

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site ID: R042XC020NM

Site Name: Limestone Hills

Precipitation or Climate Zone: 10 to 13 inches

Phase: _____

PHYSIOGRAPHIC FEATURES

Narrative:

This site occurs as hills, low mountains or the lower footslopes of higher mountains. Slopes are from rolling to very steep and vary from 15 to 50 percent, averaging about 25 percent. Direction of slope varies and is important. The north and east slopes are cooler and moister than the south and west facing slopes. This has an effect on the kind and amount of vegetation present. Elevations range from 3,500 to 4,500 feet.

Land Form:

1. Hills

2. Hillside

3.

Aspect:

1. North

2. South

3. East

4. West

Elevation (feet)	Minimum 3,500	Maximum 4,500
Slope (percent)	15	50
Water Table Depth (inches)	N/A	N/A
Flooding:	Minimum	Maximum
Frequency	N/A	N/A
Duration		
Ponding:	Minimum	Maximum
Depth (inches)	N/A	N/A
Frequency		
Duration		

Runoff Class:

CLIMATIC FEATURES

Narrative:

The climate of the area is “semi-arid continental”.

The average annual precipitation ranges from 8 to 13 inches. Variations of 5 inches, more or less, are common. Over 80 percent of the precipitation falls from April through October. Most of the summer precipitation comes in the form of high intensity – short duration thunderstorms.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is 61 degrees with extremes of 25 degrees below zero in the winter to 112 degrees in the summer.

The average frost-free season is 207 to 220 days. The last killing frost is in late March or early April, and the first killing frost is in late October or early November.

Temperature and rainfall both favor warm season perennial plant growth. In years of abundant spring moisture, annual forbs and cool season grasses can make up an important component of this site. Effective precipitation on the soil is significantly enhanced by the runoff from the adjacent rock outcrop. This factor serves to nearly double the effective precipitation, when plant cover and litter are present to aid in absorption of moisture. Due to the shallow nature of the soil areas between the rocks, excellent plant growth can be made from even light rain showers. Heavy rains result in excessive runoff. Natural geological erosion and sedimentation rates from this site are high.

	Minimum	Maximum
Frost-free period (days):	180	221
Freeze-free period (days):	199	240
Mean annual precipitation (inches):	10.0	13.0

Monthly moisture (inches) and temperature (°F) distribution:

	Precip. Min.	Precip. Max.	Temp. Min.	Temp. Max.
January	0.40	0.42	20.6	59.7
February	0.40	0.41	25.2	65.6
March	0.41	0.43	31.4	72.7
April	0.58	0.63	40.4	81.5
May	1.28	1.35	49.6	88.7
June	1.40	1.46	59.1	95.4
July	1.62	1.64	63.3	96.4
August	1.79	1.84	61.6	94.8
September	1.81	2.20	54.1	88.5
October	1.16	1.41	40.7	80.4
November	0.43	0.47	28.4	68.7
December	0.48	0.51	20.9	61.1

Climate Stations:

- (1) NM0600, Artesia, NM - Period of record 1961 - 1990
- (2) NM0992, Bitter Lakes WL Refuge, NM - Period of record 1961 - 1990
- (3) NM1469, Carlsbad, NM - Period of record 1961 - 1990
- (4) NM293792, Hagerman, NM - Period of record 1961 - 1990
- (5) NM299563, Waste Isolation Plant, NM - Period of record 1961 - 1990
- (2) NM4346, Jal, NM - Period of record 1961 - 1990

INFLUENCING WATER FEATURES

Narrative:

This site is not influenced by wetlands or streams.

Wetland description:

System	Subsystem	Class
N/A		

If Riverine Wetland System enter Rosgen Stream Type:

N/A

REPRESENTATIVE SOIL FEATURES

Narrative:

The soils of this site are very shallow and shallow and well drained. The surface textures are stony or gravelly loam. These are underlain by limestone bedrock and in complex with limestone rock outcrop. Permeability is moderate and water holding capacity is low.

Parent Material Kind: Marine Deposits

Parent Material Origin: Limestone-Unspecified

Surface Texture:

1. Loam
2.
3.

Surface Texture Modifier:

1. Extremely Cobbly
2.
3.

Subsurface Texture Group:

Loam

Surface Fragments $\leq 3''$ (% Volume): 15 - 60

Surface Fragments $> 3''$ (% Volume): 25 - 30

Subsurface Fragments $\leq 3''$ (%Volume): 15 - 60

Subsurface Fragments $\geq 3''$ (%Volume): 0 - 40

	Minimum	Maximum
Drainage Class:	<u>Moderately Well</u>	<u>Well</u>
Permeability Class:	<u>Moderately Slow</u>	<u>Moderate</u>
Depth (inches):	<u>3</u>	<u>25</u>
Electrical Conductivity (mmhos/cm):	<u>N/A</u>	<u>N/A</u>
Sodium Absorption Ratio:	<u>N/A</u>	<u>N/A</u>
Soil Reaction (1:1 Water):	<u>N/A</u>	<u>N/A</u>
Soil Reaction (0.1M CaCl ₂):	<u>N/A</u>	<u>N/A</u>
Available Water Capacity (inches):	<u>N/A</u>	<u>N/A</u>
Calcium Carbonate Equivalent (percent):	<u>N/A</u>	<u>N/A</u>

PLANT COMMUNITIES

Ecological Dynamics of the Stie:

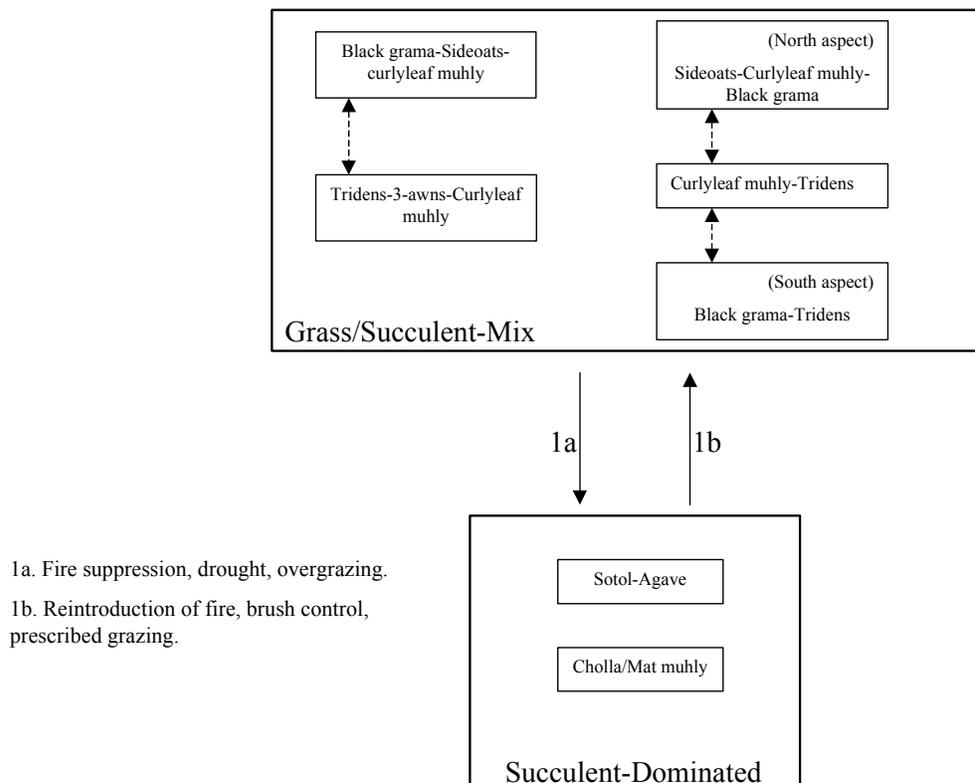
Overview

The Limestone Hills site is associated with both Draw and Gravelly sites. Draw sites often dissect the lower footslopes of Limestone Hills. The Gravelly site occurs as upland plains adjacent to, but topographically lower than the Limestone Hills site. The historic plant community of Limestone Hills has the aspect of a Grass/Succulent mix. Grasses are the dominant component followed by succulents and shrubs. Forbs are the minor component, but can increase significantly during years of abundant rainfall. Slope, aspect, soil properties, and landscape position all contribute to the diversity of plant communities. Black grama, sideoats grama, and curlyleaf muhly are the dominant grasses. Lechuguilla, agave, sotol, yucca species, and sacahuista are succulents common to this site. Retrogression within this state is characterized by a decrease in the more palatable grasses, and an increase in tridens species, threeawns, and curlyleaf muhly. The stony surface on this site serves as a rocky armor that helps to protect this site from erosion and grass loss by decreasing runoff velocities and protecting grass crowns from overgrazing. Fire suppression, drought, and/or over grazing can initiate a transition to a succulent dominated community.

Plant Communities and Transitional Pathways (Diagram)

Plant Communities Photo Display & Descriptive Diagnosis

MLRA-42, SD-3, Limestone Hills



MLRA 42; SD-3; Limestone Hills

Grass / Succulent mix



- At left Limestone Hills landscape
- At right black grama-sideoats grama, with few scattered yucca, lechuguilla, and catclaw acacia
- Ector soil series, Eddy Co., NM

Grass/Succulent mix



- At left black grama-tridens, with algerita, lechuguilla, sotol, catclaw mimosa
- At right patch of agave lechuguilla with scattered black grama and tridens
- Ector soil series, Eddy 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

Grass/Succulent Mix:

The aspect of this site is a grass/succulent mix with a high degree of diversity in plant communities. This diversity is a reflection of aspect, slope, elevation, and soil depth. Grasses are the dominant component followed by succulents and shrubs. Black grama, sideoats grama, and curlyleaf muhly are the dominant grasses. Black grama tends to dominate on south, west and neutral aspects, and lower elevations, while sideoats grama prefers the cooler moister north and east aspects and higher elevations. Curlyleaf muhly seems to be adapted across a wide range of temperature and moisture regimes and can come to dominate due to selective grazing pressure on most aspects. Lechuguilla, Parry agave, sotol, yucca species, and sacahuista are the dominant succulents. Most succulents seem to be better adapted to the warmer south and west facing slopes and lower elevations. Sacahuista however is more tolerant of cooler temperatures and higher elevations.¹ Catclaw mimosa, littleleaf sumac and creosotebush are shrubs common to this site. In general shrubs are more prevalent along drainages and on benches formed by outcrops of limestone bedrock. They are less dense and more evenly distributed across steeper slopes between drainageways. Creosotebush is usually confined to the lower footslopes of hills. Littleleaf sumac densities are higher along drainages. Catclaw mimosa prefers south and west aspects with somewhat deeper skeletal soils across side slopes of hills. As retrogression within this state occurs plants such as black grama, sideoats grama, plains bristlegrass, and green sprangletop decrease and grasses that are most readily grazed while actively growing, such as curlyleaf muhly, and less palatable grasses such as tridens and threeawns will increase. Fire suppression drought, and/or overgrazing may facilitate areas within this site becoming dominated by succulents

Diagnosis: Black grama, sideoats grama, and curlyleaf muhly are the dominant grass species. Grass cover is uniformly distributed, however, large bare areas exist as rock outcrop, or over extremely shallow soils. Succulents and shrubs are common and generally more prevalent on south and west aspects, at lower elevations, and along drainageways. There is limited evidence of active rills and gully formation if plant cover remains intact. Litter movement associated with overland flow is limited to smaller size class litter and short distances. Litter size class and distance moved increases as slopes exceed 25 percent.

Ground Cover (Average Percent of Surface Area).

Grasses & Forbs	15 – 20
Bare ground	18 – 24
Surface gravel	
Surface cobble and stone	25 – 50
Litter (percent)	10 – 12

Litter (average depth in cm.)	1
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Canopy Cover (Trees, shrubs and half-shrubs)	
Trees	0 - 3
Shrubs and half-shrubs	5 - 10

Plant Community Annual Production (by plant type):

Plant Type	Annual Production (lbs/ac)		
	Low	RV	High
Grass/Grasslike	330	550	770
Forb	60	100	140
Tree/Shrub/Vine	210	350	490
Lichen			
Moss			
Microbiotic Crusts			
Totals	600	1000	1400

Plant Community Composition and Group Annual Production: Plant species are grouped by annual production **not** by functional groups.

Plant Type - Grass/Grasslike

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
1	BOER4	black grama	250	400
1	MUSE	curlyleaf muhly		
2	BOCU	sideoats grama	150	300
2	ERIN	plains lovegrass		
3	BOGR2	blue grama	50	100
3	BOHI2	hairy grama		
4	LEDU	green sprangle top	50	100
4	SEVU2	plains bristlegrass		
5	TRIDE	tridens spp.	50	100
6	ARIST	threeawns spp.	50	70
7	LYPH	wolftail	30	50
8	2GP	other grasses	30	50

Plant Type - Tree/Shrub/Vine

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
9	AGLE	lechuguilla	50	100
9	AGPA4	parry agave		
9	YUCCA	yucca spp.		
10	MIACB	catclaw mimosa	30	50
11	DAWH2	sotol	50	100
11	NOMI	sacahuista		
12	BRICK	brickellbush	20	50
13	RHMI3	littleleaf sumac	20	50
14	GUSA2	broom snakeweed	20	50
15	BAPT	yerba-de-pasmo	20	50
16	2SHRUB	other shrubs	20	50

Plant Type – Forb

17	ERIOG	wild buckwheat	20	50
18	SPHAE	globemallow	30	50
18	PACAL5	wooly groundsel		
19	DYPA	fetid marigold	30	50
19	MAPIG2	cutleaf haplopappus		
20	2FORB	other forbs	20	50

Plant Type - Lichen

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Moss

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Microbiotic Crusts

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Other grasses which could appear on this site include: sand dropseed, fluffgrass, bush muhly, ear muhly, mat muhly, ring muhly, metcalf muhly, Hall’s panicum, burrograss and alkali sacaton.

Other woody plants include: spiny allthorn, ocotillo, mariola, Apacheplume, Texas silverleaf, cacti spp., feather delea, creosote bush and juniper.

Other forbs include: prickleaf dogwood, blanket flower, desert zinnia, desert bailey, fleabane, loco, senna and desert holly.

Plant Growth Curves

Growth Curve ID NM2820

Growth Curve Name: Historic Climax Plant Community

Growth Curve Description: SD-3 Mixed grass-shrub plant community

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	4	5	8	10	25	30	15	5	0	0

Additional States:

Succulent-Dominated: This state is characterized by the predominance of succulents, with perennial grasses as the subordinate component. Sotol, Parry agave, lechuguilla, sacahuista, or cholla may become the dominant succulent. Sotol and agave are often co-dominant in local areas, usually on south and west aspects along side slopes of hills. In the absence of fire, lechuguilla may form extensive clonal colonies often with sotol as a sub-dominant.¹ Black grama and tridens species are typically the main grass species on these sites. Sacahuista is better adapted to the cooler north and east aspects and higher elevations and may dominate with sideoats and curlyleaf muhly as subordinate species. Cholla may be the dominant on the slightly deeper soils of ridge tops and benches historically overgrazed by sheep, with mat muhly and common horehound as subordinate components. Certain areas seem to be naturally dominated by succulents. Highly calcareous limestone derived, shallow rocky soils on south and west aspect slopes provide the ideal habitat for agaves and sotol with their shallow, dense, spreading root systems and tend to naturally have greater densities of succulents.

Diagnosis: Succulents are found at increased densities. Grass cover is variable ranging from relatively uniform to patchy with frequent areas of bare ground present. On areas that are overgrazed or during periods of extended drought there is a decrease in percent composition of sideoats and black grama, and increased representation of tridens species, threeawns, and fluffgrass.

Transition to Succulent Dominated (1a): Transitions from Grass/Succulent mix to a Succulent Dominated state may occur as a result of fire suppression, drought, and overgrazing. Most of the succulents are susceptible to mortality following fire. Historically fire may have played a role in limiting the density of succulents by reducing the number of young plants, and in cases of more severe fire, killing mature plants.¹ Fire may also cause mortality by weakening the plants and making them more susceptible to damage by insects and rodents. Overgrazing by livestock may help disseminate seed and increase establishment of succulents. Loss of grass cover due to overgrazing or drought reduces fine fuel loads necessary to carry fire.

Key indicators of approach to transition:

- Decrease or change in composition or distribution of grass cover.
- Increase in the amount of succulent seedlings.
- Increased cover of succulents.

Transition back to Grass/Succulent Mix (1b) Fire is an effective means of controlling succulents provided adequate grass cover remains to carry fire.¹ Chemical control is also successful in controlling cholla; apply when growth starts in May. Prescribed grazing will help ensure proper forage utilization and sustain grass cover.

ECOLOGICAL SITE INTERPRETATIONS

Animal Community:

This site provides habitats which support a resident animal community that is characterized by mule deer, desert cottontail, cave myotis, rock squirrel, Botta's pocket gopher, cactus mouse, white-throated woodrat, ringtail, bobcat, verdin, rock wren, black-throated sparrow, brown towhee, scaled quail, Say's phoebe, collared lizard, tree lizard, Texas banded gecko, leopard lizard, Couch's spadefoot toad, red-spotted toad, rock rattlesnake, mountain patchnose snake and Sonora mountain kingsnake.

The cave swallow nests in the vicinity of Carlsbad Caverns. The white-throated swift, prairie falcon and golden eagle nest on vertical cliffs and crevices associated with this site. These raptors also hunt over this site. White-winged dove nest on the eastern side of the Guadalupe Mountains. Lark sparrows have also been known to nest on this site.

Hydrology Functions:

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

Hydrologic Interpretations

Soil Series	Hydrologic Group
Ector	C
Lozier	D

Recreational Uses:

This site offers recreaton potential for hiking, horseback riding, nature observation and photography, rock hounding. This site also offers hunting opportunities for quail, antelope, deer and predator.

This site has striking natural beauty, especially during June through August when many of the native shrubs are blooming in a riot of color. The elevations and relief of this site offer vistas from which to review the surrounding terrain.

Wood Products:

This site provides no commercial wood products. However, the wood portions of many of the picturesque desert shrubs, such as parry agave and walkingstick cholla, provide attractive materials for arts and crafts and home decorations in the southwestern traditions.

Other Products:

This site is suitable for grazing by all kinds and classes of livestock during all times of the year. It is most efficiently utilized by combinations of sheep, goats, and cattle. As retrogression occurs, plants such as black and sideoats grama, plains lovegrass, plains bristlegrass and green sprangletop will decrease and the unpalatable grasses and woody plants will increase. As this occurs, there will be a corresponding increase in bare ground.

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	3.5 – 4.3
75 – 51	4.0 – 6.4
50 – 26	6.2 – 11.0
25 – 0	11.0 - +

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	<i>Bouteloua eriopoda</i>	EP	P	P	P	D	D	D	D	D	D	D	D	P	P
sideoats grama	<i>Bouteloua curtipendula</i>	EP	P	P	P	P	P	P	P	P	P	P	P	P	P
blue grama	<i>Bouteloua gracilis</i>	EP	D	D	D	D	P	P	P	P	P	D	D	D	
curlyleaf muhly	<i>Mulenbergia setifolia</i>	EP	D	D	D	D	D	D	P	P	P	D	D	D	
hairy grama	<i>Bouteloua hirsuta</i>	EP	D	D	D	D	D	D	P	P	P	D	D	D	
wolftail	<i>Lycurus phleoides</i>	EP	D	D	D	P	P	P	D	D	D	D	D	D	
littleleaf sumac	<i>Rhus microphylla</i>	L/S	D	D	D	D	D	D	D	D	D	D	D	D	
wild buckwheat	<i>Eriogonum</i> species	EP	N/S	N/S	N/S	p	P	P	D	D	D	N/S	N/S	N/S	
globemallow	<i>Sphaeralcea</i> species	EP	N/S	N/S	N/S	N/S	P	P	P	P	D	N/S	N/S	N/S	

Supporting Information

Associated Sites:

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

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>

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 Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: South Chavez, Eddy, Lea and Otero County

Characteristic Soils Are:

Lozier stony loam	
Lozier gravelly loam	
Ector stony loam	
Other Soils included are:	

1. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, September). Fire Effects Information System, [Online]. Available: <http://www.fs.fed.us/database/feis/> [accessed 12/05/02].

Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Don Sylvester	06/05/80	Don Sylvester	06/05/80

Site Description Revision:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
David Trujillo	03/26/03	George Chavez	03/26/03