USDA Natural Resources Conservation Service

Ecological site R042BB023NM
Clayey, Desert Shrub

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R042BB014NM	**Loamy, Desert Shrub** Loamy Ecological Site. This ecological site is oftern spatially associated with Draw, Bottomland, and Loamy ecological sites with which it may intergrade and share dominant species.
R042BB016NM	**Draw, Desert Shrub** Draw Ecological Site
R042BB018NM	**Bottomland, Desert Shrub** Bottomland Ecological Site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs on piedmont slopes, alluvial flats, or permanently drained floodplains. These soils formed in slightly to moderately calcareous mixed alluvial sediments derived from sedimentary material. Slopes are usually flat, averaging less than 5%. Elevations range from 3,800 feet to 5,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Flood plain (3) Alluvial flat
Flooding frequency	None
Ponding frequency	None
Elevation	1,158–1,524 m
Slope	1–5%
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7.35 to 11.90 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 60 degree F. Summer maximums can 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 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.

Climate data was obtained from
http://www.wrcc.dri.edu/summary/climsmnm.html

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	227 days
Precipitation total (average)	305 mm

Influencing water features

This site is not influenced by water from wetland or stream.

Soil features

Soils are deep and very deep. Surface layer is cobbly clay, cobbly clay loam, clay loam, silty clay loam or sandy clay loam. Substratum is a clay, clay loam, sandy clay loam gravelly clay loam or sandy clay. Subsoil is a clay, clay loam, sandy clay loam, gravelly clay loam or gravelly loam. They vary from noncalcareous to calcareous throughout the profile. They are slow to very slow permeable, and run-off is slow to rapid.

Minimum and maximum values listed below represent the charistic soils for this site.

Characteristic Soils
Belen
Caticon
Harkey
Keno
Mimbres
Ubar
Vekol
Steller
Elbutte*

*Note: Some shallow or very shallow soils with Clay loam, Clay or gravelly clay loam textures have been included in this ESD. A shallow clayey ESD may be developed

Table 4. Representative soil features

Surface texture	(1) Gravelly clay loam (2) Clay (3) Sandy clay loam
Family particle size	(1) Clayey
Drainage class	Well drained to moderately well drained
Permeability class	Moderately slow to slow

Soil depth	152–183 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	15.24–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	1–15%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–13
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–1%

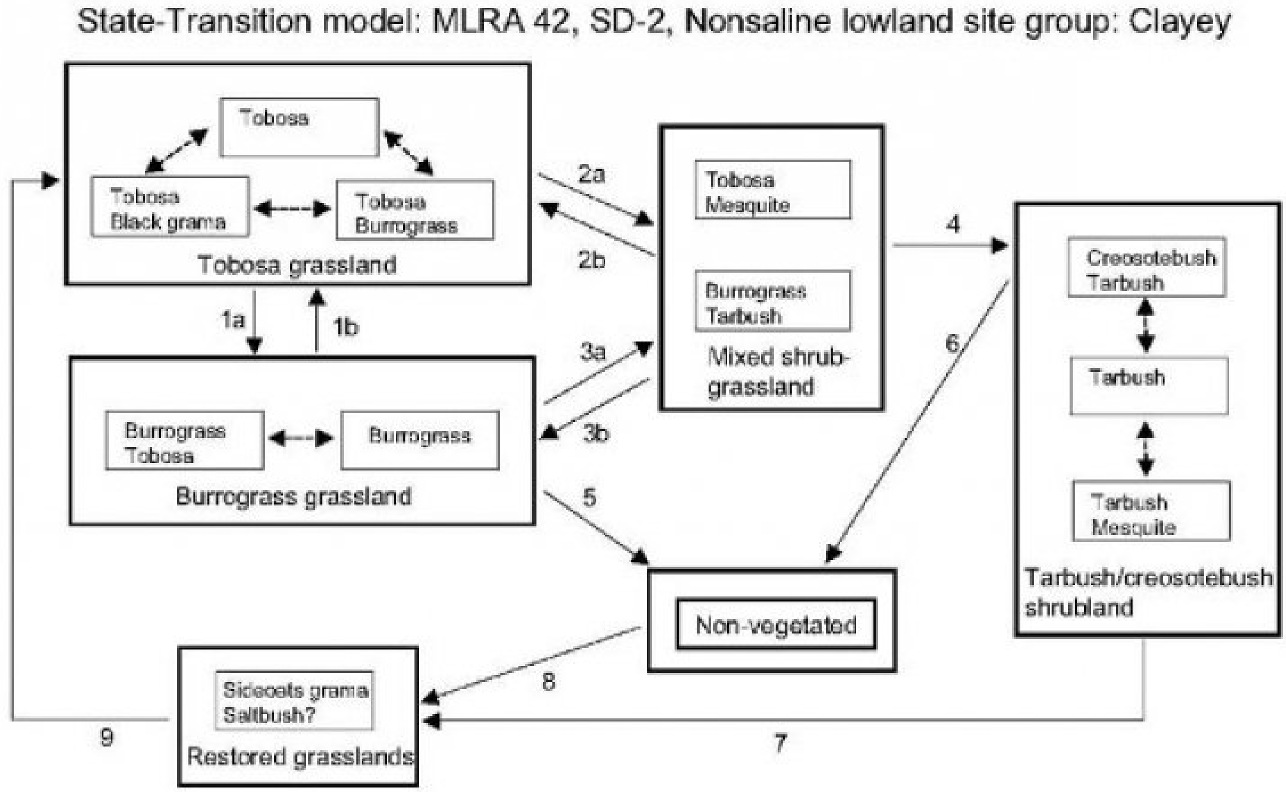
Ecological dynamics

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 shrubinvaded 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 grasslandshrubland 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 and transition model



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?

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Figure 4. MLRA 42; SD-2; Clayey

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).
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.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	188	377	565
Shrub/Vine	18	36	54
Forb	18	36	54
Total	**224**	**449**	**673**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	17%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	9%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	73%

Figure 6. Plant community growth curve (percent production by month).

NM2512, R042XB023NM-Clayey Warm Season Plant HCPC. SD-2 Clayey HCPC Warm Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

State 2
Burrograss Grassland

Community 2.1
Burrograss Grassland

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 rreparation). 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.

State 3
Mixed Shrub-Grassland

Community 3.1
Mixed Shrub-Grassland

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.

State 4
Tarbush-Creosote Shrubland

Community 4.1
Tarbush-Creosote Shrubland

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.

State 5

Non-Vegetated

Community 5.1
Non-Vegetated

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.

State 6
Restored Grassland

Community 6.1
Restored Grassland

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.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				157–179	
	tobosagrass	PLMU3	*Pleuraphis mutica*	157–179	–
2				45–67	
	black grama	BOER4	*Bouteloua eriopoda*	45–67	–
3				22–67	
	alkali sacaton	SPAI	*Sporobolus airoides*	22–67	–
4				22–45	
	burrograss	SCBR2	*Scleropogon brevifolius*	22–45	–
5				0–22	
	vine mesquite	PAOB	*Panicum obtusum*	0–22	–
6				4–22	
	threeawn	ARIST	*Aristida*	4–22	–
7				4–22	
	mat muhly	MURI	*Muhlenbergia richardsonis*	4–22	–
8				4–13	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	4–13	–
9				0–13	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–13	–
10				4–13	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	4–13	–
Shrub/Vine					
11				4–13	
	pricklypear	OPUNT	*Opuntia*	4–13	–
12				4–13	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	4–13	–
13				4–22	
	fourwing saltbush	ATCA2	*Atriplex canescens*	4–22	–
	snakewood	CONDA	*Condalia*	4–22	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	4–22	–
14				4–13	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	4–13	–
Forb					
15				22–36	
	dwarf desertpeony	ACNA2	*Acourtia nana*	22–36	–
	milkvetch	ASTRA	*Astragalus*	22–36	–
	croton	CROTO	*Croton*	22–36	–
	bladderpod	LESQU	*Lesquerella*	22–36	–
	Russian thistle	SAKA	*Salsola kali*	22–36	–
16				4–22	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	4–22	–

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.

Hydrological functions

Hydrologic Interpretations
Soil Series Hydrologic Group
Belen D
Caticon C
Elbutte D
Harkey B
Keno D
Mimbres B
Ubar D
Vekol D
Steller C

Runoff Curve Numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

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 - +

Other references

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

Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not**

invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

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17. **Perennial plant reproductive capability:**
