UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Clayey 8 to 10.5 inches

Site ID: R042XB023NM

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

Physiographic Features

This site usually occurs on piedmont slopes or permanently drained floodplains. Slopes are usually flat, averaging less than 5%. Elevations range from 3,700 feet to 5,000 feet.

Land Form: (1) Fan piedmont
(2) Flood plain

	Minimum	Maximum
Elevation (feet):	3700	5000
Slope (percent):	1	5
Water Table Depth (inches):	N/A	N/A
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	N/A	N/A
Frequency:	None	None
Duration:	None	None
Runoff Class:		
Aspect:	No Influence on this site	

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 precipitatin 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 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 wetland or stream.

Wetland Description: (Cowardin System)	System	Subsystem	Class

Representative Soil Features

The soils are deep and well drained. Typically, the surface is a thin moderately coarse, medium, or a fine-textured layer that may be gravelly. Underlying layers are usually clay loams and clays that also may be gravelly. They vary from noncalcareous to calcareous throughout the profile. They are slowly permeable, and fun-off is slow to rapid. Note: Soil Reaction CACL2 data is not available.

Predominant Parent Materials:
Kind: Alluvium
Origin: Monzonite

Surface Texture:	(1)	Gravelly Clay loam
	(2)	Clay
Subsurface Texture Group:		Clayey
Surface Fragments <=3" (% Cover):		1
Surface Fragments > 3" (% Cover):		0
Subsurface Fragments <=3" (% Volume):		0
Subsurface Fragments > 3" (% Cover):		0
Drainage Class:		Well drained To Moderately well drained
Permeability Class:		Moderately slow To Slow

	Minimum	Maximum
Depth (inches):	24	60
Electrical Conductivity (mmhos/cm):	0	4
Sodium Absorption Ratio:	1	12
Calcium Carbonate Equivalent (percent):	0	0
Soil Reaction (1:1 Water):	7.4	9.0
Soil Reaction (0.01M CaCl2):	N/A	N/A
Available Water Capacity (inches):	6.0	8.0

Plant Communities

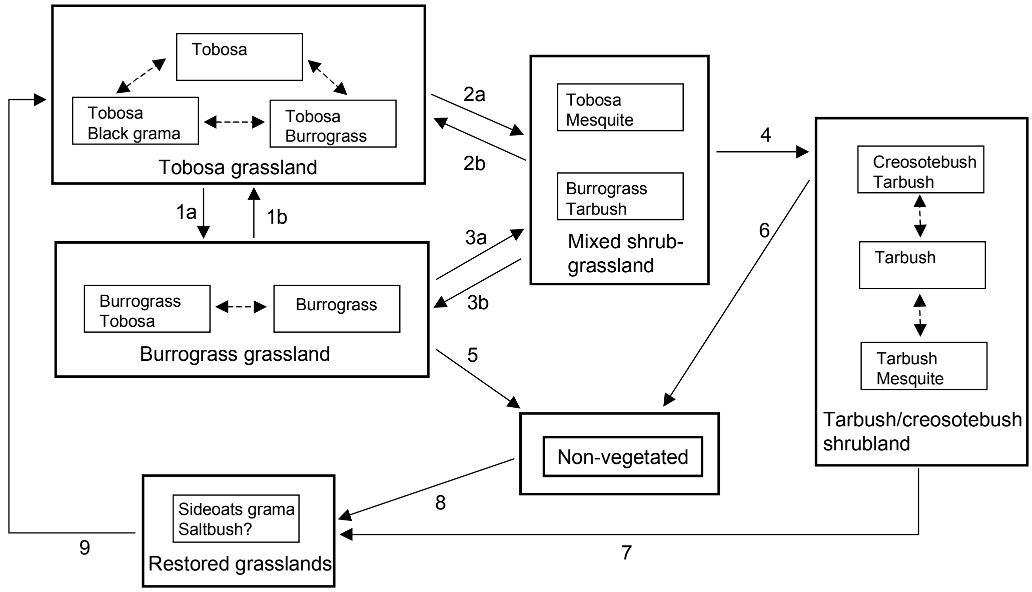
Ecological Dynamics of the Site

Overview

This ecological site is often spatially associated with Draw and Bottomland sites. This site often intergrades with Loamy ecological sites with which it may share dominant species. The presumed historic plant community type of this site is dominated by tobosa (*Pleuraphis mutica*) and, perhaps, to a lesser extent by black grama (*Bouteloua eriopoda*). Unfortunately, no reference areas exhibiting co-dominance by black grama have been located within SD-2 (including records to the year 1918). Alternatively, black grama may have occurred in relatively sandy spots and areas receiving less run-in water. Generally, transitions within this ecological site appear to be governed by patterns of soil water availability, changes to soil structure, and soil truncation. A shift to extreme dominance by first tobosa and then burrograss (*Scleropogon brevifolius*) may occur in response to grazing or drought. On some soils (e.g. Reagan clay loam), burrograss may be naturally dominant and/or be more likely to increase in response to grazing than on other soils (e.g. Stellar clay loam). It is also possible that instances of burrograss dominance are related to decreased soil moisture due to small-scale drainage patterns. Shrub encroachment by a variety of species, including tarbush (*Flourensia cernua*), mesquite (*Prosopis glandulosa*) and creosotebush (*Larrea tridentata*) occurs within this site as bare patches increase. Shrub dominance and grass loss is associated with truncation of the A horizon and, in many cases, sealing of the eroded soil surface. Subsequent loss of shrubs or continued soil degradation in the absence of shrub seeds may produce a nonvegetated clay flat, which may accumulate salts or carbonate at the surface.

Little quantitative information exists concerning the causes of transitions between grassland types and to shrub-invaded grasslands or pure shrublands. No systematic studies exist regarding the effects of range management on grassland-shrubland transitions in the lowland ecological sites. The limited information provided by Buffington and Herbel (1965) and Gibbens and Beck (1987) indicates that the relationship between grazing intensity and grassland-shrubland transitions is unclear. Overall, tobosa and burrograss grasslands characteristic of clayey soils are more stable and recover faster than black grama grasslands in the face of drought, likely due to the location of tobosa and burrograss on heavier soils that retain water at rooting depth for longer periods. Additionally, tobosa and burrograss are generally less palatable than black grama, leading to reduced utilization of these communities.

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



1a. Overgrazing, soil drying, but may be soil-determined climax. **1b**. Increase soil infiltration, decrease carbonates?
2a. Drought, overgrazing, decreased fire frequency, shrub seeds. **2b**. Shrub control, restoration of tobosa, and fire
3a. ? Drought, overgrazing, shrub encroachment or simply shrub seeds. **3b**. Shrub removal (subject to reinvasion)
4. Overgrazing, drought, increasing shrub density and soil degradation
5. Severe, frequent disturbance, accumulations of salt, nitrates, soil degradation.
6. Shrub removal
7, 8. Restoration treatments (soil addition, salinity reduction) and seeding under favorable conditions
9. Seeding with tobosa and other grasses?

MLRA 42; SD-2; Clayey

Tobosa-dominated state

- Tobosa/burrograss mosaic, a few mesquite. Low diversity community.
- Few small bare ground patches, usually associated with burrograss
- Stellar clay loam, Jornada Exp. Range, Dona Ana Co., NM

Burrograss-dominated state

- Burrograss, ear muhly dominant, some tarbush encroachment.
- Frequent bare ground patches of moderate size, but grass cover appears continuous.
- Reagan clay loam, Jornada Exp. Range, Dona Ana Co.

Mixed-shrub grassland state

- Burrograss, tobosa, and considerable mesquite encroachment.
- Frequent bare ground patches of large size, grass cover interrupted.
- Stellar clay loam, Jornada Exp. Range, Dona Ana Co.

Tarbush/creosotebush shrubland state

- Burrograss, tarbush
- Large areas without grass, crusting and loss of soil horizons apparent, microbiotic crust is conspicuous.
- Reagan clay loam, Jornada Exp. Range, Dona Ana Co.

Non-vegetated state

- No living vegetation
- Microbiotic crust absent, crusted soil surface, possible salt accumulation.
- Dona Ana Reagan map unit, Jornada Exp. Range, Dona Ana Co.

State Containing the Historic Climax Plant Community

Tobosa grasslands**:** The historic community has been identified by previous authors as the tobosa-black grama grassland community, although communities may have been dominated to varying degrees by tobosa or burrograss depending upon local drainage patterns or soil carbonate content (see *Burrograss-dominated grasslands* below). It is likely that the clay loam soils that characterize this site are of marginal suitability for black grama (Herbel et al. 1972), although there are no data to support this (Dr. Jin Yao of the Jornada Experimental Range is currently investigating this). We were not able to locate areas on clayey soils that contained black grama. Alkali sacaton (*Sporobolus airoides*) may be present in significant amounts. Other grasses include threeawns (*Aristida* spp.), ear muhly (*Muhlenbergia arenacea*), cane bluestem (*Bothriochloa barbinodis*), vine mesquite (*Panicum obtusum*) and sideoats grama (*Bouteloua curtipendula*) and low densities of shrubs including saltbush (*Atriplex canescens*), crucifixion thorn (*Koeberlinia spinosa*), as well as cacti (*Opuntia imbricata*) may naturally occur. Bare ground cover is low. Under continuous cattle grazing the black grama and alkali sacaton components should be eliminated first due to the selectivity of cattle, but natural variation in the degree of dominance by these grasses might also be observed. In general, the diversity of grasses declines with grazing. With heavier grazing or drought, the relative abundance of burrograss may increase. Fire may increase production within tobosa communities in some cases (Britton et al. 1987). In SD-2, however, tobosa production probably declines with fire because of low precipitation (Uchytil 1988).

Gile and Grossman (1997) indicate that even within a single soil series (i.e. Stellar clay loam), differences in soil structure can have profound impacts on soil water availability and tobosa dominance. On wedgy soils with many pores, tobosa production is twice as high when compared to non-wedgy soils in similar positions. Run-in water can also determine the relative dominance of tobosa. Buffington and Herbel (1965) suggest that the degradation of black grama grasslands in the upper piedmont slopes near Mt. Summerford near the Jornada Experimental Range resulted in increased translocation of water to the lower piedmont. This resulted in increased tobosa dominance on the Clayey site in this position.

Diagnosis: Tobosa basal cover ranges from 0.02-0.06% or higher, and canopy cover ranges from 30-70%. Tobosa patches are large and are often interconnected. Total basal cover ranges from 4-8%. Litter may be abundant. Bare ground cover does not exceed 45%. The % of continuous line intercept that are gaps >1 m ranges from 20-55. Average surface soil stability values range from 4.8-4.9. subsurface values (2.5 cm) range from 2.7-3.2. Few shrubs are present (data from J. Herrick et al. unpublished).

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	17
Bare ground	73
Surface gravel	1
Surface cobble and stone	0
Litter (percent)	9
Litter (average depth in cm.)	3

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	168	336	504
Forb	16	32	48
Tree/Shrub/Vine	16	32	48
Lichen			
Moss			
Microbiotic Crusts			
Totals	200	400	600

Historic Climax Plant Community Plant Species Composition:

Group	Grass/Grasslike Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
1	tobosagrass	*Pleuraphis mutica*	140	160
2	black grama	*Bouteloua eriopoda*	40	60
3	alkali sacaton	*Sporobolus airoides*	20	60
4	burrograss	*Scleropogon brevifolius*	20	40
5	vine mesquite	*Panicum obtusum*	0	20
6	threeawn	*Aristida*	4	20
7	mat muhly	*Muhlenbergia richardsonis*	4	20
8	cane bluestem	*Bothriochloa barbinodis*	4	12
9	sideoats grama	*Bouteloua curtipendula*	0	12
10	Graminoid (grass or grasslike)		4	12

Group	Shrub/Vine Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
11	pricklypear	*Opuntia*	4	12
12	broom snakeweed	*Gutierrezia sarothrae*	4	12
13	fourwing saltbush	*Atriplex canescens*	4	20
	snakewood	*Condalia*	4	20
	crown of thorns	*Koeberlinia spinosa*	4	20
14	Shrub (>.5m)		4	12

Group	Forb Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
15	dwarf desertpeony	*Acourtia nana*	20	32
	milkvetch	*Astragalus*	20	32
	croton	*Croton*	20	32
	bladderpod	*Lesquerella*	20	32
	Russian thistle	*Salsola kali*	20	32
16	Forb (herbaceous, not grass nor grasslike)		4	20

Plant Growth Curve:
Growth Curve Number: NM2512
Growth Curve Name: HCPC
Growth Curve Description: SD-2 Clayey 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 burrograss grassland state (1a): Transitions from tobosa-dominated to burrograss-dominated communities may occur due to grazing pressure (Campbell 1931) and/or drought, although Gibbens and Beck (1987) suggest that burrograss may be an alternative climax state that is unrelated to retrogression. It is likely that either explanation may apply in different situations. Natural soil differences or grazing-caused changes that lead to reduced infiltration rates may favor burrograss. Furthermore, there is evidence that burrograss is favored on siltier soils and those with high carbonate content (B. Bestelmeyer, in preparation). Knowledge of the soil series at a site (rather than the ecological site) may be required to assess the cause of burrograss presence. Changes in surface hydrology due to the presence of roads or other obstructions to water flow may also cause or facilitate this transition (and others described below).

Key indicators of approach to transition: Loss of grass species diversity, reduction in tobosa cover and increased decadence of tobosa plants, increases in burrograss cover and shrub density and cover, increases in bare patch size, increases in soil physical crusts.

Transition to mixed-shrub grassland state (2a): Transitions to a shrub grassland state from tobosa and burrograss states are due to the encroachment or expansion of tarbush, mesquite, and creosotebush populations. This shift is accompanied or preceded by a decrease in tobosa and burrograss cover and the development of large bare patches. It is unclear whether grazing or drought-induced reductions in grass cover permit shrub invasion. Extensive invasion of grasslands by tarbush have been recorded by Buffington and Herbel (1965), although data presented by Gibbens and Beck (1987) suggest that the probability of invasion over a drought period with conservative grazing was low in both tobosa- (9%) and burrograss- (8%) dominated grasslands relative to sandier sites. These values, however, may underestimate invasion rates at broader scales because of the small size and sparse distribution of the quadrats. Buffington and Herbel (1965) believed that grazing did not contribute to tarbush invasion. A reduction in fire frequency may also be a factor although no data or observations exist to support this notion. Without fire, mesquite densities changed little from 1960-2001 on Stellar clay loam and Continental loam soils on the Jornada Experimental Range (B. Bestelmeyer, in preparation). It is unclear what determines whether mesquite, tarbush, or creosotebush invades. Mesquite may be limited by high levels of calcium carbonate in surface soils, whereas tarbush and creosotebush are not. When the cover of tobosa is high, fire may be used to kill or topkill small (< 3.5 yr old) mesquite but once they are larger than this, mechanical removal techniques would be required. (**2b**). Burrograss communities generally cannot carry fire of sufficient intensity to cause shrub topkill or mortality.

Key indicators of approach to transition: Reduction in tobosa and burrograss cover, increases in shrub density and cover, increases in mean bare patch size, increases in soil physical crusting, decreases in cover of cryptobiotic crusts.

Additional States

Burrograss grasslands: This grassland often occurs with considerable amounts of ear muhly and a higher cover of bare ground than the tobosa-dominated grassland. Crucifixion thorn and other shrubs may be common but in low densities. The relative abundance of burrograss and tobosa may be determined by patterns of drainage; areas receiving abundant run-on water favor tobosa whereas burrograss is favored in areas with less run-on water (Paulsen and Ares 1962, Gibbens and Beck 1988). Furthermore, Herbel and Gibbens (1989) suggest that the probability of available soil moisture in summer is greater in the tobosa-dominated state on Stellar soils (37-63%) than on burrograss-dominated Reagan soils (9-36%) in the same topographic position. This may be due to sealing of the soil surface in the burrograss grassland, or to higher carbonate content or soil structure of Reagan soils. Reagan soils are derived from higher carbonate parent material than Stellar soils (Gile and Grossman 1997) and carbonate near the soil surface may reduce infiltration rate (Gile et al.,draft ms). In addition to this spatial variation, temporal variation in rainfall amounts may lead to changes in the relative abundance of burrograss, with burrograss increasing in representation during drier periods (Campbell 1931). Post-1950s drought changes in plant cover suggest that tobosa declined and burrograss increased on both Stellar and Reagan soils, but the decrease in tobosa was greatest on Reagan soils (Herbel and Gibbens 1996). It is likely that both continuous grazing pressure and changes in rainfall and drainage can produce transitions from tobosa to burrograss. Furthermore, burrograss dominance is soil dependent, being favored on soils derived from high-carbonate parent materials (Bestelmeyer, in preparation). Thus, in some cases burrograss grasslands should constitute a distinct state and in others it may be community type. Carbonate-rich soils may need to be removed to a distinct ecological site. Banded vegetation patterns may exist in this state on slight slopes (0.5-1%) where bands of nearly pure tobosa are interspersed with bands of burrograss. Grazing disturbance that eliminates tobosa may initiate this self-organizing pattern. Sheet flow across this surface erodes the A horizon (Gile and Grossman 1997), perhaps exposing carbonate-rich strata, and may subsequently be recolonized by burrograss (Devine et al. 1998). Erosion from the burrograss-dominated surface is higher than that from tobosa, and water (and perhaps nutrients) are intercepted by the tobosa bands. Eroding bands may eventually become bare.

Diagnosis: Total basal cover ranges from 4.3-6.5%, although burrograss basal cover may be low, often < 0.01%. Tobosa is restricted to small patches or is absent. Canopy cover is not as high as in tobosa grasslands, ranging from 30-50%. Litter may be sparse. Bare ground cover ranges from 40-47%. The % of continuous line intercept that are gaps >1 m ranges from 21-55. Physical soil crusts may be common. Cryptogamic crusts may be common. Average soil surface stability values range from 3.8-4.7, subsurface (2.5 cm) values are lower than in tobosa grasslands (1.7-2.4). Banded vegetation patterns may be observed with bands of tobosa, burrograss, and/or bare ground. Shrubs tend to be sparse where present.

Transition to mixed-shrub grassland state (3a): It is likely that the introduction of shrub seeds is all that is needed, unless burrograss is particularly dense.

Transition to non-vegetated state (5): Under conditions of severe overgrazing or perhaps ORV or other mechanical disturbance, or due to salt accumulation on the soil surface, burrograss and tobosa may be lost. Subsequent physical soil crust development inhibits germination of plants and infiltration of water. If shrubs have not yet invaded or are removed at this point, a barren clay flat is produced.

Key indicators of approach to transitions 3a and 5: Reduction burrograss and tobosa cover and patch size, increases in mean bare patch size, increases in soil physical crusting, decreases in cover of cryptobiotic crusts, decreases in soil aggregate stability, evidence of erosion including water flow patterns and litter movement. Salt accumulation on soil surface?

Transition to tobosa grassland state (1b): Reseeding, restored hydrologic inputs, and grazing rest might be used to restore palatable species. If increasing carbonate content at the surface is responsible, then perhaps chemical treatment methods aimed at reducing carbonate would be needed.

Mixed shrub-grassland state: In this state, tarbush, and/or mesquite become co-dominant with grasses or dominant. Two communities can be recognized that are grouped in this state. The tobosa-mesquite community has substantial amounts of tobosa as well as burrograss, whereas the burrograss-tarbush community often has little or no tobosa. In both communities, bare ground is greater than in the burrograss state and is highest in the burrograss-tarbush community. It is not clear if these communities change to one another or if their differences are due to inherent soil properties. For example, at the Jornada Experimental Range, Reagan soils tend to favor tarbush, whereas Stellar soils may favor mesquite (Bestelmeyer, in preparation). Evidence of soil sealing in this state is prominent and erosion rates are high on slopes. Consequently, soil moisture availability at the depths utilized by grasses is likely to be low. As soils grade into those comprising the Loamy ecological site, mesquite may become a more important shrub component and tobosa a more important grass. The causes of variation in shrub abundance (tarbush versus mesquite versus creosotebush) within an area over time (Buffington and Herbel 1965) are unknown, and additional states within this broad state may eventually be recognized.

Diagnosis: The cover of tarbush and/or mesquite is substantial, creosotebush may be subordinate component. Burrograss and tobosa cover is patchy and patches are often not interconnected. Litter cover is low. Many bare ground patches are large (> 2 m), and often associated with shrubs. Physical soil crusts are common in these bare patches. Cryptogamic crusts may be common. Pedestalling of shrubs may be apparent.

Transition to tarbush-creosotebush state (4): If low grass cover is maintained due to physical disturbance or overgrazing coincident with increases in shrub density, erosion and physical soil crusting, the capacity of grasses to reestablish in the intershrub areas may be severely diminished. The invasion of creosotebush may further contribute to the loss of grasses due to competitive and allelopathic effects. The conditions under which creosotebush invades tarbush shrublands (Buffington and Herbel 1965) is unknown, but this risk may be greater on more gravelly or calcareous soils (or, perhaps, soils that are closer to gravelly, creosotebush-inhabited sites). Tarbush may invade first due to their relatively high seed motility and thus tarbush communities may be seres that will eventually be dominated by creosotebush or mesquite.

Key indicators of approach to transition: Reduction in tobosa and burrograss cover and patch size, increases in shrub density, increases in mean bare patch size, increases in soil physical crusting, decreases in cover of cryptobiotic crusts, evidence of erosion including water flow patterns, pedestalling, and litter movement.

Transition to tobosa grassland/burrograss grassland state (2b, 3b): Brush control using herbicides or mechanical means or managed fire following grass restoration may be used. Active restoration of tobosa would be needed to permit use of fire.

Tarbush-creosotebush shrubland: Grass cover is low or has been eliminated, and only a dense cover of shrubs remains. Erosion and runoff from this state is high, the A horizon is truncated in many places and physical crusts are common, and grass reestablishment is severely diminished. As soil truncation proceeds, creosotebush may come to dominate within this state (Buffington and Herbel 1965), due either to increasing concentration of gravel near the surface with erosion and/or because it tolerates more dry soils or compacted/shallow soils than either tarbush or mesquite. It is likely that creosotebush invades only in drier, slightly gravelly, or highly calcareous soils. Creosotebush-dominated communities may constitute another state if their allelopathic effects on tobosa or burrograss maintain areas free from grasses, but this has yet to be demonstrated. Furthermore, competition by shrubs for water at grass rooting depths (see Gibbens and Lenz 2001) may lower grass survival and reproduction and accelerate conversion.

Diagnosis: Tarbush, mesquite, and or creosotebush dominates, and burrograss and tobosa cover is absent or restricted to a few, small patches. Litter cover is low and restricted to shrub bases or small depression sin the open soil. Physical soil crusts are common, and bare ground is highly interconnetced. Biotic crusts may be common. Pedestalling of shrubs may be common, especially on slopes.

Transition to non-vegetated state (6): Shrub removal without other methods may produce an unproductive clay flat.

Transition to restored grassland state (7): Herbel et al. (1973) indicate that, under conditions of favorable rainfall, rootplowing and seeding with grasses such as sideoats grama, yellow bluestem, and alkali sacaton can be used to recover a grassland from a tarbush-dominated state. Pitting or chemical treatment of the soil may also be needed.

Non-vegetated: These areas are often interspersed with patches of burrograss and are frequently associated with two-track roads and other severe physical disturbances and in microtopographic depressions. Salt accumulation may be visible on the soil surface, and physical soil crusts are thick and the subsurface structure is platy. This may explain why vegetation does not grow on these sites.

Transition to restored grassland state (8): Restoration of grasslands may be initiated by pitting or perhaps by chemical treatment or flushing of the soil surface with water to remove salinity.

Restored grassland: Brush control and seeding has been used to reestablish a grassland or shrubland consisting of saltbush (*Atriplex canescens*), sideoats grama (*Bouteloua curtipendula)* or other species.

Transition to tobosa grassland state (9): Restoration of tobosa grasslands can in principle be achieved after restoration of surface hydrologic inputs, restoration of soil structure permitting infiltration of inputs, and restoration of soil nutrients. If these conditions are achieved within restored grasslands, reseeding with tobosa may be all that is required. We know of no such examples, however.

Data and information sources and theoretical background: Communities and states are derived largely from information obtained using broad-scale associations recorded by Buffington and Herbel (1965) and fine-scale quadrat (1 x 1 m) data reported by Gibbens and Beck (1987) and the Jornada ARS (unpublished data). New observations are also reported (Bestelmeyer, unpublished). Communities are usually defined by the primary and secondary dominant plant species, but sometimes emphasize dominant species of differing life-forms. Some uncommon communities were excluded for simplicity. Hypotheses addressing the causes of transitions between states within this site are not well developed. Patterns observed by Grossman and Gile (1997), Herbel and Gibbens (1987) and discussed by Gile et al. (draft ms) can be used to identify two hypotheses. The *soil truncation hypothesis* holds that erosion due to the loss of plant cover removes the soil A horizon, exposing a hardened argillic B horizon, or calcium carbonate-rich horizon, that resists infiltration and may inhibit establishment. This hypothesis relates closely to the *soil moisture hypothesis*. This explanation holds that variation in spatial and temporal patterns of plant dominance are related to changes in the availability of soil moisture to different plants (depending upon rooting depth and extent) and plant tolerances for soil moisture levels at particular soil depths. Many factors can influence soil moisture availability including soil surface texture, plant and litter cover, surface and sub-surface soil structure, landscape position, and plant cover and soil characteristics in upslope positions. Neither of these hypotheses have been formally tested.

Ecological Site Interpretations

Animal Community:
This range site provides habitats which support a resident animal community that is characterized by pronghorn antelope, coyote, black-tailed jackrabbit, bannertail kangaroo rat, sparrow hawk, scaled quail, loggerhead shrike, horned lark, meadowlark, roadrunner, Couchs spadefoot toad, Texas horned lizard and prairie rattlesnake.

Hydrology Functions:

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
Steller	C
Brenda	C
Continental	C

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, and hunting is fair for pronghorn antelope, quail, dove and small game. Photography and bird-watching can be fair to good, especially during migration season. 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, shrubs, and cacti occurs.

Wood Products:
This site has no significant value for wood products.

Other Products:
Grazing: This site is suitable for grazing in all seasons of the year, Although most of the green forage is produced during the summer months. Ths site is suitable for grazing by cattle, sheep, goats, and horses. Retrogression caused by inadequately managed grazing results in black grama, cane bluestem, alkali sacaton, and vine-mesquite being replaced by such plants as broom snakeweed and tobosa. As advanced deterioration takes place, tobosa gives way primarily to burrograss while tarbush, and mesquite may invade. Recovery at this stage is very slow unless the competing woody species are controlled and good grazing management is practiced.

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index	Ac/AUM
100 - 76	6.6 – 7.5
75 – 51	7.1 – 10.0
50 – 26	9.6 – 15.0
25 – 0	15.0 - +

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
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
Loamy 8 to 10.5 inches	R042XB014NM	Loamy Ecological Site. This ecological site is often spatially associated with Draw, Bottomland, and Loamy ecological sites with which it may intergrade and share dominant species.
Draw 8 to 10.5 inches	R042XB016NM	Draw Ecological Site
Bottomland 8 to 10.5 inches	R042XB018NM	Bottomland Ecological Site.

Similiar Sites:

Site Name	Site ID	Site Narrative

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:	
Stellar sandy clay loam, silty clay loam	
Brenda gravelly clay loam	
Continental fine 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		