UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Bottomland

Site ID: R042XB018NM

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

Physiographic Features

This site occurs principally on main floodplains and is commonly subject to overflow or flooding (normally more often than once in two years) in which water may stand for several hours or even a day. Deep wetting is the principal feature of this flooding. Slopes average less than 3%. Elevations range from 3,800 to 5,000 feet.

Land Form:
(1) Flood plain
(2) Flat
(3) Swale

	Minimum	Maximum
Elevation (feet):	3800	5000
Slope (percent):	1	3
Water Table Depth (inches):	N/A	N/A
Flooding:		
Frequency:	Occasional	Frequent
Duration:	Very brief	Brief
Ponding:		
Depth (inches):	N/A	N/A
Frequency:	Rare	Occasional
Duration:	Very brief	Brief
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 November1.

	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	79.7	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 wetland or streams.

Wetland Description: (Cowardin System)	System	Subsystem	Class

-

Representative Soil Features

The soils on this site are deep and moderately well drained to well drained. Typically, the surface layer is moderately coarse to moderately fine textured. Underlying layers are fine to moderately coarse textured varying from clay to fine sandy loam. The soils have moderate to high water holding capacity and are subject to flooding and deep wetting.

Predominant Parent Materials:

Kind: Alluvium
Origin: Mixed

Surface Texture:	(1)	Silty clay
	(2)	Clay
	(3)	Sandy clay loam
Subsurface Texture Group:		Clayey
Surface Fragments <=3" (% Volume):		0
Surface Fragments > 3" (% Volume):		0
Subsurface Fragments <=3" (% Volume):		5
Subsurface Fragments > 3" (% Volume):		0
Drainage Class:		Moderately well drained To Somewhat excessively drained
Permeability Class:		Very slow To Moderate

	Minimum	Maximum
Depth (inches):	24	72
Electrical Conductivity (mmhos/cm):	0	8
Sodium Absorption Ratio:	0	5
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):	4.0	8.0

Plant Communities

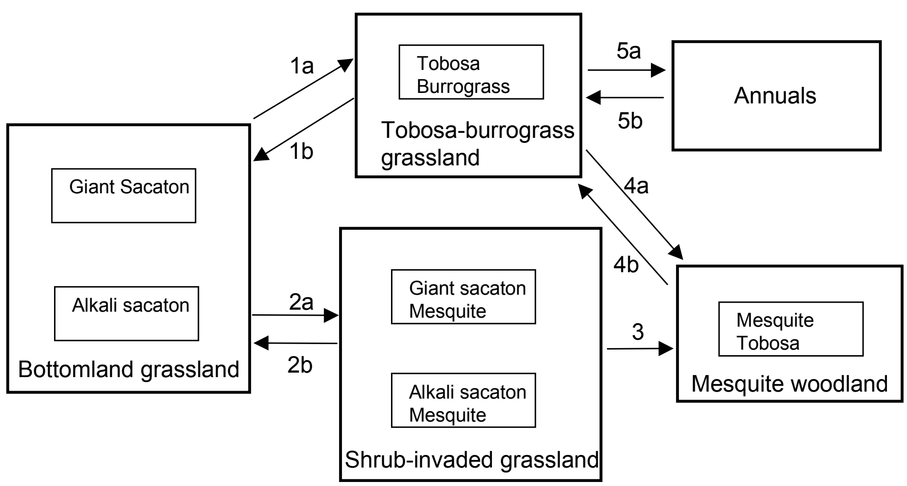
Ecological Dynamics of the Site

Overview

This site is associated with Draw ecological sites, and often occurs at the downslope ends of draws. The historic plant community type of this site is dominated by either giant sacaton (*Sporobolus wrightii*) or alkali sacaton (*Sporobolus airoides*), the distinction depending upon unknown factors (perhaps salinity). Vine mesquite (*Panicum obtusum*) and sideoats grama (*Bouteloua curtipendula*) may also be common. Reduced cover and hummocking of these grasses characterize initial stages of degradation due to overgrazing, and perhaps due to reductions in soil moisture availability with changes in hydrology. Transitions to first tobosa (*Pleuraphis mutica*) and then to burrograss (*Scleropogon brevifolius*)-dominated states may occur in response to the redistribution of run-in water via overgrazing and subsequent erosion and gullying or changes in hydrology. Shrubs such as mesquite (*Prosopis glandulosa*) and tarbush (*Flourensia cernua*) may invade in response to the loss of run-in water when propagules are available. Gullying with shrub removal, severe disturbance, or severe overgrazing may reduce the vegetation to an annual-dominated state.

No quantitative information exists concerning the causes of transitions among grassland types or to shrublands or annuals. No systematic studies exist regarding the effects of range management on grassland-shrubland/annual community transitions in the lowland ecological site group.

State-Transition model: MLRA 42, SD-2, Nonsaline lowland site group: Bottomland



1a. Soil drying due to blocked water flow, overgrazing, or gullying.
1b. Gully destruction, water redistribution.
2a. Gullying, soil drying, increasing bare patches, reduced fire.
2b. Shrub removal, restored hydrology.
3. Shrub maturation, gullying and persistent erosion, soil degradation and loss.
4a. Shrub encroachment and continued gullying and soil degradation.
4b. Shrub removal with gully destruction, soil modification, and seeding.
5a. Continued soil drying, severe overgrazing, persistent disturbance.
5b. Restored hydrology, soil modification, and seeding.

MLRA 42; SD-2; Bottomland

Bottomland grassland state

•Giant sacaton grassland, grazed at right
•Cover of grasses high,
high amounts of litter
• Mimbres silty clay loam map unit,
Dona Ana Co. NM

Bottomland grassland state

•Giant sacaton grassland, ground
•Note high litter cover
• Dev-Pima complex map unit,
Eddy Co. NM

Shrub-invaded state

•Mesquite present, giant sacaton and
large patches of tobosa
•Cover of grasses moderate to low,
less litter cover. Large bare patches
present.
• Mimbres silty clay loam map unit,
Dona Ana Co. NM

Tobosa-burrograss grassland state

•Note gully, small patches of giant
sacaton and tobosa is dominant.
Snakeweed and yuccas also indicate
drying. Few shrubs.
•Cover of grasses low, low litter
cover. Large bare patches common.
• Mimbres silty clay loam map unit,
Dona Ana Co. NM

Mesquite woodland state

•Mesquite only
•Grasses absent, low litter cover,
signs of soil sealing, erosion.
•Mimbres silty clay loam map unit,
Dona Ana Co. NM

State Containing Historic Climax Plant Community

Bottomland grasslands: The historic plant community is dominated by giant sacaton and alkali sacaton either alone or in mixture, and harbors several other grass species including vine mesquite, tobosa, burrograss, and sideoats grama. It is not known what conditions or circumstances lead to the differing abundances of the sacaton species among bottomlands, or if shifts in their relative abundances occur over time. Alkali sacaton may dominate on more saline soils. Each of these species has relatively high palatability when compared to tobosa and burrograss during the growing season. Thus, reduction of populations of bottomland grass species due to overgrazing and erosion is a risk. The giant sacaton grasslands have been reduced to 5% of their original extent (Cox 1988), thus there is great interest in preserving the remaining stands. Grazing giant sacaton during dry summers or fall may expose crowns to freezing temperatures and cause grass mortality (Cox 1988). Burning of bottomland grasslands may do more harm than good. Giant sacaton, for example, is relatively slow to recover from fire, taking from 2-3 years. Suitable burning strategies for this site are unknown, but post-fire protection of grasslands from grazing can aid the recovery of grasses.

Diagnosis: Giant sacaton and/or alkali sacaton dominates (often more than 50% basal cover) and cover is uniform. Open patches are few and less than 2 m in length, most ground is covered with litter. Mesquite is generally absent.

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	55
Bare ground	10
Surface gravel	0
Surface cobble and stone	0
Litter (percent)	35
Litter (average depth in cm.)	5

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	1620	2385	3150
Forb	54	80	105
Tree/Shrub/Vine	126	185	245
Lichen			
Moss			
Microbiotic Crusts			
Totals	1800	2650	3500

Historic Climax Plant Community Plant 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	alkali sacaton	*Sporobolus airoides*	1855	2120
	giant sacaton	*Sporobolus wrightii*		
2	tobosagrass	*Pleuraphis mutica*	27	133
3	vine mesquite	*Panicum obtusum*	80	133
4	Grass, annual		80	133
	threeawn	*Aristida*		
	feather fingergrass	*Chloris virgata*		
	mat muhly	*Muhlenbergia richardsonis*		
	burrograss	*Scleropogon brevifolius*		
5	cane bluestem	*Bothriochloa barbinodis*	80	133
	sideoats grama	*Bouteloua curtipendula*		
	Arizona cottontop	*Digitaria californica*		
	plains lovegrass	*Eragrostis intermedia*		

Group	Shrub/Vine Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
6	fourwing saltbush	*Atriplex canescens*	27	133
	longleaf ephedra	*Ephedra trifurca*		
	broom snakeweed	*Gutierrezia sarothrae*		
	crown of thorns	*Koeberlinia spinosa*		
	littleleaf sumac	*Rhus microphylla*		
	soaptree yucca	*Yucca elata*		

Group	Forb Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
7	desert holly	*Acourtia nana*	27	133
	milkvetch	*Astragalus*		
	croton	*Croton*		
	buckwheat	*Eriogonum*		
	bladderpod	*Lesquerella*		
	Russian thistle	*Salsola kali*		
8	Forb (herbaceous, not grass nor grasslike)		27	133

Plant Growth Curve:
Growth Curve Number: NM2509
Growth Curve Name: HCPC
Growth Curve Description: SD-2 Bottomland HCPC 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 tobosa-dominated state (1a): Transitions from bottomland communities to tobosa-dominated communities can occur in response to diversion in run-in water flow catalyzed by overgrazing or blockage of surface flow. Removal of grasses may increase the rate of water flow in parts of the bottomland and result in gullying. Channelization of subsequent flood waters into the gully diverts run-in water and reduces the amount of time that areas of the bottomland are submerged. Once the duration of submersion is reduced below an unknown value, tobosa establishment and persistence may be favored at the expense of bottomland grasses, especially in the presence of grazing. It is not known what conditions promote either the transition to shrub-invaded grassland versus a mesquite-free, tobosa-burrograss grassland.

Key indicators of approach to transition: Increases in bare ground cover, tobosa, and burrograss cover, increases in the size of bare ground patches, decreases in the cover and reproduction of giant and alkali sacaton, appearance of water flow patterns, rills, gullies, and debris dams associated with open spaces, reduced frequency and duration of flooding.

Transition to shrub-invaded state (2a): Overgrazing or poorly-timed grazing, with consequent reduction in grass cover and subsequent gullying and diversion of water may produce changes in the soil moisture regime or fire regime that may facilitate the establishment of mesquite and other shrubs. It is unknown whether increased shrub establishment requires only open space or requires changes in soil moisture or fire frequency. The historic role of fire in bottomlands is unknown, and the absence of fire and reduced soil moisture may act together. Tarbush may also invade.

Key indicators of approach to transition: Increases in bare ground cover, increases in the size of bare ground patches, decreases in the cover and reproduction of giant and alkali sacaton, appearance of water flow patterns, rills, and debris dams associated with open spaces, reduced frequency and duration of flooding. Increases in tobosa and burrograss may also accompany this transition. The presence of mesquite seedlings and plants may indicate that a transition is underway.

Additional States:

Shrub-invaded grasslands: Honey mesquite and/or other shrubs such as little-leaf sumac are common. Shrub increase is generally associated with declines in the sacaton species and increases in tobosa, burrograss, and bare ground. Plant distributions are often very patchy, with clumps of mesquite occupying drier parts and grasses or perhaps annuals dominating others. The expansion of mesquite may cause further reductions in grass cover, but if sufficient grass remains to control erosion, this situation may be stable.

Diagnosis: Medium to large (>50 cm tall) mesquite present. Giant sacaton and/or alkali sacaton cover and litter cover is discontinuous, tobosa, burrograss, or bare ground may dominate many large (>2 m) patches.

Transition to mesquite woodland (3): Transitions to a mesquite woodland state may occur in response to continued gully development and lowering of soil moisture, alongside soil surface degradation, either before (transition **4a**) or after (**3**) mesquite have established. This may be caused by continued overgrazing and reduction of grass cover.

Key indicators of approach to transition: Increases in bare ground cover and the size of bare ground patches, decreases in grass cover, presence of deep gullies.

Transition to bottomland grassland (2b): Mechanical/herbicide removal with restoration of hydrology and grass cover would be needed to restore bottomland grasslands.

Tobosa-burrograss grassland: This grassland is believed to occur as gullying increases (or flows are blocked by dams) and soil moisture levels during flood periods decline. Tobosa and/or burrograss dominate overall, but giant sacaton may occur along gully margins or in wetter patches. Mesquite is absent or rare, perhaps due to dispersal limitation.

Diagnosis: Giant sacaton and/or alkali sacaton restricted to wetter patches. Tobosa and burrograss dominant in large, many large (> 2m) bare patches. Large gullies are present and physical soil crusts and shrink-swell cracking is visible in bare patches.

Transition to mesquite woodland (4a): See transition 3 above.

Transition to annual-dominated state (5a): The causes, indicators, and reversing practices for this transition are believed to be similar to those for transitions 3 and 4a. In this case, however, the presence of shrink-swell clays causes root destruction of perennials and only annual species occur. Persistent disturbance and soil degradation may produce a similar effect.

Transition to bottomland grassland state (1b): Gully destruction and water-spreading to redirect flood waters across the area in conjunction with transplants or seeding of bottomland grasses (especially with vine mesquite and alkali sacaton) may possibly reverse this transition.

Mesquite woodland: Communities in this state are largely bare ground but may contain patches of tobosa, burrograss, and perhaps sacaton species. Mesquite cover may be thick.

Diagnosis: Large (> 1 m tall) mesquite are numerous. Giant sacaton and/or alkali sacaton either absent or restricted to a few patches. Tobosa and burrograss also restricted to patches. Bare ground extensive and well connected. Large gullies are present and physical soil crusts and shrink-swell cracking is visible in bare patches.

Transition to tobosa grassland state (4b): Shrub removal with gully destruction and water-spreading to redirect flood waters across the area, in conjunction with transplants or seeding of tobosa and other grasses, may improve infiltration conditions and facilitate subsequent reintroduction of bottomland grasses. Alternatively, one may attempt to restore bottomland grasses immediately. Neither has been attempted so far as we are aware.

Annual-dominated: Most of the area in this state has been reduced to either bare ground or annuals. Patches of giant sacaton, burrograss and tobosa may occur. Deep gullies are a prominent feature of this site.

Diagnosis: Bare ground or annual cover is nearly continuous. Giant sacaton and other grasses occur only in isolated patches, sometimes on the fringes of the annual-dominated area, or not at all. Gullies are present or other features obstruct surface flow of water. Physical crusting and shrink-swell cracking of the bare soil surface is extensive.

Transition to tobosa grassland state (5b): Same as for 4b without need for shrub removal.

Information sources and theoretical background: Communities and states are derived largely from observations by Brandon Bestelmeyer and Jim Powell. Communities are usually defined by the primary and secondary dominant plant species, but sometimes emphasize dominant species of differing life-forms. Transitions are derived from expert opinion and are founded upon two hypotheses (same as in the Draw site). The *channelization hypothesis* holds that the loss of herbaceous vegetation cover increases erosion and channelization, and that channelization reduces soil moisture availability to grasses across broad areas. Changes in soil moisture availability, in turn, lead directly to changes in the composition of dominant plants (Gile and Grossman 1997). The *fire hypothesis* holds that vegetation change is limited only by limitations in the dispersal and growth of dominant shrub species. Once shrub propagules are present, vegetation change is inevitable without periodic disturbances such as fire (Brown and Archer 1989). For bottomlands, the historic role of fire is far from clear. Finally, the *competition hypothesis* holds that sacaton grassland maintenance depends upon the competitive exclusion of shrub seedlings due to limitations in light or nutrients (c.f. Van Auken and Bush 1990). There may be a threshold grass density below which the probability of shrub establishment increases rapidly, leading to a transition to the shrubland type.

Ecological Site Interpretations

Animal Community:

This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, coyote, black-tailed jackrabbit, sparrow hawk, scaled quail, meadow lark, hognose snake, and Woodhouse's toad.

Where large yucca is present, this site serves as a breeding area for Scott's oriole, mockingbird and mourning dove.

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
Oscura	C
Mimbres	C
Anapra	B
Gila	C
Harkey	B
Anthony	B
Belen	C

Recreational Uses:

There may be some hazard from flooding which limits suitability for camping and picnicking. Hunting is fair for pronghorn antelope, quail, dove, small game, and waterfowl where seasonal open water occurs. Photography and bird watching 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.

Wood Products:

This site has no significant value for wood products.

Other Products:

This site is suitable for seasonal use by cattle during the period of July through September. It is generally suitable for all classes of cattle. This site is especially suitable for livestock when grasses are at their greenest, following summer flooding. Cows with calves big enough to take a substantial amount of milk would benefit greatly for increased forage nutrition during this time of year.

Although site deterioration may be caused by inadequately managed grazing, it is frequently the result of gullying and draining. This condition is at its extreme when represented by an abundance of bare ground and annuals, coupled with remnant stands of sacaton or tobosa suited so as to receive overflow from side drainages. The site is not, at this stage, recoverable through grazing management alone.

Other Information:	
Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month	
Similarity Index	Ac/AUM
100 - 76	2.0 – 3.0
75 – 51	2.8 – 3.7
50 – 26	3.5 – 6.8
25 – 0	6.8 - +

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
giant sacaton	Sporobolus Wrightii	EP	U	U	U	D	D	D	P	P	D	U	U	U
alkali sacaton	Sporobolus airoides	EP	U	U	U	D	D	D	P	P	D	U	U	U
Vine mesquite	Panicum obtusum	EP	NC	NC	NC	NC	NC	NC	P	P	P	D	D	NC
cane bluestem	Bothriochloa barbinodis	EP	D	D	D	D	D	P	P	P	D	D	D	D
Sideoats grama	*Bouteloua curtipendual*	EP	P	P	P	P	P	P	P	P	P	P	P	P
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
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
Draw	R042XB016NM	

Similiar Sites:

Site Name	Site ID	Site Narrative
Draw	R042XB016NM	

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:	
Oscura silty clay	Mimbres loam, sandy clay loam, sandy loam (as mapped in NM)
Anapara silty clay loam and clay loam	Gila fine sandy loam, loam
Harkey loam, sandy clay loam, fine sandy loam	Anthony sandy loam, fine sandy loam
Belen sandy clay loam, clay loam	Armijo sandy clay, clay
Other Soils included are:	
Verhalen silty clay loam	

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		