UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Malpais

Site ID: R042XB037NM

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

Physiographic Features

Topography of this site varies considerably from nearly level to moderately steep with small areas or hills exceeding 25 percent slopes. The terrain is frequently interrupted by basalt outcrops, rocks, and occasional boulders. The site may occur on nearly level mesa tops, valley lava flows, or on hills which are usually old volcanic cones. Elevations range approximately from 3,800 to 5,500 feet.

Land Form: (1) Lava flow
(2) Lava plain

	Minimum	Maximum
Elevation (feet):	3800	5500
Slope (percent):	0	25
Water Table Depth (inches):	N/A	N/A
Flooding:		
Frequency:	Very rare	Rare
Duration:	Extremely brief	Very brief
Ponding:		
Depth (inches):	N/A	N/A
Frequency:	N/A	N/A
Duration:	None	None
Runoff Class:	High	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	0.63	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)			

Representative Soil Features

Surface textures may vary from rocky or stony loams and stony clay loams to gravelly sandy loams and gravelly clay loams. Depth are variable but are usually shallow. Soils are usually well drained and have from medium to low water-holding capacity. In many instances, soils are in a position to receive additional runoff from associated rock outcrops, stones, or boulders.

Predominant Parent Materials:
Kind: Volcanic ash
Origin: Basalt

Surface Texture:	(1)	Gravelly Loamy sand
	(2)	Cobbly Loam
	(3)	Stony Clay loam
Subsurface Texture Group:		Loamy
Surface Fragments <=3" (% Cover):		12
Surface Fragments > 3" (% Cover):		35
Subsurface Fragments <=3" (% Volume):		12
Subsurface Fragments > 3" (% Cover):		35
Drainage Class:		Moderately well drained To Well drained
Permeability Class:		Moderately slow To Very slow

	Minimum	Maximum
Depth (inches):	3	23
Electrical Conductivity (mmhos/cm):	0	2
Sodium Absorption Ratio:	N/A	N/A
Calcium Carbonate Equivalent (percent):	N/A	N/A
Soil Reaction (1:1 Water):	6.6	8.4
Soil Reaction (0.01M CaCl2):	N/A	N/A
Available Water Capacity (inches):	1.0	2.0

Plant Communities

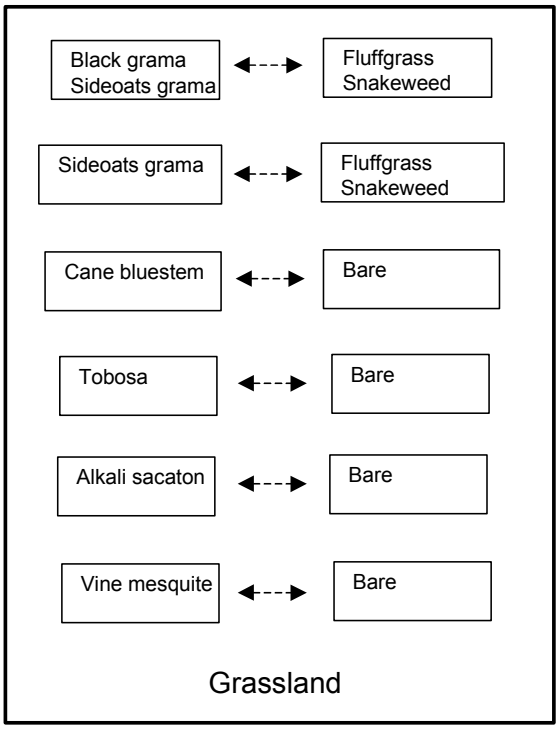
Ecological Dynamics of the Site

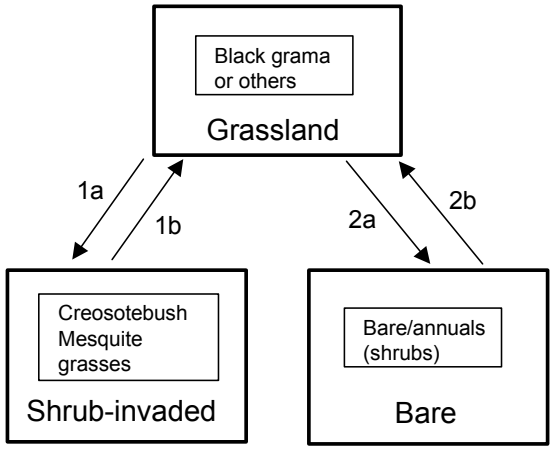
Overview

This site is associated with lava flows and volcanic cones, and often occurs in discrete areas that are bordered by other ecological sites. The soils of malpais sites are formed, in part, by wind erosion from adjacent sites and thus reflect the soils composing areas around (especially upwind) of a malpais site. Thus, historic plant communities may be dominated by a variety of species, such as black grama (*Bouteloua eriopoda*), dropseeds (*Sporobolus* spp), and alkali sacaton (*Sporobolus airoides*). Where vegetation and soils in malpais sites exist in small, discrete depressions or "pockets", grazing or drought-induced changes in vegetation may occur, but grasses tend to recover due to the favorable hydrologic conditions. Vegetation loss may result in erosion on more open, flat areas or slopes and thus result in persistent bare areas. Shrub invasion, perhaps occurring during periods when grass cover is reduced due to drought or grazing, may also occur and shrubs may compete with grasses.

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

State-Transition model: MLRA 42, SD-2, Malpais





1a. Shrub invasion, overgrazing
1b. Shrub removal
2a. Overgrazing, erosion
2b. Soil addition

Run-in buffered condition (pockets)

Non-buffered condition (flats)

MLRA 42; SD-2; Malpais

Shrub-invaded

- Mesquite, snakeweed, threeawns
- Shrubs may be monopolizing water in this larger pocket
- Sand blown in from adjacent sites, Akela series, Dona Ana Co.

Bare

- Bare, annuals on flat surface
- Heavily grazed, this site may recover grasses with improved management
- Akela series, Dona Ana Co.

Grass pockets and shrubland

- Creosotebush, winterfat, grasses
- Abundant grasses in small pockets
- Shrubs growing from fissures, probably not grazing-caused degradation
- Armendariz lava flow, White Sands Missile Range, Otero Co.

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 State:

Grasses dominate areas within malpais sites that have a sufficient depth of soil over the basalt. In some cases, (run-in buffered conditions or "pockets") soil is restricted to depressions of varying sizes, interspersed with areas of unvegetated basalt outcrops. Shrubs, including Apache plume (Fallugia paradoxa), littleleaf sumac (Rhus microphylla), saltbush (Atriplex canescens), creosotebush (Larrea tridentata), and tarbush (Flourensia cernua), as well as cacti may occur in pockets and in fissures in the basalt. In other cases, vegetation is distributed more evenly throughout the site and basalt is visible as cobbles, boulders, or small outcrops. The grasses and shrubs in these sites tend to reflect, to varying degrees, the soils that are blown into the basalt from adjacent areas or the weathering of basalt. Sites with finer soils (often weathered from basalt) may harbor tobosa (Pleuraphis mutica), vine mesquite (Panicum obtusum), cane bluestem (Bothriochloa barbinodis), sideoats grama (Bouteloua curtipendula), or alkali sacaton and sites with coarser soils may feature black grama or dropseeds. Depending on the relative palatabilities and other characteristics of the species present, heavy grazing or drought may result in increases in fluffgrass (Dasyochloa pulchella), threeawns (Aristida spp.), snakeweed (Gutierrezia spp.), and bare ground. In the case of pockets, run-in of water from adjacent outcrops and the tendency of pockets to protect soils, seeds, and plant roots from erosion results in high resilience of the plant community. In the case of flatter areas without such run-in and that are more exposed to wind and water erosion, persistent loss of grasses and soil fertility may occur.

Diagnosis: Grasses are dominant, but composition and cover varies depending on soil texture, run-in conditions, and disturbance history. Soils between 5" and 20" deep are present. Various shrub species may be present.

This site is dominated by grasses, such as black grama, sideoats grama, bush muhly, and blue grama. Although varied mixtures of shrubs and half-shrubs may be present (such as apacheplume, condalia, littleleaf sumac, fourwing saltbush, and winterfat), these are mainly noticeable as visual aspect species and do not make up an appreciable percent of the composition by air-dry weight.

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	18
Bare ground	25
Surface gravel	12
Surface cobble and stone	35
Litter (percent)	10
Litter (average depth in cm.)	3

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	225	394	563
Forb	21	36	53
Tree/Shrub/Vine	54	95	135
Lichen			
Moss			
Microbiotic Crusts			
Totals	300	525	751

Grassland 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	*Bouteloua eriopoda*	105	131
2	sideoats grama	*Bouteloua curtipendula*	53	79
3	bush muhly	*Muhlenbergia porteri*	26	53
4	blue grama	*Bouteloua gracilis*	26	53
5	vine mesquite	*Panicum obtusum*	0	16
6	curly-mesquite tobosagrass	*Hilaria belangeri* *Pleuraphis mutica*	16	42
7	cane bluestem Arizona cottontop plains lovegrass tanglehead green sprangletop	*Bothriochloa barbinodis* *Digitaria californica* *Eragrostis intermedia* *Heteropogon contortus* *Leptochloa dubia*	53	79
8	threeawn plains bristlegrass tridens	*Aristida* *Setaria vulpiseta* *Tridens*	16	42
9	Hall's panicgrass	*Panicum hallii*	16	42
10	Graminoid (grass or grasslike)		0	16

Group	Shrub/Vine Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
11	fourwing saltbush	*Atriplex canescens*	16	26
12	condalia spp. Apache plume littleleaf sumac	*Condalia* *Fallugia paradoxa* *Rhus microphylla*	16	26
13	agave common sotol yucca	*Agave* *Dasylirion wheeleri* *Yucca*	5	26
14	pricklypear	*Opuntia*	0	5
15	winterfat	*Krascheninnikovia lanata*	0	16
16	other shrubs broom snakeweed	 *Gutierrezia sarothrae*	5	16

Group	**Forb** Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
17	Forb, annual		5	26
18	Forb, perennial		5	16

Plant Growth Curve:

Growth Curve Number: NM2519

Growth Curve Name: Historic Climax Plant Community

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

Additional States:

Transition to shrub-dominated state (1a): On flat "non-buffered" positions, larger pockets, and on slopes, shrubs (especially creosotebush) may invade and dominate. This may be caused, in part, by reductions in grass cover due to drought and grazing that allow shrub establishment. Shrub dominance may also be possible in situations where fissures in the bedrock permit deep rooting and exploitation of stable water resources.

Key indicators of approach to transition: Increases in bare ground, increased germination of shrub seedlings.

Transition to bare state (2a): On flat "non-buffered" positions and slopes, persistent reductions in grass cover (due to overgrazing and drought) may result in wind and water erosion that expose infertile soil layers or bedrock.

Key indicators of approach to transition: Increases in bare ground, decadence of grasses, reduced litter cover, pedestalling of grasses, evidence or erosion around rocks, abundant water flow patterns, reduced soil depth.

Shrub-dominated: These communities are invaded and dominated by shrubs (creosotebush; *Larrea tridentata*, mesquite; *Prosopis glandulosa*) with a variable cover of fluffgrass, snakeweeds, other grasses, and annuals.

Diagnosis: Large perennial grasses are scattered, rare, or absent.

Transition to grassland state (1b): If erosion is not a problem, shrub removal might result in the recovery of grasses. If erosion from shrub interspaces has occurred, shrub removal might result in a bare state.

Bare: Soils may be very shallow, permitting only annuals and fluffgrass to persist.

Transition to grassland state (2b): Restoration of soil fertility or soil accumulation would be necessary.

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.

Ecological Site Interpretations

Animal Community:

This site provides habitat which support a resident animal community that is characterized by gray fox, desert cottontail, Texas antelope squirrel, rock squirrel, Merriam's kangaroo rat, whitethroat woodrat, Apache pocketmouse (dark phase, Carrizozo Malpais), cactus mouse, rock pocketmouse, Swainson's hawk, cactus wren, curve-billed thrasher, black-throated sparrow, white-necked raven, scaled quail, and chipping sparrow, brown towhee and Cassin's kingbird (Carrizozo Malpais only), blacktail rattlesnake, collared lizard, tree lizard and red-spotted toad.

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
Graham	D
Akela	C

Recreational Uses:

The site has appeal for rock hounding, nature study, hiking, and rock climbing. Camping and picnicking suitability is fair, limited mostly by temperature extremes. Hunting is fair to good for dove, quail, small game and predators.

Wood Products:

This site has insignificant value for wood products.

Other Products:

This site is suitable for grazing in all seasons of the year. It is adapted to cattle, sheep, goats, and horses, generally without regard to class of livestock, although whenever a high percent of rock or rock outcrop is present, breeding animals such as bulls may become sore-footed and fail to perform well. Steeper slopes, where they occur, may also affect livestock performance and accessibility for grazing.

As retrogression occurs black grama, bush muhly, and sideoats grama will be replaced by such plants as curlymesquite, tobosa, fluffgrass, and broom snakeweed.

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	4.8 – 6.0
75 – 51	5.7 – 6.8
50 – 26	6.5 – 11.5
25 – 0	11.5 - +

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
sideoats grama	*Bouteloua curtipendual*	EP	P	P	P	P	P	P	P	P	P	P	P	P
bush muhly	Muhlenbergia porteri	EP	P	P	P	P	P	P	P	P	P	P	P	P
blue grama	Bouteloua gracilis	EP	D	D	D	D	D	P	P	P	P	P	D	D
green sprangletop	Leptochloa dubia		D	D	D	D	D	P	P	P	P	D	D	D
Arizona cottontop	Digitaria californica	EP	D	D	D	D	D	P	P	P	D	D	D	D
vine mesquite	Panicum obtusum	EP	D	D	D	D	D	D	P	P	P	D	D	D
tobosa	Pleuraphis mutica	EP	N/S	N/S	D	D	D	P	P	P	D	D	D	N/S
fourwing saltbush	Atriplex canescens	EP	P	P	P	P	P	D	D	D	D	D	P	P
winterfat	Krascheninnikovia lanata	P	P	P	P	P	P	D	D	D	D	P	P	P
plains bristlegrass	Setaria vulpiseta	EP	D	D	D	D	D	P	P	P	P	D	D	D
cane bluestem	Bothriochloa barbinodis	EP	D	D	D	D	D	P	P	P	D	D	D	D
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

Similiar Sites:

Site Name	Site ID	Site Narrative

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

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:	
Graham rocky clay loam, 1 to 9 percent slope	Graham very rocky clay loam, 1 to 9 percent slopes
Akela gravelly sandy loam, 3 to 25 percent slopes	

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	02/27/03	George Chavez	03/04/03
George Chavez	02/27/03		