesa dropseed	*Sporobolus cryptandrus* *Sporobolus flexuosus*	55	69
2	black grama	*Bouteloua eriopoda*	28	41
3	bush muhly	*Muhlenbergia porteri*	28	41
4	fluffgrass	*Dasyochloa pulchella*	14	28
5	threeawn	*Aristida*	3	14
6	plains bristlegrass	*Setaria vulpiseta*	0	8
7	sixweeks grama	*Bouteloua barbata*	3	14
8	Grass, perennial, annuals		3	8

Shrub/Vine

Group	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
9	creosote bush	*Larrea tridentata*	28	41
10	longleaf ephedra	*Ephedra trifurca*	3	8
11	yucca	*Yucca*	3	14
12	fourwing saltbush	*Atriplex canescens*	3	14
13	mariola	*Parthenium incanum*	3	8
14	broom snakeweed	*Gutierrezia sarothrae*	3	8
15	Apache plume	*Fallugia paradoxa*	3	14
16	range ratany	*Krameria erecta*	3	8
17	broom dalea	*Psorothamnus scoparius*	3	14

Forb

Group	Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
18	desert holly croton tansymustard scorpion weed woolly paperflower Russian thistle	*Acourtia nana* *Croton* *Descurainia sophia* *Phacelia integrifolia var. texana* *Psilostrophe tagetina* *Salsola kali*	14	28
19	Forb, annual Forb, perennial		14	28

Plant Growth Curve:
Growth Curve Number: NM2513
Growth Curve Name: HCPC
Growth Curve Description: SD-2 Warm Season Plant Community

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

0 0 0 5 10 10 25 30 15 5 0 0

Transition to shrub-dominated state (1a): The cause of this transition is presumably due to poor grazing management or other soil disturbance, possibly in combination with drought. Climate change may also play a role.

Key indicators of approach to transition: Increases in bare ground, decreases in black grama and dropseed cover, possibly increased germination of creosotebush.

Transition to eroded shrubland state (2a): With persistent lack of grass and litter cover and high rates of erosion, soil surface conditions may be altered such that grass establishment is rare across the site. Herbel and Gibbens (1987) note that on Canutio soils, the erosional loss of the top 10 cm of soil, including the A horizon, was associated with a shift from black grama to creosotebush dominance. In the case of Caliza soils, this may also be due to the exposure of calcic horizons (and thus high levels of calcium carbonate) at the surface which inhibits grass germination and survival.

Key indicators of approach to transition: Increases in bare ground, loss of dropseed cover, increased evidence of erosion (rills, gullies, deepening of gullies) including loss of A horizon. Pedestalling should also be apparent.

Additional States:

Shrub-dominated state: This state is characterized by the persistent dominance of creosotebush and mesquite (*Prosopis glandulosa*) and a patchy cover of dropseeds or threeawn as the grass dominants. Black grama is usually eliminated and bush muhly may occur at the bases of shrubs. Fluffgrass and snakeweed are important components.

Diagnosis: Creosotebush/mesquite density is moderate and grass occurrence is patchy Evidence of erosion, including gullies and rills, may be apparent in bare areas.

Transition to eroded shrubland state (3): See 2a above, remaining grass patches are lost due to drought and/or disturbance to grasses by overgrazing or ORV use. Erosion rates increase.

Transition to mixed-shrub grassland state (1b): If competition with shrubs for water and/or nutrients reduces grass dominance in many patches, then shrub control may facilitate grass establishment and vegetative growth. If climatic conditions are not suitable for grass growth then such treatments will be ineffective.

Eroded shrubland state: Dropseeds and bush muhly are virtually absent and bare ground cover is high. Snakeweed or fluffgrass may be secondary dominants depending upon rainfall or variation in other, unknown factors. In some cases, nearly pure shrublands of creosotebush and mesquite exist with little ground cover (Creosotebush/mesquite community).

Diagnosis: Creosotebush density is moderate to high and perennial grass cover is absent or restricted to a few individual bunchgrasses, often associated with shrub bases. Fluffgrass may occur in shrub interspaces. Evidence of erosion, especially pedestalling of shrubs, is apparent throughout the site.

Transition to mixed-shrub grassland state (2a): See 2a above, remaining grass patches are lost due to drought and/or disturbance to grasses by overgrazing or ORV use. Erosion rates increase.

Data and information sources and theoretical background: Communities and states are derived largely from Jim Powell, NRCS, retired and observations by Brandon Bestelmeyer, USDA-ARS Jornada Experimental Range.

Mechanisms driving transitions are assumed to be similar to those described for the Gravelly ecological site. Specifically soil truncation due to water erosion and creosotebush allelopathic effects on plants and soil microbes are believed to cause transitions (also see Herbel and Gibbens 1987). Erosion to a petrocalcic horizon is not a factor on these soils, but the exposure of calcic horizons at the surface may result in interference of nutrient uptake in the grasses. The loss of organic matter needed to retain water at the rooting depth of grasses may also be a key mechanism.

Ecological Site Interpretations

Animal Community:

This site provides habitats which support a resident animal community that is characterized by badger, kit fox, black-tailed jackrabbit, spotted ground squirrel, Merriam's kangaroo rat, desert pocket mouse, southern plains woodrat, black-throated sparrow, mourning dove, roadrunner, greater earless lizard, roundtail horned lizard and striped whipsnake.

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
Canutio	B
Caliza	B

Recreational Uses:

Suitability for camping and picnicking is poor, and hunting is fair for pronghorn antelope, quail, dove, and small game. Photography and bird watching for numerous birds, raptors and others can be fair to good, especially during migration seasons. Most small animals of the site are nocturnal and secretive, seen only at night, early morning or evening. Scenic beauty is greatest during spring and sometimes summer months when flowering of forbs and shrubs occurs.

Wood Products:

This site has no significant value for wood products.

Other Products:

This site is generally suitable for grazing without regard to class of animal or season of use. It is adapted to grazing by cattle, sheep, goats, and horses, but is characteristically droughty, and a highly flexible stocking rate is necessary on rangelands where this site makes up a significant percentage of the total range unit. Upon deterioration, the site is characterized by very sparse vegetation which is primarily creosote bush, broom snakeweed, and fluffgrass. Recovery is slow if affected through grazing management alone.

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	7.9 – 8.8
75 – 51	8.6 – 10.2
50 – 26	9.7 – 17.0
25 – 0	17.0 -+

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
black grama	Bouteloua eriopoda	EP	P	P	P	D	D	D	D	D	D	D	P	P
bush muhly	Muhlenbergia porteri	EP	P	P	P	P	P	P	P	P	P	P	P	P
plains bristlegrass	Setaria vulpiseta	EP	D	D	D	D	D	P	P	P	P	D	D	D
mesa dropseed	*Sporobolus flexuosus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
sand dropseed	*Sporobolus cryptandrus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
fourwing saltbush	Atriplex canescens	EP	P	P	P	P	P	D	D	D	D	D	P	P
soaptree yucca	*Yucca elata*	F	N/S	N/S	N/S	N/S	P	P	N/S	N/S	N/S	N/S	N/S	N/S

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative
Sandy	R042XB012Nm	
Deep Sand	R042XB011NM	

Similiar Sites:

Site Name	Site ID	Site Narrative
Sandy	R042XB012Nm	
Deep Sand	R042XB011NM	
Gravelly	R042XB010NM	

State Correlation:
This site has been correlated with the following states: Texas

Inventory Data References:

Data Source	Number of Records	Sample Period	State	County

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:	
Canutio gravelly sandy loam, very gravelly sandy loam	Kokan very gravelly loam sand
Caliza gravelly sandy loam, very gravelly sandy loam	
Other Soils included are:	

Site Description Approval:

Author	Date	Approval	Date
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

Author	Date	Approval	Date
Dr. Brandon Bestelmeyer	05/22/02	George Chavez	05/23/02
George Chavez	05/22/02		